ONE DIVIDES INTO TWO, DUOPOLISTIC COMPETITION AND THE TRANSFORMATION OF MINISTRIES OF INDUSTRIAL PRODUCTION

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Abstract: This essay scrutinizes the formation of the current state duopolies in key industries in the PRC and the current state of competition structure in these industries. It provides the business world with synthesized knowledge and systematic comprehension of the organization of industrial production and industrial production corporations in the PRC. It has been observed that the latest round of reorganization of PRC industrial production was a process that swung towards greater centralization. Further, the transformation and reorganization of PRC industrial production were a mixture of dialectics of nature and government administrative rulings.

JEL No: L1; L6; N6

Key words: one divides into two; state duopoly; oligopolistic competition; industrial production

Introduction

This essay explores the phenomenal transformation of the industrial production systems of the People's Republic of China (PRC). In particular, it centers on the formation of the current state duopolies in key industries, evolved out of various PRC ministries of industrial production. The essay also aims at providing the business world with synthesized knowledge and systematic comprehension of the organization of industrial production and industrial production corporations in the PRC. To this end, it documents the profiles of pertinent PRC ministries of production and their successor industrial corporations, and probes the processes of transformation. It is expected to cultivate a better understanding of doing business in the PRC,

and bring the outside world closer to PRC industrial corporations, through inspecting this particular spell of transformation and restructuring.

It is assumed that the creation of duopolistic organizations brings about competition and raises social welfare by reducing deadweight losses, which can be an improvement over monopoly. These state duopolies resemble the cases of Fannie Mae and Freddie Mac as government sponsored enterprises – establishing the first one primarily out of need and creating the second one on purpose of competition. They resemble Coca-Cola versus Pepsi, Boeing versus Airbus and Intel versus AMD in the commercial world, subject to antitrust law and various regulations to varied degrees. The transformations of ministries of industrial production into business corporations were an important milestone in the history of constant reorganization of industrial production in the PRC. Specifically, those we focus on in this essay appeared to mirror one of the typical examples of dialectics of organization and change – one divides into two. It is therefore helpful to brief what dialectic means and where one divides into two comes from. Dialectical analysis or dialectical materialism (Engels 1878, 1886 and Marx 1845, 1846, 1847) is philosophy, methodology, and above all, the view of the world. It helps us gain knowledge of the unknown by splitting complex matters and processes into simpler ones. By splitting one into two, and more twos in a series of processes, our reasoning follows the logic of nature and society. Among contemporary Marxist thinkers, Lenin and Mao are most recognized owing to their tested theoretical contributions that have been put into practice. Lenin (1914) elaborated on the dialectic of the unity of opposites in his *Conspectus of Hegel's The Science of Logic*. He went on by saying: "development is the 'struggle' of opposites", which, with further contributions by Mao, led to the maxim of "one divides into two", part of the title of the present article. The masterpiece of Mao on contradiction (1937) developed further the dialectical analysis of cause and effect, quantity and quality, unity of opposites with plain, intuitive interpretations. He said: "the development of things should be seen as their internal and necessary self-movement, while each thing in its movement is interrelated with and interacts on the things

around it. … Contradictoriness within a thing is the fundamental cause of its development, while its interrelations and interactions with other things are secondary causes". Thus, Mao conceived two kinds of cause of development and change out of the struggle of opposites, one being fundamental and the other secondary. This is the kernel of one divides into two.

Dialectical analysis and dialectical materialism have once again roused intense interest amongst philosophers, historians, sociologists, political scientists and organization theorists, due to the above declared features. In March 2011, a conference entitled "*One Divides into Two: Dialectics, Negativity and Clinamen*" (Berlin Institute for Cultural Inquiry 2011) was held in Berlin. Two forthcoming ones are "*Dialectic in Aristotle's Logic*" to be held in September 2013 at Groningen (University of Groningen 2013), and "*Epidemic Crisis: The Dialectics of Event and Process*" in June 2013 at Cambridge (University of Cambridge 2013). Thus we apply the dialectical analysis of one divides into two in the present article, to a very concrete process of the transformation of PRC ministries of industrial production. In most cases, they were straightforwardly one divides into two; in other cases, a series of one divides into two. We investigate whether this kind of transformation was new, or it was similar to the previous alternations between management control along vertical lines and management control with horizontal blocks in industrial production. We focus on the cases featured by one divides into two, i.e., those have seemingly broken up state monopoly through creating a state duopoly to bring about competition.

The rest of the essay progresses as follows. The next section presents the historical lines of evolutions of PRC ministries of industrial production. Then the current profiles of major state duopolies are inspected, in conjunction with their ministerial origins. In the section that follows, other related types of competition and organizational arrangements are also examined, covering differentiated duopolies, sub duopolies and oligopolies. Assessment of major state duopolies follows, on issues of centralization versus devolution of powers and competition, and in comparison with their ministerial predecessors. The last section summarizes this study.

