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China Political Economy focuses on the crucial theoretical and practical problems China faces in the process of reform, transition and development. CPE welcomes papers which explore China’s economic transition and development, its differences to western countries and cultures and the influences of China’s economy on the wider global economy.

The contributors of the journal are economic scholars, government officials and entrepreneurs who are interested in China’s economic problems. The journal serves as a platform for scholars sharing ideas, a reference for governors making decisions and a source for entrepreneurs generating innovative concepts. The research areas that the journal will focus include China’s Economic System Reform, China’s Macroeconomy, Industrial Organization, Financial and Capital Market, Enterprise Strategies and Behaviours.

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MISSION STATEMENT

China Political Economy is a new international academic journal founded by the School of Economics at Nanjing University, China. The inaugural issue will be published in June 2018.

Political economy, especially socialist political economy, represents mainstream economic thought in China. Every step of progress in China’s economic reform and its opening-up over the past forty years is derived from the intellectual accomplishments of major theoretical studies in the field of socialist political economy. A thorough understanding of Chinese political economy would thus enable us to understand accurately the course of China’s economic reform and future development. Entering the new era of growth, Chinese political economists bear the historical mission to establish socialist political economy as a significant academic discipline with distinctive Chinese characteristics. Therefore, the study of new ideas and thoughts in the political economy of Chinese socialism makes it possible to identify emerging trends in China’s economic development in the new era.

The journal China Political Economy aims to provide a global outlook and an open-minded forum for the study of critical issues in economic theories and practices, arising from the emerging course of China’s economic reform, transition and growth. It will present readers throughout the world with the development of and innovative research in economic studies in China’s new era, recording and reviewing the theoretical contributions made by Chinese economists.

The journal will focus on themes featuring China’s concerns on the global stage while being inclusive with the unique positioning of Chinese views. The critiques and analysis presented will be deeply rooted in China’s realities while drawing on international experience, examine history with an eye to contemporary issues, and take in the fate of mankind while turning an intelligent face toward the future. The contributors and editors of China Political Economy will strive to develop the journal into a world-class academic periodical with a distinct Chinese style and ways of thinking to enhance the development of Chinese economics and further introduce it to international academic circles. The journal will help the world better understand China, especially its growth and openness, and make contributions with a distinctly Chinese perspective to the progress of our globally interconnected human community.

We welcome high-quality manuscripts submitted by both Chinese and overseas scholars, representing outstanding and well-documented research outcomes. Articles published in the journal are selected through a fair and rigorous peer-reviewing process. Submissions must be original and theory-oriented, reflecting current academic trends while providing in-depth studies and insightful analyses of China’s economic realities that shed light on the country’s unique challenges.

The journal will contain featured articles and forums on topics such as theoretical research on political economy, reform and development of the Chinese economic system, macroeconomic operations in China, and studies of business organizations, finance and capital markets, enterprise strategy and corporate behaviors as well as the relationship between China’s economic opening-up and the global economy.

While published in English, the journal will accept manuscripts submitted in Chinese or English. For accepted Chinese-language manuscripts, the editorial board will render professional translations into English so that Chinese scholars can share their findings and arguments with readers throughout the international academic arena.
Abstract

Purpose – Xi Jinping’s speech on the theme of “Continuously Exploring the New Zeitgeist of Marxist Political Economy in China,” dated back to November 2015, has illuminated the historical background, social roots, practical basis, basic characteristics, Zeitgeist, ideological realm and other issues relative to the development of “Systematic Economic Theory” with Chinese characteristics (hereinafter referred to as SETCC). The paper aims to discuss these issues.

Design/methodology/approach – Exploring the SETCC marks a fundamental postulation for the development of contemporary Chinese Marxist political economy, and an important indicator of the Chinese wisdom thereof.

Findings – Unswervingly adhering to the new development concept as the leading factor, General Secretary Xi Jinping’s elucidation of the theoretical propositions and practical topics of building a modern economic system has, starting from the five aspects of development mainline, strategic support, fundamental approach, necessary road and institutional guarantee, and their interrelationships, unfolded new connotations and opened up a new realm of Xi’s New Economic Zeitgeist with new explorations on the structure and system of SETCC.

Originality/value – This paper first explains the development of Xi Jinping’s economic thoughts and reveals its systematization characteristics.

Keywords Systematic economic theory, The “second coupling”, Liberation and development of productive forces, The new development concept

Paper type Research paper

Exploring the “Systematic Economic Theory” with Chinese Characteristics (SETCC) marks a fundamental postulation for the development of contemporary Chinese Marxist Political Economy, and an important indicator of the Chinese Wisdom thereof. In November 2015, Xi Jinping stated in the 28th Collective Study of the Political Bureau of the CPC Central Committee: “We must seek foothold upon China’s national conditions and development practices, further study the new cases and new problems facing the world economy and China’s economy, reveal new features and new laws, refine and summarize the regular achievements of China’s economic development practice, recapitulate practical experiences into Systematic Economic Theory, constantly explore the new realm of contemporary Chinese Marxist Political Economy, and contribute Chinese wisdom to the innovation and development of Marxist Political Economy.” Xi Jinping’s profound exposition of the historical background, social roots, practical basis, essential characteristics, temporal significance and ideological perspective of the formation of SETCC constitutes the theoretical and ideological essence of his speech on the theme of “Continuously Exploring the New Zeitgeist of Marxist Political Economy in China” (Party Literature Research Centre of the CPC Central Committee, 2018, p. 7). Since the 18th CPC National Congress, the exploration of Xi’s New Economic Zeitgeist on SETCC is both an application and embodiment of the theoretical and ideological essence of the theory.

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1. The essential feature and scientific evidence of the systematic economic theory with Chinese characteristics

The exploration of Xi’s New Economic Zeitgeist on SETCC is based on the essential feature and scientific evidence of the “Second Coupling” as professed by Chairman Mao Zedong, namely, the integration of the basic principles of Marxist Political Economy with the reality of contemporary China.

“Our party has always attached importance to the study, research and application of Marxist Political Economy.” (Party Literature Research Centre of the CPC Central Committee, 2018, p. 2) In February 1956, at the historic moment when the socialist transformation of means of production was about to be completed and the basic system of socialism in China was about to be established, Mao Zedong proposed, from the preliminary investigation for his renowned speech “On the Ten Major Relationships,” that: “Don’t copy everything mechanically from the Soviet Union again, think with our own minds. The basic principles of Marxism-Leninism should be combined with the concrete reality of China’s socialist revolution and construction, to explore the path of building socialism in our country.” He pointed out from the strategic position of the guiding ideology for socialist political economy: “We must conduct the Second Coupling to find the path for building socialism in China” (Party Literature Research Centre of the CPC Central Committee, 2013, pp. 550, 557). At the beginning of the exploration of China’s socialist political economy, Mao Zedong has, with great foresight, put forward the guiding ideology of the “Second Coupling,” highlighting the basic characteristics of the integration of the basic principles of Marxist Political Economy with China’s concrete reality, and clarified the scientific evidence for the development of SETCC.

In October 1984, the “Decision of the Central Committee of the Communist Party of China on Economic System Reform” put forward the conclusion that “the socialist economy is a planned commodity economy based on public ownership.” Deng Xiaoping believes that this conclusion bespeaks the “new words” commensurate with the actual reform of China’s economic system. What counts is to “address some new problems in the new situation with our own practice” and “write the first draft for political economy,” by “integrating the basic principles of Marxism with the practice of Chinese socialism” (Deng, 1993, pp. 83, 91). Deng has endowed a new connotation to the idea of the “Second Coupling” and reaffirmed an essential feature of socialist political economy with Chinese characteristics: “the integration of the basic principles of Marxism with the practice of socialism in China.”

Since the 18th CPC National Congress, the CPC Central Committee led by Comrade Xi Jinping has continued to write a “new chapter” on the “Second Coupling” and has persisted that the basic principles of Marxist Political Economy be combined with the new practice of reform and opening up in the new era to advance socialist political economy with Chinese Characteristics (hereinafter referred to as SPECC), which constitutes a more solid academic rationale for the development of SETCC.

In July 2014, in his interpretation of the “big logic” of the new economic normal, Xi proposed that “party committees and governments at all levels should learn to use political economy well,” emphasizing that the pith of “learning well to use well” is to face up to the reality of economic reforms and development, while focusing on “continuously improving the governance capability to promote reform and opening up, to pioneer in the social and economic development, and to improve the quality of these developments” (Xinhua News Agency, 2014). In November 2015, regarding the new reality of promoting supply-side structural reforms, Xi emphasized: “In the face of extremely complicated domestic and international economic situations, and a variety of economic phenomena, learning the basic principle and methodology of Marxist Political Economy is conducive to mastering the scientific economic analysis methods, understanding the economic activity process, grasping the law of socio-economic development, and elevating the ability to control the socialist market economy, to better address the theoretical and practical issues of China’s economic development” (Party Literature
Research Centre of the CPC Central Committee, 2018, p. 3). At the Central Economic Work Conference held in December, 2015, Xi emphasized the principle of “adhering to the major principles of SPECC” from the strategic stance of “adapting to the new situation of competition in comprehensive national strength in the wake of international financial crisis” (Xinhua News Agency, 2015). In July 2016, Xi reiterated the “adherence and development of SPECC” and stressed that “we must reinforce research and exploration, enhance the recapitulation of the understanding of regularities, constantly improve the theoretical system of SPECC, and promote the construction of economic disciplines that fully embodies Chinese characteristics, Chinese style, and Chinese stamina” (Xinhua News Agency, 2016). Since the 18th CPC National Congress, a series of Xi’s speeches on learning well to use well the political economy have profoundly tapped the ideological essence and essential characteristics of the “Second Coupling,” and enriched the connotation of SETCC.

The historical process of building a well-off society in an all-round way is unfolding on a magnificent scale, generating rare theoretical opportunities for the innovation of SETCC. New practices breed “new words” unspoken by the “ancestors,” contributing Chinese wisdom to the innovative development of Marxist Political Economy. Since the 18th CPC National Congress, the Party Central Committee led by Comrade Xi has deeply comprehended and grasped the trend changes and stage characteristics of contemporary China’s economic relations; implemented the “Four-Pronged Comprehensive Strategic Deployment to achieve the strategic goal of building a moderately well-off society in an all-round way; proposed a series of new theories such as the new economic normal and supply-side structural reform; promoted the new development of SETCC; and endowed new connotations to the essential characteristics and scientific evidence to the “Second Coupling” in the new era.

Actually, by adhering to the essential characteristics and scientific evidence of SETCC, it inherently contains questions about how to deal with various economic and economic trends abroad.

The communication, combination, confrontation and other approaches formed by the development of SPECC are not only focused on absorbing and tapping the essence of various economic theories, but also good at discarding and criticizing their dross. The actual exploration of SETCC has proven that, for the various economic doctrines of foreign countries, we should neither improperly belittle ourselves, treating them as “creeds” and worship them, nor swell with pride, and dismiss them as devoid of any merit in research and reference. However, in terms of fundamental characteristics and academic rationale, “it is still necessary to uphold Marxist political economics, especially contemporary Chinese socialist political economy, which can never be marginalized” (Party Literature Research Centre of the CPC Central Committee, 2018, pp. 6-7).

2. SETCC: fundamental orientation and major principles
The exploration of Xi’s New Economic Zeitgeist on SETCC takes the major issue of liberating and developing productive forces as its fundamental orientation and major principle.

As put by Mao Zedong in early 1956, in the initial exploration of socialist construction and development, the fundamental purpose of the study of socialist political economy is to liberate and develop productivity. He emphasized: “Our party, our government, and our departments at all levels must invariably carry out the task of promoting the development of productive forces,” and the superstructure must also “bespeak the requirements for this economic foundation and the development of productive forces” (Party Literature Research Centre of the CPC Central Committee, 2013, pp. 513, 515). Soon, Mao once again raised this issue and reiterated that “the purpose of the socialist revolution is to liberate the productive forces,” and the establishment of socialist ownership will “inevitably lead to the liberation of productive forces” (Mao, 1999, p. 1). Whether it is to liberate productivity or develop
productivity, it is, without exception, to achieve a “great goal,” which is what Mao believes “to strive to change China’s economic, scientific and cultural backwardness within a few decades and quickly reach the advanced level in the world” (Mao, 1999, p. 2).

In the process of reform and opening up, taking as the fundamental starting point that “the primary task of socialism is to develop productive forces and gradually improve the material and cultural living standards of the people” (Deng, 1993, p. 116), Deng Xiaoping made multi-faceted interpretations to the liberation and development of productive forces as the fundamental orientation of SPECC. In particular, on the issue of the relationship between liberating and developing productive forces, Deng emphasized: “In the past, we only talked about developing productive forces under socialist conditions. We did not say that we must liberate our productive forces through reforms, this is incomplete understanding, both the liberation and the development of productive forces should be fully addressed” (Deng, 1993, p. 370). “To fully address” the liberation and development of productive forces has become a basic premise and fundamental provision of Deng’s recapitulation of the essence of socialism, and also the deepening of connotation of the fundamental orientation of SPECC.

Since the 18th CPC National Congress, the Party Central Committee led by Comrade Xi Jinping has taken full account of the new reality of China’s socio-economic development to propose that “Productivity constitutes the most active and revolutionary factor in promoting social progress. The fundamental task of socialism is to liberate and develop social productive forces” (Party Literature Research Centre of the CPC Central Committee, 2015, p. 74). Xi’s New Economic Zeitgeist insists that only by making a general investigation based on full consideration of the evolutionary contradictions between productivity and production relations, as well as those between the economic foundation and the superstructure, can we fully grasp the basic features and development orientation of the society; reveal the essence and development law of economic relations at the primary stage of China’s socialism; adhere to the fundamental orientation and major principle of liberating and developing productive forces; and truly innovate SETCC.