Profiles of Ministries of Industrial Production

Ministries of industrial production included primarily eight ministries of machinery industries, plus the Ministry of Petroleum Industry, the Ministry of Metallurgical Industry, the Ministry of Chemical Industry, the Ministry of Light Industry, the Ministry of Coal Industry, the Ministry of Electricity, and the Ministry of Railways. There were three arms in the old Ministry of Railways – railway operations, railway construction and rail vehicle manufacturing. The first belonged to communication and transportation and the second belonged to construction; only the third arm of rail vehicle manufacturing belonged to industrial production. In early days of the PRC, there was the Ministry of Heavy Industry. At various stages of the development, there were the Ministry of Coal and Chemical Industries and the Ministry of Petroleum and Chemical Industries, depending on the closeness of the industries that changed over time. The following parts introduce them briefly. The light industry is excluded, as companies in this industry were scattered all over and no duopolies could be formed. Amongst the current 115 central enterprises[1], only one is in the light industry, namely, Sinolight Corporation; and its business is primarily trading rather than production (*cf.* Sinolight 2013).

Machinery industries

Several ministries of machinery industries were evolved from the academies or research institutes of the Ministry of Defense. These ministries were linked to the development and manufacturing of military equipment and weaponry to a large extent. For example, the Fifth Academy was for the development of space technology and astronautic engineering, which became the Ministry of the Seventh Machinery Industry – Ministry of Astronautics Industry. The Third Academy originated as the Third Sub-Academy of the Fifth Academy, which became the Third Academy and then the General Administration of the Eighth Machinery Industry, in charge of tactical or short to medium range missiles. The Tenth Academy and the Fourteenth Academy were for the development of military communications equipment, which was merged into the Ministry of the

Fourth Machinery Industry – Ministry of Electronics Industry. The Sixth Academy was for the development of aeronautical technology, which was merged into the Ministry of the Third Machinery Industry – Ministry of Aeronautics Industry. The Seventh Academy was for shipbuilding, naval radar electronic warfare, underwater acoustic electronic warfare, and communications and navigation systems, which was merged into the Ministry of the Sixth Machinery Industry – Ministry of Shipbuilding Industry. At large, the Sixth and Seventh Academies were associated with the Air Force and Navy, the Tenth Academy and the Fourteenth Academy were associated with the Communications Department of the General Staff of the People's Liberation Armed Forces, and the Fifth Academy and the Third Academy were associated with Strategic Missiles Corps – known as the Second Artillery Corps.

First and Eight Amongst ministries of machinery industries, the Ministry of the First Machinery Industry was the largest and most diverse. It was responsible for the manufacturing of civilian machinery. Nonetheless, tractor factories can be easily adapted to manufacture tanks, as the Soviet Union in the WWII. Most other ministries of machinery industries were its spinoffs. There was a Ministry of the Eighth Machinery Industry twice in the history of industrial production in the PRC. In the first time, it was the Ministry of Agricultural Machinery, spinoff from the then Ministry of Machinery Industry in 1959 and was named the Ministry of the Eighth Machinery Industry in 1965. It was taken back by the Ministry of the First Machinery Industry in 1970. It was renamed the Ministry of Machinery Industry in 1982. As the ministry was diverse and huge, it was unlikely to form a duopoly, though it was feasible to form a number of smaller duopolies. For example, there were the First Automobiles Works and the Second Automobiles Works, and the First Heavy Machinery Factory and the Second Heavy Machinery Factory under its jurisdiction.

Seventh and Eight The Ministry of the Seventh Machinery Industry for the astronautics industry possessed the greatest strategic position and the most sophisticated science and technology. It was probably the most centralized, strictly following vertical line controls. The

Ministry of the Eighth Machinery Industry was formed for the second time in 1979, completely different from its "predecessor" between 1959 and 1965. It was a spinoff from the Ministry of the Seventh Machinery Industry, when the General Administration of the Eighth Machinery Industry within the Ministry of the Seventh Machinery Industry was upgraded to the ministry rank. So the Ministry of the Seventh Machinery Industry was split into two, with the new Ministry of the Eighth Machinery Industry being mainly responsible for tactical or short to medium range missiles. They remerged in 1981. As such, it was "natural" to make a duopoly for this industry. It was given an explicit name in 1982: the Ministry of Astronautics Industry.

Second and Third The Ministry of the Second Machinery Industry was in charge of the development of nuclear technology and the manufacturing of nuclear facilities. It was also a centralized industry with large scale plants and factories, and high technology laboratories and research capacities. It was established in 1956 as the Ministry of the Third Machinery Industry. Its name was changed to the Ministry of the Second Machinery Industry two years later, when the then Ministry of the Second Machinery Industry was merged with the Ministry of the First Machinery Industry, vacating the name. One of the milestones of this ministry was the success of the first nuclear bomb test on October 16, 1964. There was no civilian use of nuclear technology at the time. So the industry was highly and strategically military. It was given an explicit name in 1982: the Ministry of Nuclear Industry. There could be a number of ways to split it up to create a duopoly for this industry.

Third The Ministry of the Third Machinery Industry was responsible for the development of aeronautical technology and the manufacturing of aircraft. It was formed in 1960 by a spinoff from the Ministry of the First Machinery Industry, while containing the future Fourth, Fifth and Sixth Machinery Industries. It was in charge of all the military industries at the time. After the spinoffs of the Fourth, Fifth and Sixth Machinery Industries in 1963, its main domain of responsibilities was aeronautics, for both military and civil aviation aircraft. It was given an explicit name in 1982: the Ministry of Aeronautics Industry.

Fourth The Ministry of the Fourth Machinery Industry was for the development of electronics technology and the manufacturing of communications equipment. It was formed in 1963, when the then Ministry of the Third Machinery Industry was split into four. In 1965, all the officers, soldiers and staff of the Tenth Academy of the Ministry of Defense were transformed to civilians and the Academy was merged into the Ministry of the Fourth Machinery Industry. It was given an explicit name in 1982: the Ministry of Electronics Industry. The rapid expansion of civilian appliances of electronics and communications meant a declined share of military role in this industry. It was a modestly centralized industry, with a few large enterprises being run centrally by the central government and many more enterprises controlled by the local governments. There was no apparent monopoly in this industry.

Fifth The Ministry of the Fifth Machinery Industry was for the development of conventional weaponry technology and the manufacturing of conventional weaponry and military equipment. It was established in 1963, a spinoff from the then Ministry of the Third Machinery Industry. It was given an explicit name in 1982: the Ministry of Weaponry Industry. Similar to the Third and Fourth Machinery Industries, its products could be for both military and civilian use, such as vehicles and motorcycles. The rapid expansion of manufacturing of commercial civilian machines reduced the military share in this industry.

Sixth The Ministry of the Sixth Machinery Industry was responsible for shipbuilding. Formerly the Ninth Bureau of the Ministry of the Third Machinery Industry, it was established in 1963 from a spinoff of the then Ministry of the Third Machinery Industry. It can be further traced back to the Bureau of Shipbuilding Industry of the Ministry of Heavy Industries from 1950 to 1953, and the Shipbuilding Administration of the Ministry of the First Machinery Industry from 1953 to 1958. There were many shipyards, research institutes and development facilities scattered all over the country, under the jurisdiction of the Ministry of the Sixth Machinery Industry. It was given an explicit name in 1982: the Ministry of Shipbuilding Industry.

Heavy industries and energy industries

These included the Ministry of Metallurgical Industry, the Ministry of Chemical Industry, the Ministry of Petroleum Industry, and the Ministry of Coal Industry. Oil and gas, chemicals and coal had been combined to form two ministries at various stages, such as the Ministry of Coal and Chemical Industries, and the Ministry of Petroleum and Chemical Industries.

Heavy industries consisted primarily of the metallurgical industry and the chemical industry. The metallurgical industry was a typical heavy industry in the PRC. The central enterprises under the jurisdiction of the Ministry of Metallurgical Industry were typified by 10 large iron and steel works, being supported by a range of large metallurgical construction companies, and research and design institutions. Bao Steel near Shanghai was established and joined this portfolio of large iron and steel works in the late 1970s. However, there were many medium and small enterprises of iron and steel – local state-run enterprises. The chemical industry was also a typical heavy industry in the PRC. Both the Ministry of Chemical Industry and the Ministry of Metallurgical Industry were established in 1956, the two major constituents of the Ministry of Heavy Industries abolished in the same year.

Energy industries included oil and gas, coal and electricity. The Ministry of Electricity and the Ministry of Hydraulics were merged and separated for a number of times. They were combined because most electricity was generated by hydraulics at the time. Electricity generation was also part of the Ministry of Fuel Industry at some stage. Similarly, the oil and gas, coal and chemical industries were combined only to be separated again for several times. The names lasted for the longest periods were the Ministry of Chemical Industry, the Ministry of Petroleum Industry, and the Ministry of Coal Industry. These were also the names before their transformations into industrial corporations, based on which started their one divides into two (several) exercises, i.e., the recent rounds of organizational restructuring and change.