Since the 18th CPC National Congress, the focus and foothold of Xi’s New Economic Zeitgeist is: “To build a well-off society in an all-round way, and realize socialist modernization and the great rejuvenation of the Chinese nation, the most fundamental and urgent task is, nevertheless, to further emancipate and develop social productive forces” (Party Literature Research Centre of the CPC Central Committee, 2014, p. 549). The strategic goal of building a well-off society in an all-round way derives from an overall understanding and judgment of the basic features and development orientation of the contemporary Chinese society. It is necessary to integrate the liberation and development of social productive forces into the whole process of building a well-off society in an all-round way, which will stimulate new potential energy and new power to achieve an overall escalation in this respect. Only in this process with the “most urgent task” can we truly achieve the gradual satisfaction of people’s expectations and demands for a better life, and promote the five major civilizations of material, spiritual, political, social and ecological civilization, to accelerate the realization of the fundamental goal of the free and comprehensive development of the people. This explains why Xi’s New Economic Zeitgeist maintained the “liberation and development of productive forces” as the foremost “major principle” and fundamental orientation of SPECC, which also constitutes the logical conclusion of the development of Marxist Political Economics in China.

The liberation and development of social productive forces has always been the fundamental orientation and major principle, no matter in the initial path-finding of China’s socialist construction, where Mao Zedong proposed the theories of “basic contradictions of the socialist society” to “coordinate the development of agriculture, light industry and heavy industry with overall consideration, paying attention to the overall balance, and take
agriculture as the basis, and industry as the leading factor,” or in the continuous deepening of reform and opening up, where important theories covered the “essence of socialism, the basic economic system in the primary stage of socialism, and the socialist market economic system,” etc.

In May 2018, Xi Jinping pointed out in his speech commemorating the 200th Anniversary of the Birth of Karl Heinrich Marx: “The liberation and development of social productive forces is the essential requirement of socialism and a major issue for the Chinese communists to explore in succession and focus on addressing” (Xi, 2018, p. 18). Xi Jinping’s major theoretical contribution in the exploration of SETCC is reflected in the liberation and development of productive forces as the fundamental orientation and major principle, which is reflected in the innovation on the major issue for the Chinese communists to “explore in succession” and “focus on addressing.”

3. SETCC: guiding philosophy and major contents
The exploration of Economic Zeitgeist in Xi Jinping’s New Era on SETCC takes the new development concept as the guiding philosophy and major contents.

In the Report of the 19th CPC National Congress, Xi’s exposition of the major achievements in economic construction since the 18th CPC National Congress has, first and foremost, affirmed the historical achievements of “unswervingly upholding the New Development Concept, resolutely correcting the development concept, transforming the development mode, and incessantly uplifting the development quality and efficiency” (Xi, 2017, p. 3). This is a profound illumination of the New Development Concept as the leading philosophy of Xi’s New Economic Zeitgeist and the mainstay of SETCC. Facing up to the changes in the primary contradictions in the new era and the prominent issues in development, such as the development quality & efficiency and innovation capacity urgently needed to be improved, the overall level of the real economy to be escalated, the gaping gap between regional and sectoral development, the multiple drawbacks in social and public services, the ecological environment protection to be strengthened, etc., the significance of unswervingly adhering to and actualizing the new development concept looms large.

The contents and approaches of development constitute a major issue not only to the development of the contemporary Chinese society, but also to the world today. Since the 18th CPC National Congress, the Party Central Committee led by Comrade Xi Jinping has made new explorations and novel theoretical interpretations on development issues from the perspective of governance, administration and building a well-off society in an all-round way. The New Development Concept runs through the whole process of Xi’s new era of developing socialism with Chinese characteristics since the 18th CPC National Congress, and has also become the mainstay of Xi’s New Economic Zeitgeist on SETCC.

At the successive Central Economic Work Conferences held after the 18th CPC National Congress, the new development concept has always been placed on the top agenda. At the Central Economic Work Conference held at the end of 2012, Xi emphasized: “We must adhere to the strategic ideology taking development as the absolute principle, and we must not waver in the slightest,” “We must comprehensively deepen reforms and resolutely eliminate all obstacles of ideological concepts and institutional mechanisms that impede scientific development.” At the Central Economic Work Conference held at the end of 2013, Xi explained the innovative concept of “implementing innovation-driven development” and the coordination concepts of “promoting regional coordinated development” and “focusing on sustainable development,” and explored in depth the concept of sharing: “letting the people share tangible benefits,” as well as the concept of opening up: “constructing the 21st Century Maritime Silk Road, strengthening the interconnection and interoperability of the sea-lanes, and tightening the mutual interest ties.” At the Central Economic Work Conference held at the end of 2014, Xi stated in his illumination of the
concept of innovation and coordination that “innovation in the industrial entity” must be embodied in the creation of new growth points turning innovation into real industrial activities. From the perspective of the linkage between regional coordination and synergetic development, he proposed to “improve regional policies and promote coordinated development, synergetic development and common development of all regions.” The five aspects of the new development concept are near perfect, and their internal links become manifest. The Central Economic Work Conference was held at the end of 2015 at an important time node in the “Thirteenth Five-Year Plan” period. Guided by the principle of “firmly establishing and implementing the development concept of innovation, coordination, greenness, openness and sharing,” Xi elucidated the “key tone” of economic reform and development. At the last Central Economic Work Conference of the 18th CPC held at the end of 2016, Xi pointed out that with the new development concept as the “pilot” and “guide,” a set of policy frameworks for sustainable and healthy development of China’s economy has been initially formed, tested and highlighted in the practice of China’s economic reform and development guided by the new development concept.

In the Report of the 19th CPC National Congress, Xi highlighted the great significance of adhering to the new development concept in his interpretation of the socialist ideology with Chinese characteristics in the new era, and proposed new requirements for “development as the basis and key to solving all problems in China,” which purport that “development must be scientific, and we must unswervingly implement the New Development Concept of innovation, coordination, green, openness, and sharing” (Xi, 2017, p. 21).

The new development concept’s role of “overall management, fundamental management, directional management, and long-term management” profoundly reveals its general characteristics, which are reflected in the interdependence, mutual action, complementarity and close ties of its factors: innovation constitutes the “first drive” to lead development, and coordinate the “intrinsic requirements” for sustained and healthy development. Greenness constitutes “the necessary conditions for sustainable development” and therefore an “important manifestation” to satisfy the people’s pursuit of a better life. Openness builds the “necessary road” for national prosperity. Sharing manifests the “essential requirements” of socialism with Chinese characteristics. These five aspects are diversely focused but mutually supportive, forming an organic whole that “upholds innovation, emphasizes coordination, advocates greenness, advances openness, and promotes sharing” (Party Literature Research Centre of the CPC Central Committee, 2016, p. 56).

This overall feature is also reflected in the “piloting” and “guiding” roles of the new development concept, which are embodied in, fundamentally based upon and completely inseparable from the “general layout” of the five major aspects of constructing economic, political, cultural, social and ecological civilizations: innovation construction relies on scientific and technological innovation, innovative driving force and innovative talents to occupy the “highland” of innovation, and exert first-mover advantage, focusing on forming a more complete institutional framework for promoting innovation; “coordination” construction adheres to the overall planning and coordination of the development of all regions, urban-rural areas, the five major civilizations, as well as the economic and national defense construction, and aims to broaden the development space, deepen and comprehensively enhance the sustainable development; “greenness” construction aims at providing more high-quality ecological products for the people, promoting the formation of green development methods and lifestyles, adhering to the principle of green development to achieve, in a coordinated manner, prosperity for the country and the people, and beautiful scenery for China; “openness” construction expands the connotation, vision, scope and level of opening up to the outside world, to create a new pattern with deep integration and mutually beneficial cooperation; and the construction of “sharing” focuses on solving the problem of social equity and justice to enable the broad masses of people to share the fruits
of reform and development. These five aspects of the new development concept and their overall functioning process are unified in the “Five in One” layout and shall be achieved in the historical process of realizing the construction of a socialist modernization power with Chinese characteristics and the great rejuvenation of the Chinese nation.

This overall feature is also reflected in “action object” of the new development concept. The introduction of the new development concept embodies the exploration of the lessons learned from the success or failure of global economic growth and development, especially the various dilemmas in developing countries. The new development concept actually provides a Chinese path-finding model for countries and nations aspiring to accelerate development while maintaining independence. A series of ideas put forward by the new development concept on development clues, directions, strategies, goals, steps, focuses and performances can shed light on many countries in the world to get rid of the “stereotype” traditional growth models and get over the so-called “Middle Income Trap.”

With its overall characteristics of “overall, fundamental, directional and long-term management,” the new development concept has become an important theory of Xi’s New Economic Zeitgeist, and a leading concept and mainstay of SETCC.

4. Recapitulation of “systematic economic theory” by the economic Zeitgeist in Xi Jinping’s New Era

Xi’s New Economic Zeitgeist has two important recapitulations on the exploration of SETCC: once in the 28th Collective Study of the Political Bureau of the CPC Central Committee, Xi put forward in his speech on the theme of “Continuously Exploring the New Zeitgeist of Marxist Political Economy in China”; and once at the Central Economic Work Conference held after the 19th CPC National Congress. These two recapitulations are integrated in harmony, reflecting the latest achievements in the development of Xi’s New Economic Zeitgeist, thereby opening up a new realm of SETCC.

In the 28th Collective Study of the Political Bureau of the CPC Central Committee, Xi made a recapitulation on the six aspects of the basic contents of SETCC for the first time since the 18th CPC National Congress, stressing the unswerving adherence to: the people-centered development idea; the new development concept; the improvement of the socialist basic economic system; the improvement of the socialist basic distribution system; the direction of socialist market economic reform; and the fundamental national policy of opening up to the outside world. The recapitulation of these six aspects highlights the initial achievements of SETCC in Xi’s new era. In the initial recapitulation of SETCC, Xi’s New Economic Zeitgeist highlights the adherence to two important theories concerning the basic economic system of socialism with Chinese characteristics: first, the basic economic system theory of primary stage of socialism with public ownership as the mainstay and co-development of multiple ownership economic entities; and, second, the theory of socialist basic distribution system. Xi’s New Economic Zeitgeist also highlights the theory of adhering to the fundamental national policy of opening up to the outside world: since the 18th CPC National Congress, the characteristics and trends of in-depth integration of China’s economy into the world economy have become increasingly prominent. Opening up to the outside world must focus on developing a higher level of open economy featuring the active participation in global economic governance to promote the development of the international economic order in the direction of equality, justice, cooperation and win-win. At the same time, we must resolutely safeguard China’s development interests, and actively guard against various risks to ensure national economic security.

Shortly after the 19th CPC National Congress, at the Central Economic Work Conference held at the end of 2017, the new recapitulations of Xi’s New Economic Zeitgeist have
highlighted its innovation in the exploration of SETCC. With a profound grasp of the
time-phased characteristics and trend changes of the new era, this recapitulation firmly
adheres to the major principles of SPECC, and the new development concept as the
mainstay, and puts forward the theoretical essence of “Seven Adherences,” which has
formed a systematic framework that covers three aspects: the essential characteristics and
core positions of socialist economic relations with Chinese characteristics; the theoretical
pillars of economic reform and development; and the fundamental methods and strategic
thinking, thus enhancing the theoretical realm of “SETCC.”

The new development concept is the mainstay of SETCC. As a theoretical recapitulation
of China’s political economy since the founding of New China, especially since the reform
and opening up, the new development concept provides a new answer to the major strategic
issue of “What to develop and how to develop.” In Xi’s New Economic Zeitgeist, the new
development concept as the mainstay is epitomized in the “development concepts of
innovation, coordination, greenness, opening, and sharing, which are the sublimation of
China’s perceptual knowledge gained in the practices of economic development, and the
theoretical recapitulation of such practices. We must persist in applying the new
development concept to lead and promote China’s economic development, continuously
solve the tricky problems and create a new situation in economic development” (Party
Literature Research Centre of the CPC Central Committee, 2018, p. 4). Guided by the new
development concept, a set of systematic and institutional frameworks to promote the
sustained and healthy development of China’s economy has formed the empirical ground for
the concept to become the mainstay of SETCC.

Adhering to the theory of CPC leadership in economic work and people-centered
development is the essential feature and core position of SETCC. Adhering to the theory of
CPC leadership in economic work is, in essence, to uphold the party’s centralized and unified
leadership over economic work, so as to ensure that the socialist economy with Chinese
characteristics develops in the right direction. Adhering to the theory of people-centered
development is, fundamentally, to take as the starting point and foothold for economic
development the “People-Oriented Theory” that seeks happiness for the people and the
revival of the nation, and the “People’s Happiness Theory” that realizes the people’s
aspirations for a better life. In the process of incessantly solving the primary contradictions
of socialism, we will continue to promote the “Five In One” overall layout and coordinate the
promotion of the “Four-Pronged Comprehensive” strategic deployment, and persist in
elevating the well-being and all-round development of the people, to make steady progress
in realizing prosperity for all. These two basic theories are profound expressions of the
fundamental characteristics and core positions of SPECC.

The new normal of economic development, socialist market economic system reform and
supply-side structural reform are the theoretical pillars of SETCC regarding economic
reform and development.

China’s economic development has entered the “new normal,” which emphasizes the
accurate grasp of new features, new requirements, overall situation and principles for
accurate adaptation and leadership. The aims are to promote comprehensive deepening of
reforms, earnestly complete the historical tasks of model transformation and structural
adjustment; realize medium-high speed of economic growth, move the industry to the
medium-high-end; and promote the comprehensive implementation of the innovation-driven
development strategy. The new normal of economic development is fundamentally to
“embark on a new road of development with higher quality, better efficiency, optimized
structure and full advantage, and promote China’s economy to a higher level, better division
of labor, and more reasonable structure in phased evolution” (Huo, 2015).

The theory of deepening socialist market economic system reform puts forward two
questions about “Dialectic Law and Two-Point Theory”: first, on the issue of the integration of
socialist economic system with market economic system, we must highlight the “Dialectic Law and Two-Point Theory,” and give full play to the strengths of both market economy and the socialist basic system; second, on the issue of the market’s decisive role in resource allocation and better play of the role of the government, we must also highlight the “Dialectic Law and Two-Point Theory.” The core issue lies in the well use of the “‘invisible hand’ and the ‘visible hand,’” to “accelerate the transformation of government functions, delegate power sufficiently and appropriately to the market and society, and achieve well-functioning and well-regulated government administration” (Party Literature Research Centre of the CPC Central Committee, 2016, p. 67). Fundamentally, it is necessary to deepen the reform of the socialist market economic system and resolutely remove the system and institutional obstacles to economic development.