Railways

The recently dissolved Ministry of Railways[2] was in fact just one third of the old Ministry of Railways, in charge of railway operations only. Railway construction and rail vehicle manufacturing were also under the jurisdiction of the old Ministry of Railways until 2000. The rail vehicle manufacturing arm was reorganized and became an industrial corporation in 1995, while remained under the jurisdiction of the Ministry of Railways. Both the railway construction arm and the rail vehicle manufacturing arm became independent of the Ministry in 2000. At the time the rail vehicle manufacturing corporation was split into two, CNR Corporation and CSR Corporation. Here C stands for China, N for North, S for South and R for Railways. Literally in Mandarin, they are North Vehicles Corporation and South Vehicles Corporation, leaving room for future development into manufacturers of any vehicles. Thus the separation was made primarily, albeit not exactly, according to the geographic locations of the constituent companies. Historically, there were Railway Corps of the People's Liberation Armed Forces, working alongside their civil counterparts in the Ministry of Railways for developing and constructing railways. Understandably, Railway Corps worked in much harsh natural conditions in remote areas, mountains, and drilling tunnels, which would have been unbearable for civilian workers. Nevertheless, most members of Railway Corps were young between 18 years old and mid-20s, and enjoyed the military honor that was spiritually superb in those years. Thus, to split the railway construction arm of the Ministry of Railways into two was naturally simple. Arrived were China Railway Group and China Railway Construction Corporation evolved from Railway Corps.

State-run enterprises, local state-run enterprises, and their features

In the age of the above profiled ministries of industrial production, state-run enterprises were under the reign of ministries of industrial production of the State Council, or central government. There were local state-run enterprises under the reign of provincial government departments in charge of industrial production, which might be regulated but not directly controlled by

respective ministries of the central government. In a sense, one ministry of a specific industry was a group of oligopolies, surrounded by fringe firms controlled by respective departments in local governments. A ministry of industrial production resembled a kind of internal market[3] also. Therefore, a specific industry was a variation of oligopolistic industry and featured by a variation of oligopolistic competition under the planning system. Although production was not determined by market forces but was regulated and planned by the ministry and government, firms still competed for output quotas, product development and resources. After the introduction to, and the discussion of, the current state duopolies in the next section, contrast will be made between the industrial structure in the age of ministries of industrial production and that of the current state duopolies.

The Rise of State Duopolies

The early stage of transformations of ministries of industrial production started in the mid-1980s. It was mainly a name-changing exercise. For example, the Ministry of Shipbuilding Industry was made China Shipbuilding Industrial General Corporation, and the Ministry of Petroleum Industry was made China Oil and Gas Corporation. Both corporations kept the government functions and possessed the business organization functions as their predecessor ministries did. The former included regulation of the industry. The chairmen and/or CEOs were exactly the cabinet minister rank as before, with many of them being corresponding ministers. The rise of the state duopolies started in the late-1990s when these giant state monopolistic corporations were each split into two. Table 1 presents and summarizes major state duopolies, their industries and the predecessor ministries from which they originated.

Oil and gas: Sinopec v. CNPC

The State Council dissolved the Ministry of Petroleum Industry and China National Petroleum Corporation (CNPC) was established on September 17, 1988 (*cf.* CNPC 2013). Before that,

China National Offshore Oil Corporation (CNOOC) was established on February 25, 1982, and China Petroleum and Chemical Industrial General Corporation (Sinopec) was established on July 20, 1983, under the direct jurisdiction of the State Council. They co-existed with the Ministry of Oil Industry and the Ministry of Chemical Industry. The Chinese government decided to restructure and establish the new CNPC and Sinopec Group in accordance with the principle of upstream and downstream integration in 1998. The restructuring ceremony was held on May 26, 1998. Oil fields and oil supply firms became the subsidiary companies of Sinopec Group, and oil refinery firms became the subsidiary companies of CNPC. They were formally established on July 27, 1998 (*cf.* Sinopec 2013). In the years to come, CNPC has acquired oil fields and engaged in oil supply business, while Sinopec has developed oil refinery too. A kind of state duopoly emerged in the oil industry between Sinopec and CNPC, as CNOOC is much smaller and operates in a different business line.