The supply-side structural reform theory emphasizes adapting to the changes in the major contradictions of China’s society in the new era, and insists on improving macro-control and promoting the supply-side structural reform as the main line of economic work. The key point lies in: to exert force from the supply side; to promote industrial optimization and restructuring, develop strategic emerging industries and modern service industries, and increase the supply of public goods and services; and to focus on the demand side, and grasp the changes in scale, structure and quality of aggregate demand, which have an effective counteraction on the supply-side structural reform. Marx believes that the “supply aggregate and demand aggregate interact with each other as two entities and two forces”, and fundamentally “show the social nature of production and consumption” (Marx and Engels, 2009, p. 215). Therefore, equal importance shall be attached to: the decisive role of the production links and process of the supply side, and the reaction of the consumption links and process as the demand side; the structural reform of supply, and the structural adjustment of demand; the decisive role of the market in resource allocation, and the better role of the government; and the development of social productivity, and the improvement of social production relations.

Adhering to problem-orientated and correct work strategy is the fundamental method and strategic thinking of SETCC. Adhering to the problem-oriented deployment of new strategies for economic development is, fundamentally, to strengthen problem orientation, focus on resolving prominent issues and obvious shortcomings, and respond to the people’s demands and expectations. These are the basic methods for exploring the theoretical and practical issues of socialist economics with Chinese characteristics. Adhering to the correct work strategy and method means the adherence to the general tone of work for stability and progress; to improving the quality and efficiency of development, and to stable macroeconomic policies, accurate industrial policies, flexible microeconomic policies, realistic reform policies and pro-poor social policies, etc. We will strengthen the guidance of expectation, deepen innovation-driven reform, and promote stable and healthy economic development, social harmony and stability. Fundamentally, it is to seek progress while ensuring stability, maintain strategic composure, adhere to the bottom line thinking and move forward step by step.

Judging from the strategic height of Xi’s scientific system of socialism with Chinese characteristics in the new era, these two recapitulations of SETCC proposed for the new era have their internal unity and together constitute the overall structure of socialist economy with Chinese characteristics in Xi’s new era, they jointly reflect the latest development and theoretical crystallization of SPECC.

5. The extension and innovation of the “systematic economic theory” in the construction of the modern economic system
Since the 19th CPC National Congress, the Party Central Committee led by Comrade Xi Jinping has faced up to the new challenges in socialist economic reform and
development with Chinese characteristics in the new era, and has taken the advancement of the new development concept as the lead. The new theory of building a modernized economic system with supply-side structural reform as the main line has expanded and innovated the theoretical connotation of Xi’s New Economic Zeitgeist and sublimated the realm of SETCC.

At the 19th CPC National Congress, while interpreting the ideological essence of socialism with Chinese characteristics in the new era, Xi Jinping put forward that: “it should be clarified that in the new era, the major contradiction of our society is that between the people’s growing needs for a better life and the unbalanced and inadequate development. We must adhere to the people-centered development ideology and constantly promote the all-round development and the common prosperity of all people” (Xi, 2017, p. 19). This is the theoretical guidance and practical guide for SPECC in the new era.

In terms of the new changes of the major contradictions of society, adhering to the new development concept is prominently reflected in four aspects: first, adhere to and improve China’s socialist basic economic system and distribution system, unwaveringly consolidate and develop the public sector of the economy, unwaveringly encourage, support and guide the development of the non-public sector of the economy; second, further enable the market to play a decisive role in resource allocation, and better play the role of the government; third, focus on promoting the simultaneous development of new industrialization, information technology, urbanization and agricultural modernization; and fourth, actively participate in and promote the process of economic globalization and develop a higher level of open economy. Adhering to the new development concept and continuously expanding China’s economic strength and overall national strength are the basic strategies for comprehensively building a modernized socialist power, and are also the fundamental requirement and realistic basis for handling and solving the major social contradictions.

Taking the new development concept as the leading factor and building a modern economic system is the fundamental requirement for dealing with and solving the major contradictions of the society. It is a new topic for the development of Xi’s New Economic Zeitgeist and a new basis for the development of SETCC.

China’s economy has shifted from a high-speed growth stage to a high-quality development stage. In this strategic process of transforming the development mode, optimizing the economic structure, and switching the growth momentum, the construction of a modern economic system is an urgent requirement and a barrier-breaking strategic goal. The modern economic system is an organic whole consisting of the interrelationship and intra-relations of all links, levels and sectors of socio-economic activities. In terms of structure, it mainly includes: an innovation-driven industrial system with coordinated development; a unified, open, competitive and orderly market system; an income distribution system embodying efficiency, promoting equity; an urban-rural regional development system demonstrating local advantages, coordination and linkage; and a resource-saving, environment-friendly green development system; a diversified, balanced, secure, efficient and comprehensive open system, giving full play to the role of the market and better playing the role of the government. These seven systems are unified and integrated, and we must focus on the “Integrated Construction and Advancement” (Xinhua News Agency, 2018).

Obviously, the construction of a modernized economic system is a major decision-making deployment that “focuses on realizing the ‘Two Centenary Goals’ and adapting to the new requirements of the new era of socialism with Chinese characteristics.” Therefore, Xi pointed out: “Building a modern economic system is a ‘big article.’ It is not only a major theoretical proposition, but also a major practical issue that needs to be discussed in depth by integrating theory with practice” (Xinhua News Agency, 2018).
Since the 19th CPC National Congress, the extension and innovation of Xi’s “Systematic Economic Theory” has been focused on the five aspects of the modern economic system, namely, development mainline, strategic support, fundamental approaches, the necessary roads and institutional guarantees, and their inherent and comprehensive relationship.

Continuously deepening the supply-side structural reform constitutes the main line of development for the modern economic system. We must vigorously develop the real economy and build a solid foundation for a modern economic system. We must adhere to quality first and give priority to efficiency: regarding the direction of supply-side structural reform, we must strive to reform economic development quality, efficiency, and momentum; improve total factor productivity; and focus on accelerating the construction of an industrial system with coordinated development of real economy, technological innovation, modern finance and human resources. Regarding the goals of supply-side structural reform, efforts should be made to build an economic system with an effective market mechanism, dynamic micro entities and well-regulated macro-control, and continuously enhance China’s economic innovation and competitiveness.

Accelerating the implementation of innovation-driven development strategies and the construction of an innovative State constitutes the strategic support for building a modern economic system. We must focus on innovation, aim at the forefront of the world’s science and technology, strengthen and achieve forward-looking basic research, and make major breakthroughs in leading original achievements; strengthen the construction of national innovation system, consolidate strategic scientific and technological strength; and establish enterprise-led, market-oriented, industry-university-research integrated technology innovation system, beef up the support for SMEs’ innovation and promote the transformation of scientific and technological achievements.

Implementing the rural revitalization strategy and regional coordinated development strategy is the fundamental way to build a modern economic system. Implementing the rural revitalization strategy is a big plan that cannot go amiss. We must adhere to the prioritized development of agriculture and rural areas, build a modern agricultural industrial system, production system and distribution system; improve the agricultural support and protection system, establish and improve the system, mechanism and policy for urban-rural integrated development; and accelerate the modernization of agriculture and rural areas. Implementing a regional coordinated development strategy constitutes the groundwork for optimizing the spatial layout of the modern economic system. It is necessary to promote the coordinated development of the Beijing-Tianjin-Hebei Region, the Yangtze River Economic Belt, as well as the Greater Bay Area of Guangdong, Hong Kong and Macao. We will intensify efforts to support and accelerate the development of revolutionary old areas, ethnic areas, border areas and poverty-stricken areas; reinforce initiatives to promote the new-pattern large-scale development of the western region; deepen and accelerate the reforms for the revitalization of old industrial bases such as the Northeast; give full play to local advantages to promote the rise of the central region; take innovation-driven measures to realize optimized development of the eastern areas; and establish more new mechanisms for effective regional coordination and development.

Promoting the formation of a new pattern of comprehensive opening up, and actively participating in and promoting the process of economic globalization, is the “necessary road” to build a modern economic system. We must focus on developing an open economy, improving the international competitiveness of the modern economic system and making better use of global resources and markets. We must focus on the construction of the “Belt and Road,” adhere to the principle of attaching equal importance to “Going in (Introduction)” and “Going Out (Going global),” follow the principle of “co-consulting, joint construction and sharing,” elevate innovation capabilities in open cooperation and form a pattern of opening up with a two-way interactive linkage between land and sea, between
home and abroad and between the east and west. It is necessary to expand foreign trade, foster new operation models of trade business and promote the construction of a strong trade power country.

Deepening economic system reform is the institutional guarantee for building a modern economic system. We must speed up the improvement of the socialist market economic system, resolutely iron out the flaws in various system and institutional aspects, and stimulate the vitality of innovation and entrepreneurship in the whole society. The reform of the economic system must focus on improving the property rights system and the market-oriented allocation of productive factors. We must improve the administration system for various state-owned assets, deepen the reform of state-owned enterprises and develop the mixed-ownership economy, to foster world-class enterprises with global competitiveness.

Unswervingly adhering to the new development concept as the leading factor, General Secretary Xi Jinping’s elucidation of the theoretical propositions and practical topics of building a modern economic system has, starting from the five aspects of development mainline, strategic support, fundamental approach, necessary road and institutional guarantee, and their interrelationships, unfolded new connotations and opened up a new realm of Xi’s New Economic Zeitgeist with new explorations on the structure and system of SETCC.

References
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Study on the “high-quality development” economics

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Abstract
Purpose – As China embarks upon a new era of high-quality development, it is increasingly important and imperative for China’s economic development to live up to its real nature, which is to satisfy people’s growing needs for a better life. The paper aims to discuss this issue.

Design/methodology/approach – The paper attempts to discuss the implication of HQD and its related theoretical issues from the basic theory of economics, and literature review. It is necessary to return to Marx’s “dual character of commodity” to check the theoretical foundation of this issue, based on the duality methodology, namely, the duality of the value of use and the value of exchange.

Findings – Moving from HSG phase to HQD phase constitutes a major challenge and an arduous task that is extremely difficult both theoretically and practically. A series of new problems crop out as to the theoretical understanding and practical resolution. Fundamentally speaking, this new dynamic mechanism intrinsically requires a perfect integration of the instrumental rationality of market economy and the value-based rationality of economic development.

Originality/value – This new momentum requires a perfect match between the instrumental rationality of market economy and the value-based rationality of economic development.

Keywords Development strategy, High-quality development, Instrumental rationality, Value-based rationality

1. The economic nature of “high quality”
Putting “high quality” as a core concept in the semantic context of major policies constitutes a challenge to economics. In the mainstream academic framework of modern economics, “quality”
is basically a factor that is "abstracted," and generally attributed to the "supposed constant" factors, or proxied by price in the "quality-price" symmetry assumption that the quality of high-priced products outshines that of the lower-priced products, i.e., "high quality entails high price." However, if the quality factor is embodied in production efficiency or scale efficiency, resulting in the phenomenon of "good quality & affordable price" or "High Quality, Fair Price," which is common in industrial production, especially when mass production and supply induces "mass consumption," the analysis of economic activities and estimation of the economic nature product quality has, more often than not, become elusive for theoretical economics. For instance, as a high-tech product, today's smartphone has a price that falls far short that of the previous prototype 'Big Brother' yet outruns the latter by far in performance and quality. Given this, product quality and price are well without the "quality-price" symmetry: a negative correlation, rather than a positive correlation between the two shows the utter inability of price to reflect the quality level of the product. This phenomenon was actually common in the industrialized era after the industrial revolution, and technological progress and innovation also made this phenomenon universal. But economics seems to turn a blind eye to it, and only assumes that at a certain point in time, high-quality products have higher added value than lower-quality products, thus statically constructing a symmetric relationship between quality and price.

The root cause of this phenomenon is that after Marx pushed classical economics to a theoretical peak, economics retreated and the theories of dual characters of commodity were merged into a unitary direction, i.e., the use value of commodity merges with the exchange value in the later development of economics, which tends to completely replace the value theory with supply-demand analysis. For example, as an underlying logical basis of the economics, it is purported that the marginal utility of a product determines its value, and the marginal cost and marginal revenue determine its price. In this way, the evolution of economics and the logical system can move toward the direction of pro-mathematics characterization and analysis. This tendency of mathematical modeling of economic research renders the complex quality factors elusive: the abstract method of economic research avoids as much as possible the quality problems that are too concrete to be abstracted. With this orientation, economics seem to become more and more "pure," "accurate" and "exquisite." All economic relations are abstracted into quantitative relationships. The only important gauge is "price" (including wages, interest rates and other factor variables). All economic variables are converted to individual or aggregated amount measured in monetary units. In this way, all variables related to the use value are intentionally or unintentionally "abstracted" and classified as magnitudes of exchange value in the absence of quality. Therefore, economics is even called as the "second mathematics." Almost all economic relations can be expressed by mathematics, and it is believed that only those economic relations expressed and characterized mathematically are the clearest and qualitatively most accurate variables with interlocking relationships. To this end, there are only two ways to deal with the quality factors (i.e. the concrete characteristics of use value) that exist in the real economy: the first way is to define the same product of different qualities as different products, that is, only the products with the same quality count as the same product, so there is no quality difference and measurement difficulty when analyzing the supply–demand relationship of the product. In the second way, the differences in products, including quality differences, are all classified as "monopolic" factors. In effect, products with different qualities are still defined as products without performance (quality) substitutability and are therefore equivalent to different products or similar products that are not fully substitutable. For the quality of products, and then the quality of economic development based on this, economists are often ambiguous, vague and unwilling to discuss in depth. The underlying reason is that modern mainstream economics lacks the academic basis for studying quality factors and quality phenomena as well as the analytical tools based on this.