Table 1. Major state duopolies

Industry	Duopolies		Predecessor ministry
	A	B	
Oil and gas	CNPC	Sinopec	Petroleum Industry
Astronautics	CASC	CASIC	Seventh Machinery Industry and Eighth Machinery Industry
Aeronautics	AVIC	COMAC	Third Machinery Industry
Nuclear industry	CNNC	Cnecc	Second Machinery Industry
Conventional weaponry	NORINCO	CSGC	Fifth Machinery Industry
Shipbuilding	CSSC	CSIC	Sixth Machinery Industry
Rail vehicle manufacturing	CNR	CSR	Railways

Astronautics and aeronautics: CASC v. CASIC and AVIC v. COMAC

The Ministry of the Seventh Machinery Industry was given an explicit name, the Ministry of Astronautics Industry, in 1982. It merged with the Ministry of Aeronautics Industry in 1988 to become the Ministry of Aeronautics and Astronautics Industries. The ministry was dissolved in 1993, replaced by two corporations – China Aeronautics Industry General Corporation and

China Aerospace Industry General Corporation (National Aerospace Bureau), which were virtually the two ministries before their merge.

On the astronautics/aerospace side, China Aerospace Science and Technology Corporation (CASC) and China Aerospace Machinery and Electronics Corporation (CAMEC) were born from China Aerospace Industry General Corporation on July 1, 1999 (*cf.* CASC 2013). This was an exact exercise of one splitting into two. In July 2001, CAMEC was renamed China Aerospace Science and Industry Corporation (CASIC) (*cf.* CASIC 2013).

On the aeronautics side, China Aeronautics Industry General Corporation was split into two, also on July 1, 1999. It became the First China Aeronautics Industry Corporation and the Second China Aeronautics Industry Corporation, and the two corporations merged on November 6, 2008 to form Aviation Industry Corporation of China (AVIC) (*cf.* AVIC 2013). This consolidation was not a simple undoing of the previous one splitting into two exercise. Commercial Aircraft Corporation of China (COMAC) was established on May 11, 2008 (*cf.* COMAC 2013). As such, there have been duopolies in this industry since 1999, although AVIC is among the six large institutional shareholders of COMAC.

Nuclear industry: CNNC v. Cnecc

The State Council dissolved the Ministry of Nuclear Industry, which was replaced by China Nuclear Industry General Corporation established on September 16, 1988. The nuclear industry minister became the CEO of the corporation upon the changeover (*cf.* CNNC 2013a). On July 1, 1999, the corporation was split into two to become China National Nuclear Corporation (CNNC) and China Nuclear Construction Corporation (Cnecc) (*cf.* CNNC 2013b).

Conventional weaponry and military equipment: NORINCO v. CSGC

The Ministry of Weaponry Industry and the Ministry of Machinery Industry were merged in December 1986, to become the National Commission of Machinery Industry. In August 1988,

the Ministry of Electronics Industry was combined with the National Commission of Machinery Industry, to form the Ministry of Machinery and Electronics Industries. Meanwhile, China North Industries (Group) General Corporation was established, responsible for the weaponry industry under the jurisdiction of the new ministry. In January 1990, China Weaponry Industries General Corporation was established, based on China North Industries (Group) General Corporation. On July 1, 1999, the corporation was split into two to become China North Industries Group Corporation (NORINCO) and China South Industries Group Corporation (CSGC) (*cf.* NORINCO 2013, CSGC 2013). The former is literally China Weaponry Industries Group Corporation in Mandarin, and the latter China Weaponry Equipment Group Corporation.

Shipbuilding: CSSC v. CSIC

The State Council dissolved the Ministry of Shipbuilding Industry, which was replaced by China Shipbuilding Industry General Corporation on May 4, 1982. One of the former shipbuilding minister become chairman of the board of directors at the inception of the corporation (*cf.* CSSC 2013). On July 1, 1999, the corporation was split into two: China State Shipbuilding Corporation (CSSC) and China Shipbuilding Industry Corporation (CSIC) (*cf.* CSSC 2013, CSIC 2013).

Rail vehicle manufacturing: CNR v. CSR

Unlike in other industries where industrial corporations were direct successors to their respective ministries at the time the ministries were dissolved, the industrial corporation for rail vehicle manufacturing was established in 1995, 18 years before the Ministry of Railways was finally dissolved in 2013. It was split into two in 2000 at the time of spinoff from the ministry. The split was made along the geographical lines, with CNR subsidiaries being mainly located in the North and CSR subsidiaries mainly in the South (*cf.* CNR 2013, CSR 2013).

Differentiated Duopolies, Sub Duopolies and Oligopolies

It is unlikely for establish a monopoly or duopoly in electronics and telecom equipment, domestic machinery, metallurgical and chemical industries. While the current structure for the electronics industry, as well as for telecom equipment, can be characterized by differentiated duopolies, the current structure for domestic machinery is several pairs of duopolies at sub industry levels. To a certain extent, the differentiated duopolies in the electronics and telecom equipment industries are sub duopolies. Some of the sub duopolies can be differentiated duopolies too. Metallurgical and chemical industries are mostly oligopolistic, dominated by a few large firms with many fringe firms. Table 2 presents and summarizes major differentiated and sub duopolies, their industries and the former ministries they belonged to. Table 3 presents and summarizes the oligopolistic structure in the metallurgical industry.