Economists certainly know that the ultimate goal of production is to meet people's practical needs, that is, to obtain useful products, and the so-called “useful products”
actually contain strong figurative quality characteristics. However, the ultimate goal of production is not necessarily the direct purpose of economic behavior. Moreover, if people only produce to meet their own needs, that is, the direct purpose and ultimate goal of production are completely assimilated, then productivity will be, on the contrary, greatly hampered, because such a self-sufficient natural economy actually denies the possibility of social division of labor. Therefore, human society must move toward a division of labor-based exchange economy (market economy), wherein products become commodities for exchange. In this way, the production purpose of each producer is converted from providing self-use value to providing use value to others in return for use value provided by the other parties. At this time, the attention to quality desirability reflected by use value has been shifted, from that of self-use products, to that of the products approved and accepted by the counterparts in commodity exchange. Adam Smith (1983) wrote: “No matter who he is, if he wants to buy and sell with others, he must first propose this. Please give me what I want, and at the same time, you can get what you want. This sentence is the general meaning of transaction. Most of the mutual help we need is based on this approach. The food and beverages we need every day come not out of the favor of butchers, winemakers or bread-makers, but out of their self-interest.” In this way, the producer’s “self-interest” motivation lies not in that the product is useful to himself, but in the usefulness of the exchanges that others can provide. This is a phenomenon of relationship “reversal,” which is of crucial significance to the quality concern of human production activities, that is, due to the universalization of exchange relations, the exchange value is generated to replace the status of use value. When money becomes the plenipotentiary of exchange value, the use value is increasingly falling into a weak position; and the root of the use value – quality – is relegated to the second place and even seriously ignored.

Of course, this is not to say that economists do not know that people’s actual motives are not just for self-interest. They fully know that people’s behavioral motives are always complicated. Economist Marshall (1983) admits: “When we say that the motive for a person’s activities is motivated by the money he can earn, this is not to say that in his mind, besides the idea of profit-seeking, there is no other consideration.” However, he also clearly stated: “Economics is on the one hand a science that studies wealth; on the other hand, it is also a part of the social sciences that study human activities in society, which studies the many efforts of mankind to seek satisfaction.” The measurement of such efforts and desires is, however, limited only to wealth or its general representative: the currency. Although he also acknowledged that “money is never the perfect measure of this motivation,” he still believed that: “if care is taken, money can be a fairly good measure of the momentum to form most of the motivations of human life.” It can be seen that economists often “keep one eye open and one eye shut.” The “abstraction” and “hypothesis” made by economics are limited only to studies on the phenomena and relationships that can be measured by the currency. This method of looking at the world with only one eye is quite “risky” and may go well astray. Therefore, Marshall pointed out that economics must not forget two hypothetical conditions: “First, assume that other conditions remain unchanged; second, these reasons can produce certain results without hindrance,” and “Adam Smith and many economists of the past, pursuant to their habits of talking, saved the hypothetical statement, and thus obtained the superficial simplicity. But this made them constantly misunderstood by others and caused a lot of waste and trouble in unhelpful debates; they gained superficial peace of mind, but they were not worth the candle.” In other words, on the one hand, economics should be as “abstractive” as possible to use value factors, on the other hand, they must not ignore it. The value of use must remain in the minds of economists, but economics fumbles while dealing with the value of use. If the value of use and its quality factors are introduced, economics will appear to be “clumsy” and inaccurate, just like keeping two eyes open while firing a gunshot can be less accurate than with one eye closed.
While ignoring the value of use and quality factors, economics would seem to lose its roots. This is a “life-threatening” problem in economics from the beginning to the present.

Therefore, to study the issue of HQD, it is necessary to return to Marx’s “dual character of commodity” to check the theoretical foundation of this issue. From classical economics to Marx’s theory of labor value, the study of the theory of commodity value has always been based on the duality methodology, namely, the duality of the value of use and the value of exchange, none is to be stressed to the exclusion of the other. In the authentic sense of economic activity, human beings engage in productive activities, in the final analysis, of course, to obtain the use value to meet their real needs. This is a simple but common-sense fact. With the continuous improvement of real needs and the corresponding increase in production capacity, the use-value performance of products is also constantly improving, which is also the original nature of economic activities. On this fundamental issue, Marx always maintained his academic composure and put the duality theory of commodities on the logical base of economics, and always insisted on making it a “gene” to implement and determine his entire academic system. According to his logic, when exchanges become a common phenomenon, especially when they develop into a currency-based market economy, the dual characters of goods are significantly opposed, and independent supply-demand sides are thus formed: the party providing the useful product is the supply side, and the counterpart paying currency is the demand side. The immediate purpose of the supplier is to obtain a currency that represents the exchange value, and the direct purpose of the demand side is to obtain useful products with value of use. Moreover, the subjects involved in the exchange will be in the position of the supplier and the demander successively in order to achieve the ultimate goal of obtaining use value. This is the simple commodity exchange relationship and simple commodity economy defined by Marx in the symbolic form W-G-W (W: commodity, G: currency). At this point, although the party concerned with quality of use-value may have been reversed, the ultimate goal of both parties is still to obtain value in use. The further substantial change is that from the simple commodity exchange economy to the capitalist market economy, the purpose of production and exchange is reversed again, that is, it becomes G-W-G’ (W: commodity, G: currency, G’: proliferated currency). At this point, the purpose of the exchange is no longer to obtain value in use, but to obtain exchange value, that is, the proliferation of currency. The use-value of goods and the importance of quality thus “resigned from a leading post” and marginalized, that is, the use value and its quality characteristics are important only under the premise that they facilitate or do not impede the exchange economy, namely, the proliferation of money. In short, if it is possible to adopt a method to obtain more exchange value, namely, the proliferation of money without involving the use value and quality at all, is not that better? If the currency can proliferate on its own, is not that a desirable “clever move” and “shortcut!” This is exactly the logic of the so-called “virtual economy.” That is to say, in the original sense of economic activities and economic development, the use value is the purpose of production, the exchange value (currency) is the means, but now it is reversed: use value and quality are only means, and the real purpose lies in reaping more exchange value (currency). If the purpose of currency proliferation is attainable while the means or instrument of use-value and its quality characteristics are absent (or omitted), then the value of use and its quality characteristics can be completely “ignored” (Jin, 2017a).

Of course, in this case, the use value and its quality characteristics are not completely irrelevant, because in the market economy, the virtual economy is ultimately determined by the real economy. The supply and demand relationship of the real economy is competitive, only when the product quality can meet the real needs, there will be more buyers; only when the buyer is willing to buy, the seller can get the currency, namely, the exchange value of the goods is realized. This scenario can be called as commodity exchange’s desirability requirements over quality, that is, the buyer’s needs for the quality of use value must be met,
and otherwise the use value cannot play the role of achieving exchange value. More importantly, under normal circumstances, there are many suppliers producing and supplying goods, if the exchange value of the seller’s products is to be realized, it is necessary to have a more favorable price-quality ratio to defeat the competitors to complete the transaction process. This can be called as the competitiveness of quality, i.e., the quality advantage compared with competitors. It is thus clear that quality desirability determines quality competitiveness. Quality competitiveness determines the value realization of the product.

Judging from the above implications of the quality of goods, it is of course related to the material and technical performance of the products. In general, the higher the performance, the higher the quality of the product, and the better its quality desirability and competitiveness will be. But the quality of goods defined or targeted by economics is by no means related only to the material and technical performance of the product. In the economic sense, product quality is relative to the actual needs of people. If there is no actual need, there is no such product quality. If the material and technical performance outweighs the actual needs and leads to higher production costs and product prices, it is considered to be “excessive quality.” For example, it is uneconomical to produce shoes at high costs so that one can wear for 100 years without damage. It is superfluous in quality, not high quality in the economic sense.

In short, from the basic theory of economics, quality refers to the use value characteristics of products that can meet the actual needs. In the competitive field, quality also refers to the desirability and competitive characteristics that are more cost-effective and satisfying. It should be emphasized that the so-called “needs” are very complicated, especially with the economic development and social progress, the “needs” are also constantly evolving and changing. Therefore, when this understanding is derived into the concept of HQD, it is endowed with a strong dynamic, in its basic economic sense, it can be expressed as: HQD is an economic development mode, structure and dynamic regime that can better meet people’s real and ever-growing needs.

2. The theoretical implications of moving from high-speed growth to high-quality development

As mentioned above, when discussing the quality of growth and development, this concept has a strong dynamic meaning. Real economic activities are always carried out within a certain period of time. As a process of continuous advancement, socio-economic development is staged. The way and state of economic growth and development are diverse at different historical stages. In other words, different stages of development are distinguished by their distinct qualities. In the past 40 years of China’s reform and opening up, the national economy has achieved rapid growth, and the rapid expansion of its quantity and scale is its most prominent feature. Entering a new era, such rapid growth has fulfilled its historical mission, and the Chinese economy will turn to a stage of HQD. Then, from the basic theoretical analysis of economics, what are the similarities and differences between the status of HSG and HQD? What is the internal relationship between the two?

Fundamentally speaking, be it HSG or HQD, its essential meaning is first the aggrandizement of useful products produced and consumed by society. That is to say, their economic meaning is the same: the aggrandizement of use value to meet the growing needs. The value of exchange has no use-value. It is, in essence, not the purpose of rational pursuit, but the means or tool for obtaining use-value. However, since the use values of various products are difficult to measure and aggregate consistently, economic research has to use currency as the accounting unit for consistent measurement. For example, the true meaning of GDP and its growth is the total amount of products and services produced by a country (or region) and its growth, which is essentially the magnitude of use-value and its growth, calculated in monetary units. In other words, the essence of GDP is a use value, but it has to be portrayed and expressed in terms of exchange value (currency). Technically, this
substitution is based on the assumption that the product use value has a positive correlation with the exchange value. Therefore, the latter reflects the former to a large extent (which can be called "quantity-quality symmetry"). Of course, since the use value, rather than the exchange value, is what we really want to measure, accounting statistics often use non-current statistical indicators such as “constant price” and “purchasing power parity” to eliminate as much as possible the measurement deviation from the true amount of use value as a result of exchange value changes (nominal price changes) or the international difference (the deviation of the actual purchasing power of a country due to fluctuation of currency exchange rate) (Jin, 2016).

Aside from the above-mentioned essential correlation between HSG and HQD, the difference between the two is also evident. In the HSG phase, on the one hand, the main focus was on economic output, namely, the insufficient supply of products and services. At that time, the basic characteristic of China’s economic supply side was: “backward productivity.” To get rid of this, growth must be accelerated. On the other hand, the instrumental rationality of the market economy has exerted a strong force. It is manifested in the instrumental goals (income, profit, GDP, etc.) in economic relations, which have become the paramount goals pursued by society. At this stage of development, the entire China is characterized by a vigorous materialist values, and the pursuit of material achievements largely has or tends to have a strong desire for money. In particular, since the monetary system of the modern economy is dominated by credit money, the exuberant materialist values and behavior tendencies have been transformed into a mad game of irrational pursuit of monetary figures, leading to the so-called phenomena of “Irrational Exuberance” and “Bubbles.” However, we may not imprecate, instead, we must see that it is an era of great economic development achievements. The whole society and the country have progressed steadily and become richer and stronger. Over the past 40 years, China’s economic aggregate has expanded substantially, GDP has rocketed from less than 5 percent of the world to more than 15 percent, and will continue to grow. China has become the world’s second largest economy in terms of total GDP (measured by exchange rate), with a potential to surpass the USA and become the world’s largest economy. If measured by purchasing power parity, according to some international institutions, China’s economic aggregate has exceeded that of the USA. The image of the Chinese has changed from “poor” to “rich.” In the eyes of all countries in the world, today’s China is “really rich!” But, you cannot forget the nature of “money?” You cannot equate “rich” with developed economy.

After this exciting period of HSG and great achievements, the inherent contradictions and problems have accumulated and become increasingly manifest. More than a decade ago, people began to realize the Achilles heel of China’s economic development: the seriously “unbalanced, uncoordinated and unsustainable” problems. General Secretary Xi Jinping further pointed out in the Report of the 19th CPC National Congress that “the principal contradiction facing Chinese society has evolved. What we now face is the contradiction between unbalanced and inadequate development and the people’s ever-growing needs for a better life.” At this point, people cannot help but wonder: in order to achieve rapid economic growth, a lot of prices have been paid and many contradictions generated. “Is this really the economic growth we need?” Are we pursuing material wealth or even virtual coins and figures out of madness in the absence of the authentic goals of economic development? Is rapid growth exactly equal to the actual realization of economic development? In short, when the quantity problem of economic growth is basically solved, namely, the problem of “backwardness” is basically solved, the problem of the quality of economic development looms large. The low quality of economic development is mainly reflected in the structure of the real economy. The so-called economic structure, in terms of economic theory, is actually the use value of the product and its production process, that is, the supply side phenomenon. Of course, there are also structural problems on the demand side, and the structural problem of real demand is actually a phenomenon related to the use value, namely, the demands for quality.
Therefore, from the perspective of the commodity duality of the market economy, the shift from HSG to HQD denotes the shift from a situation where the goal and dynamic mechanism of economic operation are mainly focused on the increase in the total amount of products calculated by the exchange economy (currency units), to another scenario where more attention is paid to the use value of products and economic activities and the quality desirability. Of course, this is by no means to say that exchange value is no longer important at the turning point to HQD stage. The instrumental rationality mechanism of the market economy embodied in exchange value is still of great significance and will further play an important role. Income, profit, wealth, GDP, etc., are still important indicators denoting whether the economy can operate effectively and progress. However, in a new era of HQD, it will become more important to reflect the authentic nature of economic development and pay more attention to the supply side of satisfying the people’s growing needs for a better life.

It is precisely because of the above changes of objective reality that the author once wrote that “the Chinese economy has entered into an era of authentic renaissance. The authentic renaissance of human development is essentially to achieve the fit between instrumental rationality and human value on the basis of highly developed productivity.” That is to say, to achieve the authentic value goal of human development with the feasibility and effectiveness of instrumental rationality, yet without losing the essential purpose of economic development, this can make human development return to the track of its authentic rationality. In this sense, today’s human development is not led by authentic rationality and is still in the era of “the obscurantism.” Therefore, a second enlightenment must be carried out to realize the renaissance of its authentic rationality (Jin, 2017b).