Differentiated duopolies: electronics and telecom equipment

Electronics and telecom equipment share many common features. In parallel with the Ministry of the Fourth Machinery Industry and its successor the Ministry of Electronics Industry, there was a Ministry of Post and Telecoms. In addition to telecom operations, the Ministry of Post and Telecoms also had its research and development and manufacturing wings that competed with the research institutes and manufacturing firms administered by the Ministry of Electronics Industry.

Table 2. Major differentiated and sub duopolies

Sub industry	Duopolies		Former controlling ministry
	A	B	
Electronics	CETC	CEC	Fourth Machinery Industry
Telecom equipment	Potevio	Datang	Post and Telecoms
Automobile	FAW	DMC	First Machinery Industry
Heavy machinery	CFHI	Erzhong	First Machinery Industry
Electric generation equipment	HEC	DEC	First Machinery Industry
Conglomerate machinery	SINOMACH	CMA	First Machinery Industry

The duopolies in the electronics industry are segmented according to their lines of business: research establishments and manufacturing firms. They are differentiated duopolies, albeit both were/are involved in product development and the boundaries between them have become increasingly blurred. China Electronics Technology Group Corporation (CETC) and China Electronics Corporation (CEC) were originated from the Ministry of Electronics Industry. The Ministry of Electronics Industry had gone through a series of consolidation with various government ministries and agencies and now is part of the Ministry of Industry and Information Technology, being called the Ministry of Machinery and Electronics Industries the Ministry of Information Technology at various stages. CETC was established in March 2002 by incorporating all research institutes and high technology enterprises under the jurisdiction of the then Ministry of Information Technology (*cf.* CETC 2013). CEC was established much earlier in May 1989, in a drive to remove the management of manufacturing firms from ministerial functions. Comprising of dozens of large companies, CEC's principal areas of business cover IT products and services (*cf.* CEC 2013). There was no monopoly in this industry, which was featured by an oligopolistic structure prior to the formation of the current differentiated duopolies. The reorganization and restructuring effectively tightened management control along vertical lines.

The duopolies in the telecom equipment industry are also differentiated according to their core businesses, with the former mainly for manufacturing and the latter mainly for research and development. Potevio was evolved from the Post and Telecom Industries Corporation established in March 1980 by the then Ministry of Post and Telecoms (*cf.* Potevio 2013). Datang Telecom Technology & Industry Group (Datang) was established in 1999, being formerly the Research Institute of Post and Telecom Science and Technology under the jurisdiction of the Ministry of Post and Telecoms (*cf.* Datang 2013).

Sub duopolies: domestic machinery

The Ministry of the First Machinery Industry was the largest with conglomerate lines of business. Emerged from this ministry are a number of pairs of duopolies at sub industry levels. These include First Automobile Works (FAW) and Dongfeng Motor Corporation (DMC) in the automobile sector (*cf.* FAW 2013, DMC 2013). The latter was established in 1969 as Second Automobile Works, and was renamed after its product brand of Dongfeng that is literally east winds. The second major pair of duopolies is China First Heavy Industries (CFHI) and China National Erzhong Group Corporation (Erzhong) in the heavy machinery sector (*cf.* CFHI 2013, Erzhong 2013). Er is Second and zhong is heavy in Mandarin, so China Erzhong is literally China Second Heavy Industries (CSHI). The third major pair is Harbin Electric Corporation (HEC) and Dongfang Electric Corporation (DEC), in the electric generation equipment sector (*cf.* HEC 2013, DEC 2013). The fourth is China National Machinery Industry Corporation (SINOMACH) and China Academy of Machinery Science and Technology (CAM). They sound like general machinery, but they constitute just a pair of sub duopolies for domestic machinery with the existence of the other three pairs of sub duopolies. They are differentiated sub duopolies, segmented according to their lines of business, with the former mainly a group of manufacturing firms and the latter research establishments (*cf.* SINOMACH 2013, CAM 2013). The organization and competition structure remained the same in the sub industries.