In terms of politics, if we are to “remain true to our original aspiration and keep our mission firmly in mind,” then, in terms of economy, we must “remain true to authentic economy and keep quality firmly in mind.” That is to say, after struggling for centuries, China has finally got rid of the label of “backward productivity” and entered into a new era with greatly improved productivity. The authenticity of economic development will increasingly be reflected in the continuous progress of the use-value side, namely, the day by day improvement of quality in economy. This constitutes the fundamental reason why economic work should shift to the supply-side structural reform.

3. New quality status of economic development in the new era
Modern economics originated in the Enlightenment Era of the 18th century, with industrial revolution as its practical background. Therefore, the development of economics develops in the direction of instrumental rationality, and is largely based on the metaphor of physics, which conceives economic activity as a “machine.” Thus, the concepts and analytical methods of equilibrium, optimization, maximization, control and regulation have become the mainstream mind tools of economics. For example, the American economist Richard Taylor (2016), the Nobel Laureate in Economics, said that the logic of mainstream economics can be simply expressed as: “optimization + equilibrium = economics.” In this direction, and in an effort to introduce more complex mathematical methods into economics to reflect the “profundity” and “cutting-edge” of economics, the form of economics appears to be more and more “exquisite” and “elegant,” but more and more away from complex reality, losing its authentic research objects. This leads to a peculiar phenomenon: the higher and the deeper economic analysis is, the more it seems to have nothing to do with the real world, the “aesthetics” of economics seems to be the self-consistency of its own reasoning logics. In this way, economics seems to have a “saucer” character: a delicate and gaudy saucer may hold few physical objects. Advanced theory and refined models suffice not a full explanation of reality, especially, it is difficult for them to predict major changes that may occur, such as the outbreak of economic crisis. This is prominently reflected in the fact that in dealing with the problem of “quantity,” economics seem to be able to carry out analysis and judgment...
with confidence, but once faced with the problem of “quality,” economics wears the embarrassment of powerlessness. In particular, when the “quality status” of the social economy has undergone major changes, the economic analysis methods formed under the “quality” conditions of the past societies are, no matter how sophisticated and advanced, difficult to adapt to a new era with new quality conditions. The key point lies also in that the main problem now is not the quality of economic development in the general sense, but the quality of economic development under the conditions of the new era of socialism with Chinese characteristics. Therefore, in our economic “trays,” we need to put in the new qualitative factors of this new era and the new phenomena and relationships that it ushered in, and to analyze them to obtain credible conclusions.

The American Economist Joseph Schumpeter has made important contributions to the study of economic development. His Innovation Theory has had far-reaching academic influence. Now, when it comes to innovation and entrepreneurs, almost all economists would refer to Schumpeter. However, it can be seen from the title of Schumpeter’s (1991) famous book: Economic Development Theory – Investigation of Profits, Capital, Credit, Interest, and Economic Cycle, that his major concern lies still in the value of exchange, i.e., the phenomena on the currency side, whereas the factors of the side of use value, namely, the supply side, is subordinate. However, Schumpeter is conceptually concerned with the quality status changes in economic development. He said: “The development we are referring to is a special phenomenon that is totally different from what we may have observed in the trend of circulation or equilibrium. It is a spontaneous and intermittent change in the circulation channel, a disturbance to the equilibrium, which is always changing and replacing the previously existing equilibrium state. Our theory of development is nothing more than a discussion of this phenomenon and the process that accompanies it.” According to this line of thinking, Schumpeter actually came down to the problem of the qualitative change of economic development, and abstracted it into the phenomenon of “new combination” of various factors in the economic cycle, and defined the “dynamic” process of entrepreneurial “innovation” and the quality status change of economic development as a process introducing new factors to achieve “new combinations.” Of course, Schumpeter did not extend the qualitative change of economic development to that of the “new era,” which is the research topic faced by today’s economists, especially those in China.

Based on the above discussion, we can use “HSG” and “HQD” as conceptual expressions to distinguish the different qualitative states of the two development stages. Then, what new changes have taken place in China’s economic quality in the new era? What methods and tools can be used to observe, study, and judge these changes?

Compared with the past 40 years, the qualitative change of China’s economy is remarkable: from low income to middle income, from poor countries with backward productivity to the world’s second largest economy, from the most important goal of GDP growth to achieving balanced and comprehensive development (which is more important), and from the full pursuit of “Mountains of Gold & Silver” to more “Green Hills and Clear Waters,” etc. Such fundamental changes in quality will lead to a substantial change in the concept of development: the spirit of the past era is – “it is better to live less for 20 years and to win large oil fields.” People praised and cheered the black smoke from the factory chimney as beautiful “Ink painting big peony.” In contrast, the new development concept of the new era is: innovation, coordination, greenness, opening and sharing.

In a market economy, the important economic nature of major production activities is indeed exchangeable, that is, most people’s behavior is to obtain more exchange value (income, profit) for the purpose of obtaining consumption rights (for consumer goods). Therefore, consumption is a property of rights, that is, people can only consume their own products. In fact, the reality is much more complicated than the theoretical logic stated above. Production is not only exchangeable, thus it regulates market activity at market prices; it also requires the support of external conditions (such as infrastructure) as well as
positive or negative economic externalities. At the same time, real consumption (of use value) is not only right-based (only possessing property rights can one consume), but also shared, that is, consumption can be made without possession of property rights. However, in the past era, non-exchange production activities and non-proprietary consumption (sharing) were not of substantial importance, so they could be “abstracted” in the general theoretical analysis framework of economics. In the new era, the economic quality has undergone tremendous changes, and the economic nature of production and consumption has significant new features. The social quality characteristics and quality requirements of production and consumption today are inevitably different from those of the past, therefore their theoretical explanations and expressions must be deepened and changed.

It is precisely because in the market economy, most of the production activities are carried out for exchange, the producers work to provide the use value to others, the purpose is to obtain more exchange value (currency), which does not have a use value in itself, so such a production mode is actually a reversal of the ends and means of production activities. Although such a mechanism can inject strong momentum into economic growth for social production, as the famous American scholar David Harvey (2016) said, it is a mechanism in which exchange value is the master and use value is the slave. When human society enters a certain stage of development, the authentic nature of economic development will surely highlight its ultimate resolve, namely, realizing the authentic renaissance at a new stage of development. Fundamentally speaking, it is the rise of “enjoyment,” and the “equilibrium movement” of “enjoyment” over “exchange” (Jin, 2018). In this sense, namely, from the value theory of economics, the new era is one in which the truth becomes gradually dominant (or the era of authentic renaissance), and there must be profound changes in the concept of development to adapt and reflect the evolutionary trends of quality status of this era. The authentic rationality of economic development is essentially motivated by the pursuit of higher quality objectives under certain economic conditions.

In the new stage of development, due to changes in economic quality, the quality requirements for development will also change (improve). The basic factors involved in HQD are not the same as in the past, that is, the policy objectives of development and the priorities of each goal will be reshuffled. Based on the past socio-economic quality or development stage, the major focus at the time was that “market economy is an exchange economy.” That is to say, in the duality of goods defined by Marx, the exchange value (claim right) is emphasized, while the use value (enjoyment) becomes instead the means of obtaining exchange value. In that era, it can be understood and theoretically expressed. But in the new era, it is biased to continue to understand the market economy in such a simple stance. Although the market economy is indeed an exchange economy, this nature does not negate the fact that market economy is ultimately an economic system that meets the people's substantive needs, and the former nature of the market economy is ultimately determined by the second nature (creating use value to meet real needs) mentioned above. Just because the former nature can be the most effective means to achieve the latter, market economy is the most efficient and realistic economic system in human development, and so far, the most effective system to meet the real needs of people. In a certain development stage of the market economy, due to the dominance of instrumental rationality and the backwardness of social productivity, the second nature stated above is suppressed. In the new era, the ultimate nature of the market economy that is ultimately subordinated to meeting the real needs of the people will loom large.

Therefore, the new concept of development, i.e.: innovation, coordination, greenness, opening and sharing, has become a new requirement for HQD in the new era and an evaluation criterion for achieving HQD. Moreover, the realization of these requirements in the new era also inherently determines that economic operations must be oriented toward efficiency and quality, namely, to demonstrate “Quality first, efficiency first” and achieve higher quality, more efficient, fairer and more sustainable development.
4. Institutional mechanisms to promote high-quality development

From HSG to HQD, it is not only a change in the mode of economic growth and the path, but also a process of institutional reform and mechanism transformation. The realization of rapid development of the transition from HSG to HQD must be based on new development concepts for new institutional arrangements, especially for supply-side structural reforms. In other words, HQD must be achieved through certain institutional arrangements and the formation of new mechanisms.

First, HQD depends on the effectiveness of market price adjustment. The basic institutional mechanism requires that the market must play a decisive role in resource allocation. Therefore, the rationalization of the price regime of the entire economic system is a prerequisite for the HQD of the economy. The price mentioned here includes not only product prices, service prices, but also factor prices, namely, wages, interest rates, exchange rates, etc. The effectiveness of price regulation depends on the fairness of competition among market microeconomic entities (mainly enterprises). In reality, there are various types of microeconomic entities in the market system: private and state-owned, for-profit and non-profit, large and medium and small-sized, national and foreign, unitary and networked, substantive and financial, natural human and legal persons, franchises and free trade, etc. These different types of microeconomic entities have different market powers and are often very unequal to each other. If the market structure of all kinds of entities is “unevenly matched” or the powers and responsibilities are unequal, then the actual consequence of price adjustment is that it is difficult to achieve effectiveness and desirability, and the resource allocation pattern required for achieving high-quality development will not be guaranteed. Therefore, a reasonable price system and an effective price mechanism constitute one of the fundamental and decisive factors for high-quality development.

Second, the validity of price regulation and the rationality of the price system depend on the validity and rationality of the property rights system and the trading system. Only when the property rights are clear-cut, safe, reliable, effective and convenient in transactions, can the price mechanism effectively play the role of regulating economy. In this sense, a sound system of property rights protection, including an intellectual property protection system, is a fundamental guarantee for promoting HQD. As mentioned above, the relationship between property rights in the market economy and production and consumption is complex. Production activities and consumption enjoyment and their effects often exceed the boundaries of property rights, yielding “externality” and “sharing.” At this time, the ways to give play to the effectiveness and desirability of price regulation and construct a system that can make the price mechanism play a regulatory role under the condition of special property rights relationship, become an innovative pursuit that must be completed to achieve HQD of institutional arrangements. Therefore, to promote HQD, it is necessary not only to “lift price controls” as much as possible, but also to build an effective trading system in various fields, especially those special fields.

In economic theory, property rights and transactions are highly correlated, their relationship and the actual institutional arrangements determine the level of transaction costs, which, in turn, have an important impact on the quality of economic development. Although it is difficult to achieve institutional arrangements with zero transaction costs in practice, minimizing transaction costs and thus making property rights more effective, is the direction of reform that promotes HQD. In a sense, it can be said that the high transaction cost of the market operation is a manifestation of low quality of economic development, and a major obstacle that makes it difficult to improve the quality of economic development.

The above two points show that the new era not only confirms the market economy relationship, but also further develops and improves the market economy, forms and relies more on higher quality and more effective market economy system. On the one hand, the proprietary production and consumption required by the exchangeability of the market
economy will be more effective; on the other hand, the enjoyment of the market economy will be raised to a higher level, and the scope of enjoyment will be extended from individual ownership to group sharing (public service), environmental quality (ecological environmental protection), and even broader areas that embody the inclusiveness and equality of enjoyment. This is, in effect, the integration and coordination of the individual (private) and public proprietary rights of production and consumption in the market economy. In short, the HQD stage requires more effective market system and mechanism to better reflect the high degree of coordination of exchange and enjoyment of the market economy.

Third, better play of the role of the government is an important factor in achieving HQD. As mentioned above, the basis of market regulation mechanism is the dominance of instrumental rationality. Although market regulation is very effective under the “perfect” market system, in all fields, however, it cannot be ensured that the “market knows everything,” and the “market is always correct.” That is to say, in some aspects and areas, especially when economic development involves profound and extensive quality aspects, the market may be “quite at sea” and blind, and thus regulation failures may occur. From another point of view, it can also be said that the improvement of the quality level of production and consumption in the new era puts higher demands on the guarantee of public proprietary mechanism and the enjoyment of non-proprietary attributes (such as good environment). Therefore, the government must play an active role in the regulation of the market, major planning especially regional planning, providing public services, protecting the ecological environment, regulating income distribution, building social safety nets and assisting vulnerable groups, which directly reflect the quality of economic development. Therefore, better functioning of the government is an indispensable and important means for achieving HQD.

Of course, one thing always has two sides. As mentioned above, the government’s better role is an indispensable factor in promoting HQD. However, improper or excessive intervention by the government may lead to an escalation in the transaction costs of the market, which constitutes a disadvantage to the quality of development. Therefore, the government’s streamline administration and institute decentralization, the enhancement of residents’ convenience in livelihood, and the convenience of business activities have always been the direction of the reform and opening up for 40 years. There is still a long way to go and there is still a lot of work to be done. As a country of market economy already, China is, however, not a high-quality market economy with low transaction costs. Therefore, there is still a lot of work and tasks to be done to improve the efficiency of market operation. In short, the role of the government is to reduce the transaction costs of the market economy rather than increase them.

Fourth, scientific discoveries, technological inventions and industrial innovation are key drivers to achieve HQD. Only an innovation-driven economy can achieve sustained HQD. In economics, innovation is a broad-based concept with different types. Among them, technological innovation has a particularly important significance and has often received more attention. For technological innovation in an industry or enterprise, there must first be a source of new technology, which can be exogenous (such as introduction, imitation) or endogenous (such as independent R&D, learning while doing). From the perspective of social division of labor, in the real world, almost all technological innovations are a combination of internal and external resources. Of course, due to the needs of analytical research, innovative technology types can be divided into two typical categories: exogenous and endogenous.

As a latecomer country, China’s past development, especially the 40-year HSG, relies more on exogeneity-led technologies, which are manifested in economic activities such as technology introduction, investment attraction, imitation and absorption. Then, when we enter a new era and change to HQD, what kind of road will China’s industrial technology
innovation take? In the past two centuries, China has been in an era of “backward productivity.” Today, China’s economy has developed tremendously, albeit it is still a middle-income developing country, but after all, it is no longer a backward country, and it has the special advantages that many other countries are in want. The “Chinese characteristics” are largely China’s advantages, or at least, they can be transformed into China’s advantages. In terms of technological innovation in industries and enterprises, Chinese characteristics can obviously be expressed or transformed into China’s advantages. The technological innovation of industry and enterprise features a key link in the complete chain from scientific discovery, technological invention, to R&D and industrialization, and finally enters the market realization process of technical products. Therefore, people often say that “enterprise is the entity of innovation.” In the above-mentioned division of labor, for firms, most of the high-tech enterprises are exogenous, that is, enterprises must obtain scientific and technological resources or achievements from departments engaged in scientific discovery and technological inventions (such as universities and research institutes). From a national and international perspective, the scientific and technological resources and achievements that enterprises can obtain can be domestic or foreign, and of course, international cooperation. Entering the stage of HQD, enterprises are increasingly demanding for scientific and technological resources and achievements and are able to obtain high-tech resources in various channels and in many ways, making them the source of R&D and innovation; this has become an issue of institutional mechanisms with far-reaching significance. Therefore, in the new concept of development, and in terms of institutional and policy arrangements, the meaning of “opening up” refers more than just international trade and investment. Equally important and even more important is that the openness and actuality of the entire national science and technology innovation system is, in essence, the issue of integrating scientific discovery, technological invention, industrial technology innovation, enterprise R&D and new product industrialization, to form a cooperative mechanism, that is, to ensure and promote the generation and industrialization of scientific research results via effective institutional mechanisms. In short, HQD must better solve the problem of high-tech “fountainhead” for enterprises. This is a key institutional mechanism reform task to achieve high-quality development.

5. Multi-dimensional characteristics of high-quality development

On the basis of the above discussion, there will naturally be a problem: given the transition from HSG to HQD, and that the performance of HSG in a country or region can be quantified by statistical means (using indicators such as income, output or GDP, etc.) Then, can the performance of HQD be quantified statistically? The basic method used to calculate the economic growth rate is to use the figures of exchange value, that is, the currency unit quantity to replace use-value for calculation and aggregation, to obtain total output expressed in monetary units and its growth figures, so as to determine the level of economic growth. Although there are some technical difficulties in this method, the statistical results thus obtained are basically credible and can be used for comparison and judgment. In short, the use of accounting data to determine high growth, low growth or medium-speed growth can be relatively clear and usually doubtless.

However, the accounting statistics and quantitative comparison of “high quality” development are much more complicated. The above-mentioned “quantity-quality symmetry” and “quality-price symmetry,” which are often assumed in economics, are generally absent or difficult to ensure in reality. More importantly, the so-called quality of development is essentially a comprehensive concept with both objective and subjective nature, that is, certain judgments about quality depend on its relationship with the stakeholder and the degree of concern of the stakeholder. The so-called “stakeholder” is a complex group, and individual concerns (based on individual rationality or feelings) and group concerns (based on collective rationality or evaluation choices) may differ greatly.
Therefore, just like it is difficult to accurately determine the quality of different people or groups of people, it is difficult to accurately determine the quality of development. In theory, this involves at least three basic issues. One is about the quality of development, some factors are measurable, and some are not. For the quantitative measurement of the factors that are not quantifiable in nature, only the alternative indicators can be used, which can only reflect the actual situation roughly, and often the more “precise” the number, the less credible the reality may be reflected. The second is to aggregate the main data reflecting or substituting the quality of development to make it a comparable single index. It is necessary to select the unit of measurement and determine the weight of each data value in the aggregation, in this process, it is difficult to avoid the influence of subjectivity. Third, people may perceive quality very differently, say, for the temperature factor of environmental quality, some people think that the temperature quality of 20°C is high, some 23°C and even some people considered that 15°C is the best. So, how do you determine what is the right temperature for “high quality environment?” When it comes to socio-economic issues, the subjective judgment criteria of “quality” are more likely to be different. For example, what are “rich,” “free,” “autonomy,” “happiness,” “fairness,” and “equality?” It is difficult for different people to reach a consensus.

However, the above discussion of statistical accounting and quantitative comparison of development quality does not purport that the level of development quality is completely unrecognizable and incomparable. It is only that the way of thinking needs to be changed. As mentioned in the first section of this paper, the mainstream economic thinking to date is mainly based on the metaphor of (mechanical) physics, envisioning the economy as a machine system determined by causality, the behavioral objectives of every “atoms” in the machine are all rationally determined (the simplest assumption is that everyone is a rational “economic man (Homo Economicus)”). Therefore, the operation of this economic system must have an “optimal” or “maximum” target value, and the closer the real economy is to this value, the better. Nonetheless, modern mainstream economics does not deny that this economic system will change, evolve and develop. Some economists have introduced psychology, biology and other disciplines into the economic system, and have obtained valuable research results, forming new economic schools or branches (e.g. behavioral economics or experimental economics). Some scholars even believe that the physical (mechanical) metaphor of economic thinking is outdated, and should be changed to a metaphor of biology, that is, a living body instead of a machine. Today’s world economy has entered into the “new biological era,” and the phenomena reflected in biological concepts such as “heredity,” “mutation,” “evolution,” “emergence,” “distributed system” and “neural system,” will play an increasingly important and even decisive role in the modern and future economic development. But such economic researches are still very inadequate, completely insufficient to counter or replace the dominant position of mainstream economics.

It can be seen that when China’s economy shifts from a HSG stage to a HQD stage, it calls for not only a great transformation in the direction of social behavior, but also an adaptive change and a leading innovation in the way of thinking. Although the “high quality” direction of economic development is a concept expression with considerable ambiguity, its fundamental nature determines the inaccurate characteristics of its magnitude, the value of ambiguity is, however, not incomparable. It is completely feasible in practical actions to determine the direction of efforts based on the estimation of the fuzzy magnitude (i.e. the direction of higher quality development can be determined), and the result of the efforts can also be quantitatively evaluated, although it is difficult for such quantitative evaluation to be highly accurate. In analogy, although it is difficult to quantify the “quality” of people, it does not hinder the determination of the direction of efforts to improve the quality of people. For example, work in the fields of sanitation, health, education, research, experience, culture, law and discipline is, without doubt, of positive significance to improving human quality,
and all these efforts and the results achieved can be quantitatively evaluated. Therefore, in a new era oriented to HQD, we can also develop a set of accounting indicators that reflect the quality of economic development. Scientific quantification and indexation can be applied to factors like innovation, coordination, greenness, openness, sharing, efficiency, quality, structure, safety and sustainability, which act as indicators of HQD status and achievement. That is to say, although the quality of economic development has very rich factors (multidimensionality is its basic feature, and as the level of development escalates, the meaning of development quality will also change constantly, because the needs of a better life of people, who are fundamental to the quality of development, are constantly increasing and changing), in theory, it is still possible to quantify and summarize the development quality evaluation factors at the present stage into an index system as an evaluation tool to measure the quality of development.

Of course, even if HQD can carry out, to a certain extent, evaluation of quantitative indicators, its essence is different from that of the HSG display indices, over which people’s concerns are also different. HSG cares primarily about aggregates, while HQD is mainly concerned with the structure, i.e., the various components and their mutual relations. From the basic theory of economics, HSG assumes that the exchange value (currency unit) accounting amount replaces the actual value of the use-value, and assumes that the two are highly positively correlated. Whereas HQD is a multi-factor composite indexed value, which contains factors that are inherently difficult to quantify, therefore any quantitative expression may be quite different from the real situation. This difference precisely reflects the substantial difference between HSG and HQD, and also reflects their different characteristics of the times and the economic development quality. Since the direction of HSG is mainly the expansion of economic aggregates, the emphasis is on instrumental value; the direction of HQD is mainly on structural upgrading and system optimization, and more emphasis is on the value of authenticity. Therefore, in actual work, HSG is often manifested in the competition state of “championship” race, wherein the quicker one wins; whereas HQD needs more step by step work like “soft fire makes sweet malt,” believing that “Roma is not built in one day,” and stressing steady progress and better quality. People’s feelings about the achievements of HSG, for example, escalated output, increased income and lucrative profits are more directly measurable; and the feelings of HQD achievements involve more balanced evaluations, such as quality of life, environmental quality, subjective well-being, etc.

High-quality development requires a diversity of regional development approaches and pathways. The HSG stage is mainly characterized by “leaps and bounds,” “encouraging get-rich-first and get-rich-fast” and is more concerned about “GDP-first.” The HQD stage, however, is mainly characterized by “steady progress” and “people sharing” and is more concerned about “greenness and environmental protection.” Based on such changes, it can be expected that the regional situation of China’s economic development will also undergo profound changes. The certain ambiguity of development quality evaluation reflects the multidimensionality and richness of development value, and the concern of evaluation gradually extends from the level of material achievement to the inherent essence and experience (scholars outside China call this process a transition from “materialism” to “post-materialism”), which determines that the development of each region can have multiple paths, and shall be committed to giving play to comparative advantages and creating distinctive high-quality performance. The multidimensionality and richness of development value and the geographical diversity of each region also determine that different regions have different main functions and shall not rely solely on rapid GDP growth. Although for HQD, a certain rate of economic growth, especially sustainable growth, is necessary and fundamental, but the optimization goals of pursuing HQD can be “all-in-one” and “diversified.” Due to different locations, resources and historical conditions,
the economic growth rate and economic scale of each region will inevitably vary. “High growth” and huge economic scale (production scale) are not necessarily the targets that all regions can achieve. However, the characteristics of each region can be the basic factor for the development of high-quality economy. The development quality of the economic hinterland is not necessarily inferior to that of the growth centers, and the development quality of regions with relatively small economies (lower economic density) is not necessarily inferior to that of the regions with large-scale production capacity (higher economic density). As a super-large country, China’s diverse regional structure and economic and cultural characteristics constitute a huge advantage that provides various conditions and multiple options for the formation of HQD models and paths with distinctive characteristics. HQD requires diversity, and the constant improvement of economic competitiveness is based on the special advantage of differentiation, which abounds in China’s huge economy. Each region has multiple strategic options for development, which is very conducive to supporting the realization of HQD strategy.

It can be seen that the difficulty in the comparison of HQD evaluation and the complexity of the construction of the indicator system can form an important revelation: the multidimensionality and richness of the content of development quality requires the highly innovative development strategy and mode selection. Systematically creating development advantages, pursuing a path consistent with the reality and reflecting national characteristics, and satisfying people’s growing and multifaceted needs in multiple effective and sustainable ways are the essential characteristics of HQD. In short, the goal of “bigger economic scale” in China’s economy has been basically achieved in the HSG stage, and “improving the quality of development” has become the dominant direction of the new era; the speed targets of HSG can be expressed as unitary, but the development quality targets are pluralistic. Therefore, to shift to a HQD stage, it is necessary to select a viable development strategy in a new systemic way of thinking, and each region can pursue a variety of advantages based on its own reality.

6. Leading high-quality development with comprehensive strategy and modern governance system

The above discussion shows that a fundamental feature of HQD is multidimensionality, which is reflected in the strategic direction as the diversity of policy objectives. Therefore, unlike the strategic thinking of the HSG stage, the strategic thinking for achieving HQD is highlighted as comprehensive, and many important initiatives often require “full coverage.” Under the premise of portfolio diversification of policy objectives, achieving the comprehensiveness of strategic direction is the key to leading HQD. But this requirement is often elusive in reality, since there may be some conflict between multiple goals, that is, the pursuit of one goal may hamper another. Of course, the comprehensiveness of strategic direction is by no means the absence of a major target and the disregard of priorities. On the contrary, the realization of it must be promoted through the scheduled accomplishment of the major targets within a certain period.

In theory, any outcome is paid for in the real world, and economic development is even more so. It is impossible for mankind to fight for or produce anything that is effective and valuable, “at all costs,” which are, sometimes, nothing but a gesture of declaring determination. The nearly 300-years’ history of the industrial revolution in Western Europe marks, undoubtedly, the history of mankind’s tremendous development achievements. But “acquisition” is also accompanied by “loss,” and achievements always by price. Shortly after entering the industrial revolution, its cost began to loom large. Therefore, regarding the industrialized countries entering a “gold age” or “golden age,” there have been heated debates in the past. In fact, in the process of pursuing wealth, many other valuable things have been lost. Is this worth the candle?
Enlightenment thinkers in the 18th century have profoundly recognized the negative impact of economic development, namely, the social cost. They pointed out: “The pursuit of wealth has produced exquisite elegance, rendering life more comfortable, more polite and more prosperous, but also Citizens turning into selfish and profit-seekers, destroying all community consciousness and introducing wrong values – thus burying the root of moral misconduct, which is both the sign and the cause of national decline” (Gay, 2016).

From a global perspective, the inevitable cost of economic growth is manifested at least in: ecological environment destruction, polarization of income and wealth distribution, rampant corruption, accumulation of risk factors and corruption of social morality, etc. Although these phenomena are not necessarily caused by economic development itself, they are, with few exceptions in countries around the world, concomitants that are difficult to avoid completely in the period of rapid growth. Therefore, when HSG turns to HQD, it is extremely important and urgent to curb and contain these phenomena that reflect the low quality (inferiority) of development. It can be said that this is also the most important sign to evaluate the realization of high-quality development. If the above-mentioned socio-economic unhealthy phenomena are serious and there is nothing to do with them, then it cannot be called “HQD” in any case.