Table 3. Oligopolies in metallurgical industry

Line of business	Oligopolies
Processing, engineering, construction and design, R&D for ferrous metals	Ansteel, Baosteel, WISCO, Sinosteel, MCC, CISRI
Nonferrous metals	CHINALCO, China Gold, CNMC, GRINM
Minerals and mining	China Minmetals, CNMC, CMGB, BGRIMM

Oligopolies: metallurgical industry

The largest component in the Ministry of Metallurgical Industry was iron and steel, being typical oligopolistic, dominated by a few large iron and steel works. There used to be, famously, 10 large iron and steel works. They were under the jurisdiction of the Ministry of Metallurgical Industry but experienced the alternations between management control along vertical lines and management control with horizontal blocks, with the middle sized works being often delegated to local government control. Currently, four iron and steel corporations are central enterprises: Anshan Iron and Steel Group Corporation (Ansteel) that took over Pan Iron and Steel Corporation, one of the 10 large iron and steel works, in May 2010 (*cf.* Ansteel 2013); Baosteel Group Corporation (Baosteel) that acquired several smaller iron and steel works in recent years (*cf.* Baosteel 2013); Wuhan Iron and Steel Group Corporation (WISCO) that also acquired several smaller iron and steel works in recent years (*cf.* WISCO 2013); and Sinosteel, a conglomerate of fringe businesses and relatively smaller metallurgical firms under the control of local governments in the past (*cf.* Sinosteel 2013). These reorganizations were further signs of centralization, employing management control along vertical lines, which was especially evident in the case of Sinosteel. A wide range of design, construction, mineral, nonferrous metals companies and research institutes are also associated with the metallurgical industry and were under the jurisdiction of the Ministry of Metallurgical Industry. In total, there are 13 out of 115 central enterprises that were formerly constituents of the Ministry of Metallurgical Industry. These include Aluminum Corporation of China (CHINALCO), China National Gold Group Corporation (China Gold), China Nonferrous Metal Mining (Group) Corporation (CNMC), and General Research Institute for Nonferrous Metals (GRINM) for the nonferrous metals sector (*cf.* CHINALCO 2013, China Gold 2013, GRINM 2013). Included also are China Metallurgical Group Corporation (MCC), the largest metallurgical engineering contractor and provider of technological upgrading and reconstruction services in metallurgical engineering in the world, and China Iron and Steel Research Institute Group (CISRI) for research and development for

ferrous metals (*cf.* MCC 2013, CISRI 2013). For minerals, there are CNMC as introduced earlier in the nonferrous metals sector, China Minmetals Corporation (China Minmetals), China Metallurgical Geology Bureau (CMGB), and Beijing General Research Institute of Mining and Metallurgy (BGRIMM) for mining, metallurgical geology, and research and development respectively (*cf.* CNMC 2013, China Minerals 2013, CMGB 2013, BGRIMM 2013). Although there is only one company specialized in aluminum that is CHINALCO, there are other nonferrous metal companies, such as CNMC and GRINM. So, CHINALCO is not a monopoly in the aluminum industry even within the PRC. For the same reason, China Gold is not a monopoly in the gold sector in the PRC. Therefore, the metallurgical industry is a truly diversified industry, with many heavy weight players, none of them being able to dominate over others. The industry is featured by oligopolistic competition if not chaotic competition.

The Current State of Duopolistic Competition

Apparently, duopolies have been formed in each of the above reviewed industries since the end of the last century, aimed at the promotion of competition, which is assumed to result in efficiency gains and welfare gains. However, such aims and gains can only be achieved under the pretext of state monopolies prior to the formation of state duopolies, with reduced concentration of market power. As indicated before, a ministry of industrial production was not a state monopoly but a group of oligopolies, competing with each other for output quotas, product development and resources, albeit under the umbrella of one ministry. Currently, each of the two duopolies in one industry is also composed of a number of large subsidiary companies. But it is more an integrated company rather than a group of oligopolies. Concentration of market power in a handful companies will be obviously reduced if the grip of subsidiary companies by the duopoly remains the same or is reduced. Concentration of market power may be increased if the grip of subsidiary companies by the duopoly is increased to a certain extent. This may be a transformation from an oligopolistic industry to a duo-oligopolistic

industry or to a duopolistic industry, depending on the degree of centralization within the duopoly. A transformation from an oligopolistic industry to a duo-oligopolistic industry could be effective in reducing the concentration of market power; whereas a transformation from an oligopolistic industry to a duopolistic industry increased the concentration of market power in even fewer companies. The following makes inquiries into this transformation and process.

Centralization or devolution?

The PRC planning system had experienced a series of alternations between centralization and decentralization. It was featured by management control along vertical lines and management control with horizontal blocks. Management control along vertical lines, or columns, was a top-down approach; whereas management control with horizontal blocks, or rule by region, was relatively a decentralization or devolution approach to overseeing and managing industrial production. Although all the ministries of industrial production were dissolved and transformed to industrial corporations, swings between vertical lines and level blocks continue. The latest round of reorganization of industrial production and industrial production corporations was a centralization process to a great extent. It created a pair of state duopolies by splitting a ministry of industrial production into two in a specific industry on the one hand. It detached the regional links, which the management control approach with horizontal blocks possessed, on the other hand. The new management control after the transformation was along vertical lines, or a top-down approach to overseeing and managing industrial production. What differed from the previous alternations between the two management control approaches was that the latest round of reorganization created two vertical lines of management control for each industry. It was a transformation from an oligopolistic industry to a duopolistic industry rather than a transformation from an oligopolistic industry to a duo-oligopolistic industry, enhancing the concentration of market power in even fewer and larger companies.