Adam Ferguson, an 18th-century Scottish Enlightenment Thinker who was greatly admired by Marx, once pointed out that rapid economic development may lead to “community falling apart”: the general growth of wealth is not fairly distributed, and the elite groups become stakeholders of vested interests at the expense of public interests. In this way, the division of labor nurses arrogance and selfishness to some people, and grudge and slavishness to most people. It is both a gospel and a curse. It breeds a bright future and brings great danger. In Ferguson’s view, the economic issue is a social issue, and moreover, a political issue (Gay, 2016).

It can be seen that since the 18th National Congress of the Communist Party of China, China’s strong anti-corruption actions and the ongoing “three major battles for prevention and resolution of major risks, precise poverty alleviation, and pollution prevention” and the party integrity and clean government construction with a focus on adhering to the “Eight Regulations” are all great efforts to transform into HQD. Just as high-quality life is reflected in cleanliness and sanitation, HQD must of course be reflected in the “high cleanliness” of the economy, society and even the political field: clean production, clean environment, clean government, clean business relations and clean society.

It is thus easy to understand: “security” is just as important as “cleanliness.” HQD must of course be reflected in a more secure development. The state must be able to control socio-economic risks to a certain extent and avoid a crisis out of unleashed risks. Therefore, one of the keys to achieving HQD is to weigh the relationship between freedom and security. Without freedom, there is no HQD, and if security is lost, all development results will be lost. A major issue in the economic development strategy and policy arrangement of the new era is thus to realize the modernization of the national governance system that is fine-tuned between “loose” and “strict.”

It can be seen that the socio-economic quality of HQD is not only reflected in the economic field, but also in the broader social, political and cultural fields. Fairness and justice are the inherent requirements of HQD. To promote efficiency with equity, and achieve inclusive development with high efficiency, this is the real HQD. The discussion of equity and justice is beyond the scope of this paper, but it is an indispensable warning to point out the requirements of HQD for fairness and justice, the absence of which would make HQD an air castle. It can be said that they are the basic bottom line for HQD, while inclusiveness is one of the indispensable essential features of HQD.

A touchstone judging the quality of economic development is, in the final sense, its capacity to meet people’s growing needs for a better life, which goes well beyond the simple
China has seen the basic needs of over a billion people met, has basically made it possible for people to live decent lives, and will soon bring the building of a moderately prosperous society to a successful completion. The needs to be met for the people to live better lives are increasingly broad. Not only have their material and cultural needs grown; their demands for democracy, rule of law, fairness and justice, security, and a better environment are increasing. Therefore, HQD must be reflected in all aspects of people’s needs for a better life, which are not only multifaceted, but also “increasing.” The higher the level of socio-economic development, the more comprehensive the human capabilities will be. The purpose of HQD is, fundamentally, to meet the needs and requirements of the full development of human capabilities. Since the development of people and their abilities orients to comprehensiveness and full-fledge, achieving HQD is inevitably a great undertaking that covers all aspects of society, and a permanent and continuous process that is never perfect. Once some of the people’s needs are met, new and higher needs would inevitably emerge, complete satisfaction is never reachable. Therefore, there must be higher quality development, and this is the cause of endless HQD.

7. Conclusion
Moving from HSG phase to HQD phase constitutes a major challenge and an arduous task that is extremely difficult both theoretically and practically. A series of new problems crop out as to the theoretical understanding and practical resolution. Dominated by the instrumental rationality of the market economy, which has an infinite pursuit of exchange value, HSG has a strong momentum and can and does reap great material achievements, but it can also pay a considerable price. When HSG shifts to a multi-dimensional HQD stage, it is no longer possible to rely solely on this “single-engine” dynamic mechanism, instead, a comprehensive strategy must be implemented to balance the various policy objectives to achieve the multidimensional purpose of HQD, i.e., to meet the people’s growing and multifaceted needs for a better life. Therefore, unlike the rapid growth stage primarily driven by instrumental rationality, the HQD stage calls for a new momentum with more authentic value and rationality, which directly aims at development strategies and objectives catering to people’s aspirations and the authentic purpose of economic development. This new momentum, with its supply side driven by innovation and demand side by people’s aspirations, is precisely the new dynamic mechanism that promotes HQD and needs to be formed and strengthened via the furtherance of comprehensive and deepening institutional reforms, and the modernization of the national governance system and governance capacity. Fundamentally speaking, this new dynamic mechanism intrinsically requires a perfect integration of the instrumental rationality of market economy and the value-based rationality of economic development.

References


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On the economic long wave

Gao Feng
School of Economics, Nankai University, Tianjin, China

Abstract

Purpose – There exist long-term fluctuations in the process of capital accumulation. The economic long wave is an essential part of research into non-mainstream western economics. After the Second World War, the capitalist world experienced the fourth long wave of expansion and then entered into a downward phase of the long wave in the 1970s. Regarding to whether a new long wave of expansion took place in the 1980s, left-wing scholars hold different viewpoints. The purpose of this paper is to focus on this issue.

Design/methodology/approach – First, based on the review of the long wave history, this paper discusses three kinds of long wave theories with significant influence and puts forward the theoretical framework of analyzing the long wave of capitalist economy. Next, under the guidance of this theoretical framework and in combination with the actual development and evolution of the capitalist economy, the issue of whether the fifth long wave of the capitalist economy began to emerge in the 1980s is discussed deeply.

Findings – This paper argues that, from the early 1980s to 2007, the US-dominated developed countries experienced a new long wave of expansion driven by the information technology revolution, the adjustment of the neoliberalism system and the economic globalization. However, the financial-economic crisis of 2008–2009 led to a new phase of long wave downswing.

Originality/value – This paper does not agree with the single-factor analysis of the intrinsic formation mechanism of economic long wave and sticks to the multi-factor analysis centering on the fluctuation of accumulation rate. It is pointed out that the evolution of the long wave of capitalist economy depends on the combined influence of technology, institutions and market. The study of the long wave of the economy will help us to correctly understand the historical stage and characteristics of the current world capitalist economy in the long-term fluctuations, so that we can make an appropriate and positive response.

Keywords Capitalist economy, Long-term fluctuations, Financial-economic crisis, Long depression

Paper type Research paper

1. Long-term fluctuations in the process of capital accumulation

Long-term fluctuations in the development of capitalist economy, also known as the Kondratieff Long Cycle, have been studied by non-mainstream Western economists, and there are already many different viewpoints and arguments upon this topic. Due to a lack of strict definition of the time cycle and reasons for long-term fluctuations, scholars prefer to refer to it as “long-term fluctuations” or a “long wave” rather than a “long cycle.”

First, this paper will look back in history for the existence of long-term economic fluctuations in the development of capitalist countries. Empirical observation first involves the selection of economic indicators reflecting economic fluctuations. The early long wave scholars paid more attention to price fluctuations, while the later scholars put more emphasis on the fluctuations of industrial production and overall national output. It is clear that observing the long-term economic fluctuations with regard to the industrial production or the growth rate of national output is more in line with the substance and nature of economic activities. Next, this paper will consider the growth rate of industrial production, of total output, of the gross domestic product (GDP hereinafter), as well as the long-term fluctuations of world industrial production in the major capitalist countries from the middle of the nineteenth century to the 1970s.
The growth rates reported in Tables I–III clearly indicate the existence of the long-term fluctuations in capitalist economies. Each long wave contains an upward period of a relatively rapid accumulation of capital and a downward period of a relatively slow accumulation. We do not report the first long wave in tables because academics have not yet arrived at agreement on it. There may be exceptions of growth rate changes in any countries during any periods. But the existence of the long wave is doubtless. Duijn’s work was published in 1983, so the situation after the 1980s was not covered in the chronology. However, left-wing scholars express different opinions and views on the fluctuations of capitalist economy after the 1980s. Since this issue is of great value in practice and it is the focus of this paper, we will discuss it in detail later.

According to the actual situation of economic changes in historical development, long wave scholars generally believe that the major capitalist countries have experienced four or five long-term fluctuations. Because of the differences in focus, the views of the long wave scholars were not completely consistent on starting, ending and turning years of each long wave, but they did not differ greatly in their choice of key years except for Rostow. According to the opinions held by most scholars, the long wave in the history of capitalism can be roughly classified as follows: the first long wave, from 1790 to 1848, with the upward phase between 1790 and 1815, and the downward phase between 1815 and 1848; the second long wave, from 1848 to 1896, of which the upward phase was between 1848 and 1873, and the downward phase was between 1873 and 1896; the third long wave, from 1896 to 1948, where 1896–1929 was the upward period, and 1929–1948 was the downward period; and the fourth long wave, starting from 1948, where 1949–1973 was the upward period.

### Table I.
Long-term fluctuations in the growth rate of industrial production in major capitalist countries (from mid-nineteenth century to the 1970s)

<table>
<thead>
<tr>
<th></th>
<th>UK</th>
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**Note:** *1948–1973: W. Germany*

### Table II.
Long-term fluctuations in the growth rate of total output in major capitalist countries (from the mid-nineteenth century to the 1970s)

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**Notes:** *1873–1890 for the UK, 1873–1885 for the USA, 1872–1880 for Germany, 1872–1880 for France, 1873–1890 for Italy; *1948–1973: W. Germany
To investigate the inner mechanism of the long wave of capitalism, first, we should briefly review several leading theories about the long wave. There are three influential theories that explain the inner mechanism of long wave. The first is the long wave theory of technological innovation proposed by Joseph Alois Schumpeter, which states that the Investment booms driven by the emergence of a cluster of major technological innovations in a given period, and the decline of investment due to the exhaustion of the potential of technological revolution are the fundamental causes that bring about the long-term fluctuations in economy. (Schumpeter, 2000; Mensch 1979; Van Duijn, 1993) The second theory is Mandel’s Marxist long wave theory, stating that the rise and the decline of the profit rate constrained by some essential economic variables are the primary factors that lead to long-term fluctuations. He also stressed that the economic factors that pushed the economy switching into the downward phase of long wave are endogenous, while the rising phase of the long wave must rely on exogenous factors (Mandel, 1983, 1993). The third theory is the long wave theory of “social structure of accumulation” proposed by David Gordon et al. It emphasizes that the formation and the decay of the specific institutional environment (social structure of accumulation), which are beneficial to capital accumulation, play a decisive role in long-term economic fluctuations, while the formation and the decay of the specific social structure of accumulation are endogenous economic processes. The replacement of the accumulation structure is accompanied by successive long waves, finally forming separate stages of capitalist development. This school is also deeply influenced by the traditions of Marxism (Gordon, 1998; Gordon et al., 1982[1]).

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investment or capital accumulation should be placed at the center of the long wave analysis. While emphasizing the core role of the investment rate change, it is easy to see that it is not a single factor but multiple factors that determine the long-term changes in investment rates. In the rising period of the long wave, the relatively higher investment rate and capital accumulation rate involve at least the following conditions: first, the motivation of investment. This comes from a rising trend of profit rate and the resulting optimistic profit forecasts. The purpose of capital is to pursue profits. Without the stimulation of increasing profit rates, capitalists will not invest large amounts of capital in production and management. The rising trend of profit rate needs the independent or combined impacts of the main relative economic variables, such as the increase of the rate of surplus value, the relative stagnation of the value composition of capital, the increasing velocity of turnover of capital and improvement of the conditions for the realization of the product. This is exactly the issue that Mandel is trying to analyze. Second is the material basis of investment. It comes from the new production sectors formed by technological revolution and innovation clusters, and the technical reconstruction of the traditional production departments promoted by the technological revolution. The production and construction of large-scale infrastructure and advanced production equipment are material carriers of large-scale investment. Without this material basis, large amounts of capital will not be invested, and, of course, it will be difficult to maintain a high investment growth rate for many years. Third is the institutional environment of investment. This means that some new institutional structures will be formed to promote the development of prominent economic variables so as to increase profit rates, thus guarantee the investors could hold a good and stable expectation of profit and investment enthusiasm. During the great wave of technological revolution, institutional structure conducive to capital accumulation may play a decisive role. The promotion and influence of institutional adjustment on the long wave indicate that the long wave, the capitalist economic phenomenon, is basically endogenous. Fourth is the market demand for investment. One of the basic contradictions in the process of capital accumulation is the contradiction between the production of surplus value and the realization of the surplus value. A higher accumulation rate requires the expansion of domestic and foreign markets so as to meet the conditions for the realization of large quantities of products produced by huge investments. If these products cannot be consumed by the market and the value cannot be realized, the capitalist cannot gain profits and maintain a relatively higher investment rate. This condition is added because even the above three theories have mentioned this point, it has not been emphasized. These are the four necessary and basic requirements for the long wave of expansion. In turn, lower investment rates and capital accumulation rates in the downward phase of the long wave result from the lack of the four basic conditions of investment power, material base of investment, favorable investment environment and the market demand. Thus, it can be seen that the intrinsic mechanism of the economic long wave is not determined by a single factor emphasized in the above three theories, but by a combination of basic factors directly related to investment in social and economic life. According to the analysis of the long wave mechanisms above, this paper will take profit rate and accumulation rate as its focus to investigate the basic characteristics of the long wave from the three major factors: technology, institution and market. In order to highlight the emphasis of this paper, we will start the discussion from the fourth long wave.