Dialectics of nature or government administrative exercises?

One divides into two is the dialectic of the unity of opposites that development is the struggle of opposites. That is a process of internal contradictions within an entity, interacting externally with the things around it. Was the transformation of ministries of industrial production a process of internal contradictions within an entity, which resulted in two corporations through a "one divides into two" process? Or it was instigated from the above? Was the transformation interacting externally with the things around it? Or it was imposed from outside? The answers would be ambiguous nonetheless, whereas both natural forces, i.e., laws of economics, and administrative rulings, played a role. That is, the international contradictions might not have progressed to the stage which warrants a qualitative change. Likewise, the interaction between the process of internal contradictions and external things around the entity might not have been forceful enough to warrant a qualitative change. The administrative rulings, to a crucial degree, made it happen and made it happen in the way it happened. The administrative rulings might be designed to imitate the pertinent laws of economics. But as they were administrative rulings, they would have inevitably been influenced by human beings' subjective views and preferences, resulted in the departure from the natural process of development that was objectively prescribed by laws of economics. There were internal contradictions within a ministry of industrial production, like within any entity. Whether these internal contradictions within a ministry of industrial production would have led to a pair of duopolies as they emerged, or some other organizations or organizational forms is open to discussion. There were interactions between the process of internal contradictions and external things around a ministry of industrial production. But the interactions were facilitated by bureaucratic interference and governmental decrees, in the very way the government declared not to interfere with the industry, industrial production and business organizations. Ironically, the process could still be labeled dialectical change, beyond the endowment of abstract laws of economics. Further interdisciplinary research in this important process of transformation is envisaged and required.

Summary

This essay has scrutinized the formation of the current state duopolies in key industries of the PRC and current state of competition structure in these industries. State duopolies in the PRC emerged from the phenomenal transformation of the industrial production organization and out of a planning system. Providing the business world with synthesized knowledge and systematic comprehension of the organization of industrial production and industrial production corporations in the PRC, the essay cultivates a better understanding of doing business in the PRC, and brings the outside world closer to PRC industrial corporations. This benefits both PRC industrial corporations and the outside world. While this essay has deliberated the formation of the current state duopolies in key industries and provided the business world with synthesized knowledge and systematic comprehension of industrial production in the PRC, further interdisciplinary research is required.

The organization and repeated reorganization of PRC industrial production experienced a series of alternations between centralization and decentralization, featured by management control along vertical lines and management control with horizontal blocks. It has been observed that the latest round or reorganization did not break away from such alternations and the reorganization was a process that swung towards greater centralization - management control with horizontal blocks. Nonetheless, the latest round of reorganization created two vertical lines of management control for each industry, which differed from the previous reorganization processes and practices. It was a transformation from an oligopolistic industry to a duopolistic industry rather than a transformation from an oligopolistic industry to a duo-oligopolistic industry. The concentration of market power lied in even fewer and larger companies.

Further, the transformation and reorganization of PRC industrial production were a mixture of dialectics of nature and government administrative exercises. The "one divides into two" transformation of ministries of industrial production was partly a process of internal

contradictions within an entity, but it was instigated from the above to a great extent. The transformation was partly an interaction with the things around it externally, but the interactions were facilitated by bureaucratic interference and governmental decrees. Both natural forces and administrative rulings played a role. The administrative rulings, to a crucial degree, made it happen and made it happen in the way it happened.

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Notes

[1] List of Central Enterprises (*cf.* State Asset Supervision and Administration Commission of the State Council 2013). Most of the current 115 central enterprises can be traced back, and are corresponding, to state-run enterprises; whereas those local state enterprises are corresponding to local state-run enterprises.

[2] According to "Programs of Reforms of Institutions and Transforms of Functions of the State Council" approved by the first convention of the 12th People's Congress on March 10, 2023, the Ministry of Railways was dissolved. It's administrative functions and policy and regulatory responsibilities were transferred the Ministry of Transportation, with the creation of the State Railways Bureau, under the jurisdiction of the Ministry of Transportation. A new corporation, China Railways General Corporation was established for railways operations and all related businesses. (*cf.* Xinhua News Agency 2013).

[3] Other internal markets include the internal market of the NHS in England and Wales, EU internal markets for various industries.