2. The fourth capitalist long wave that emerged after the Second World War
After the downward period of the long wave which was characterized by the Great Depression in the 1930s and the Second World War, a new rising period of the long wave has gradually arisen since the late 1940s. The leading countries in this long wave of expansion are the USA, Germany and Japan. The main technical basis for the long wave
of expansion in the 1950s and 1960s after the war should be the continuation and expansion of the scientific and technological revolution marked by power and internal combustion engines at the late nineteenth century and the early twentieth century. In developed countries, the leading economic sectors that promoted the rapid economic growth were automobiles, tractors, mechanized war equipment, aircraft, durable consumer goods, processing equipment, synthetic materials, petroleum, petrochemicals and the corresponding infrastructure. These may well be the leading industrial sectors in the early twentieth century when the scientific and technological revolution took place, together with the essential industries derived from that technological revolution. The institutional foundations of the long wave of expansion after the war included the following aspects. First, the major economic sectors of the developed countries are controlled by large monopolized companies. The oligopoly market structure formed by them plays a leading role in some highly concentrated sectors, and with the small and medium-sized enterprises controlled by them formed the whole economic dual structure. Second, in the main economic sectors, a relatively coordinated labor and capital system had been established, which was marked by the collective bargaining of labor and capital. This contributed to expanding consumer demand, promoting productivity growth and increasing profit rates. Third, banking was further concentrated and financial institutions became diversified. This strengthened the ability to concentrate idle money funds so as to promote capital accumulation and household consumption. Fourth, the national intervention system in the economy was unprecedentedly strengthened under the influence of Keynesianism. The economic function of the country was expanded continuously. The total effective demand of the society was adjusted, and the government attempted to “iron out” crises by means of “counter-cyclical” operation. This has contributed to the relatively stable growth of the “Golden Age” economy. Fifth, a relatively stable international economic environment dominated by the USA was formed. In addition, the development of international trade and the expansion of the world market provided an indispensable market condition for the rapid growth of the capitalist economy in the 1950s and the 1960s. Rapid capital accumulation had created a strong demand for investment. The government’s macro regulation policy and welfare system helped raise the income level of residents, significantly improving the effective demand of developed countries, and expanding the domestic market and the trade among countries. The developed countries also continued to exploit developing countries with economic means such as trade, investment and aid, and took them as a supplier of cheap energy and raw materials and also the sales market of manufactured goods. The expansion of world market presented itself in the way that the export growth of developed countries had increased rapidly and had greatly exceeded the growth rate of the economy.

The technology, institution and market conditions of the “Golden Age” formed after the war mentioned above greatly promoted strong economic growth in developed countries. During the period between 1950 and 1973, for the 16 developed countries, the average compound annual growth rate of GDP, per capita GDP, non-residential fixed capital stock and export was 4.9, 3.8, 5.5 and 8.6 percent, respectively (Maddison, 1982, p. 91, Table 4.9). However, the rules of the long-term fluctuations cannot be eliminated in capitalist economy, and various potential problems were gradually accumulated and exposed with the long wave of expansion. On the supply side, with the strong economic growth over a long period, the labor market was becoming increasingly tense, and real wages continued to increase, gradually forming a profit squeeze. At the same time, prices of raw materials also gradually increased, thus further squeezing the profits of enterprises. Two “oil crises” in the 1970s exacerbated soaring the prices of primary commodity. Thus, the rising costs weakened the accumulation of profits. On the demand side, the effective demand of the masses would not catch up with the rapid expansion of global production. The long-term rapid growth provided a large number of commodities to the world market; however, the effective demand of the society finally became relatively inadequate. The contradiction between production and consumption was gradually intensified, and the
international competition within the developed countries became increasingly fierce. Since the influence of the scientific and technological revolution was gradually weakening, the capital accumulation in developed countries was restrained by the insufficient impetus of technological change and the insufficient consumer demand, which led to the inevitable slowing down of the growth rate of investment. Global overproduction and overcapacity were finally taking shape. The utilization rate of production capacity was therefore bound to decline. At the same time, intensified competition limited the ability of capitalists to raise prices. As a result, the squeeze of profits was self-evident.

These increasingly serious economic problems reflect the re-intensification of internal contradictions in the capitalist economy, which plunged it into an unprecedented double crisis. In the 1970s, the capitalist economy entered a stage of “stagflation” and fell into a dilemma of low accumulation, low growth, high unemployment and high inflation. Take the USA, the annual average growth rate of capital accumulation fell from 7.2 percent in the 1960s to 5.6 percent in the 1970s. The annual average growth rate of GDP fell from 4.4 to 3.3 percent, the unemployment rate rose from 4.8 to 6.2 percent and the inflation rate rose from 2.4 to 7.1 percent[2]. The trend of macroeconomic indicators in other developed countries was basically the same as that in the USA. The 1970s marked the ending of the “Golden Age” of the post-war capitalism and the beginning of the crisis and economic depression. The downward phase of the long wave in the post-war economy begun.

3. Long-term fluctuations after the 1970s

For the fourth rising phase of the long wave which the capitalist countries experienced from the 1950s to the 1960s after the war, most long wave scholars seem to have no dispute, but they have disagreement on the period after that. Many left-wing scholars believe that, since the 1970s, the capitalist economy had entered a long and sustained downward phase of long wave, which lasted until the end of the last century, and even faced the occurrence of the global financial crisis in 2008. As O’Hara (2003) said, “Long wave regulation scholar tend to argue that during the 1950s and 1960s there was a long wave upswing in the USA and world economy, while the 1970s to 1990s was a period of downswing. This mode of regulation analysis is supported by the reference cycle of US gross domestic product (GDP) growth.” Since the 1960s, the average annual growth rate of real GDP per decade has indeed declined. But if we investigate the long-term changes in the major economic indicators such as the real GDP in the USA with a different way of dividing time, we will see a very different trait (Table IV).

<table>
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<tr>
<th>Period</th>
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<th>Gross private domestic investment (annual average compound rate of growth)</th>
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</table>

Table IV.
Changes in real GDP and other major economic indicators during different periods of the post-war period in the USA

Notes: Calculation basis: the change rate of real GDP in the US: Bureau of Economic Analysis of US Department of Commerce (May 26, 2017); gross domestic product: percent change from preceding period; the rate of change in private domestic total investment: Bureau of Economic Analysis of US Department of Commerce (June 29, 2017). Table 1.1.1. Percent change from preceding period in real gross domestic product; the change rate of productivity of labor: Bureau of Labor Statistics, US Department of Labor (June 5, 2017); labor productivity (output per hour) non-farm business sector, all employed persons, percent change from previous quarter at annual rate. Unemployment rate: Bureau of Labor Statistics (February 8, 2017; employment status of the civilian noninstitutional population, 1946 to date)
From the changes happening in the main economic indicators mentioned above, we can see that after the economic boom in the 1950s and the 1960s, the economic growth of the USA did not experience a continuous downward trend, but rather a new form of long-term fluctuations. After the slowing down of the growth rate over the ten years from 1973 to 1982, the acceleration of growth rate continued from the early 1980s until 2007 when the financial crisis broke out. Since the 1980s, economic growth was accelerated in a new way. So, can it be seen as a new rising phase of the long wave? The answer is likely to be affirmative. This is because in more than 20 years (from the early 1980s to 2007), compared with the 1974–1982 depression, the main indicators of the US economy had shown a significant improvement. As the growth rate of real GDP accelerated, the growth rate of investment also increased greatly, the growth rate of labor productivity being more than doubled, and the unemployment rate dropped by 1.4 percentage points.

What is the decisive factor for the long-term fluctuations of the US economy after the war? It is the fluctuation of the rate of capital accumulation. Table V shows that capital accumulation represented by private domestic total investment is the most volatile. The rapid growth of accumulation rate drove the US economy into a new rising phase of the long wave. The sharp decline of the accumulation rate after the outbreak of the financial crisis marked the ending of the long wave of expansion. Later, the US economy once again entered the phase of long period of downswing.

Next, we will analyze the main conditions and causes of the new long wave of expansion since the 1980s by focusing on the fluctuations of the accumulation rate.

4. The major driving force for the new long wave of expansion that started from the 1980s
In the early 1980s, capital accumulation in the USA began to accelerate again. It did not happen by accident, but was the result of a series of technological, economic and institutional changes. The following factors played the major role.

4.1 Information technology revolution
Information technology is characterized by integrated circuits, computers, software, telecommunications, the internet and mobile communications. These are quite different from the post-war technology revolution dominated by automobiles, oil, aircraft, agricultural machinery, household appliances and synthetic materials in the 1950s and the 1960s. Although information technology had already been on the rise in the 1960s and the 1970s, it started to develop rapidly only in the 1980s and the 1990s when many rapidly expanding industrial sectors emerged, such as chip production, computer manufacturing, software production, telecommunications equipment manufacturing and telecommunications operations. These required large-scale infrastructure construction related to information technology, such as fiber optic networks, wireless communication base station and so on. These sectors also promoted the information technology upgrading of the entire industrial

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<th>Non-residential fixed assets investment</th>
<th>Equipment investment</th>
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<tr>
<td>1974–1983</td>
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<td>1984–1989</td>
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<td>1990–1999</td>
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<td>2000–2007</td>
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<td>2008–2016</td>
<td>1.6</td>
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Note: Calculation basis: US Bureau of Economic Analysis (June 29, 2017) “Table 1.1. Percent Change From Preceding Period in Real Gross Domestic Product”

Table V. Average rate of change of non-residential fixed assets investment in American economy (1974–2016) (%)
enterprise and also influenced the service industry, offices and families. The influence of information technology revolution is profound. It has changed the organization mode and operation mode of enterprise production, changed the social and economic life of people, and formed the new "techno-economic paradigm" that is mentioned by Carlota Perez and Freeman (Perez, 2007; Freeman and Louçã, 2007a). As a material and technological foundation for the long wave of expansion, the information technology revolution has contributed much to capital accumulation and economic growth. The booming of the information industry and the transformation of information technology in traditional industrial sector have created a strong demand for investment and provided a material carrier for large-scale investment. In addition, the extensive application of computers and the rapid development of the internet have greatly increased labor productivity and accelerated the growth of economic output. Because the growth rate of productivity of the information technology core equipment (chip) sector is very high, its costs and prices have fallen sharply, thus increasing capital productivity and total factor productivity while the investment of information technology leads to the capital deepening, and helps accelerate the economy growth rate further.

4.2 Recovery of the profit rate

The changing trend of profit rate plays a decisive role in the long-term fluctuations of the capitalist economy. The empirical research of the left-wing scholars both at home and abroad has proved that the profit rate in the US economy started the rising trend since the early 1980s. Although the specific values of the long-term data in G. Duménil and D. Lévy, or in R. Brenner, or in Xie Fusheng et al., differ from each other due to the different calculation methods, the data indeed show that the profit rate changing trends of the US manufacturing industry and the private economy were roughly similar. The profit rate fluctuated in a high level from 1948 to the mid-1960s, and turned to a downward trend in the middle of the 1960s, and began to decline sharply in the crisis period in 1973. After the crisis during 1980–1982, the profit rate returned to an upward trend, and then fluctuated until the financial crisis broke out in 2007 (Brenner, 2003a, p. 67, Figures 2–10; Duménil and Lévy, 2002; Xie et al., 2010).

There are two direct factors that resulted in the start of the uptrend of the US profit rate in 1983. One factor is the expansion of profit share in the national revenue. The growth rate of labor productivity in the USA began to increase after the recession in the early 1980s, but the real wage of American employees was stagnant for a long time. The real income per hour of production and unsupervised employees in private non-agricultural economies (calculated in dollars in 1982) was $8.55 in 1973 and only $7.86 in 1999, still below the level in 1973. The long-term growth of labor productivity and the stagnation or decline of real wages inevitably push up the profit share of capital. The profit share of American companies rose from 18 percent in 1973 to 21.6 percent in 1997 (Pollin, 2000). The increase of profit share is beneficial to the rise of the capital profit rate. Another factor is the increasing capital productivity. The increase in capital productivity means that the capital consumption and capital cost of unit production will be declining, and the profit rate of enterprises will also be raised.

The two direct factors that determine the rise of profit rate involve two basic concepts of Marxist economics: the rate of surplus value and the organic composition of capital. The profit share is only another measuring method of the rate of surplus value, and the capital productivity usually correlates negatively to the technical composition of capital. Because the change of the capital-output ratio (the reciprocal of capital productivity), under the condition of constant labor productivity, is in direct proportion to the change of the capital-labor ratio. Marx regards the rate of surplus value and the organic composition of capital as essential variables in determining the profit rate. In a depression period of low-profit rates, the primary
means of boosting profit rates to stimulate investment and growth is to try to increase the rate of surplus value and reduce the organic composition of capital. This is exactly what the US economy experienced in the 1980s and 1990s of the last century: it fundamentally changed the rising trend of worker’s real wages in the post-war period, and, at the same time, restored the sluggish growth rate of productivity in the 1970s, while the capital accumulation dominated by information technology constrained the increase in the organic composition of capital. Both of these brought out a gradual rise in American profit rates. According to Roberts’ (2016c) calculation, in the period from 1982 to 2002, the rate of surplus value in the US economy increased by 22.5 percent, the organic composition of capital fell by 5.2 percent and the profit rate increased by 29.9 percent (Figure 4.2).

The recovery of profit rates in US economy from 1983 had a strong institutional background. Since the 1970s, driven by tough economic situation such as declining of the profit rates and slowing down of the growth rate, the US economic relationship has undergone a profound adjustment process, and created a favorable economic environment and institutional basis for re-increasing profit rates and investment rates. There are three particular important aspects:

(1) The relationship between labor and capital: the most profound change in the labor and capital system in developed countries after the 1970s is that the relatively coordinative and mutual beneficial labor relation formed in the post-war period gradually became tensive and against the workers. Since the US economy was in trouble in the 1970s, the management level of large companies began to take a strong offensive strategy towards workers. The rise of economic globalization and the US Government’s neoliberalism economic policy contributed to the transformation of capital strategy. The federal minimum wage level had been frozen in a rather long period for several times. The large-scale relocation of labor-intensive production reversed the supply and demand situation in labor market, which made the workers lose the ability to bargain with capital. The “trade union density” (the proportion of workers in the union) continued to decline, and the trade union was increasingly defensive under the capital’s offensive strategy, so that concessions should be made in terms of wages and benefits. The “flexible” work system was widely adopted that made a large number of involuntary part-time workers suffer from low wages, low welfare and lack of occupational security. All these institutional changes have contributed to the stagnation of real wages and the rise in exploitation rates since the 1970s.

(2) The financial system: the American financial system has gradually developed towards liberalization since the 1980s. The financial regulation gradually relieved. The “Glass Steagall Act” appeared to be weakened and was finally abolished in 1999. Commercial and investment banks’ operation tended mixed. This change in the financial system expanded the scale of banks, and intensified the competition in the financial sector, improved the allocation efficiency of financial resources to a certain extent and was conducive to the capital accumulation and the growth of investment. At the same time, under the impetus of American financial liberalization, financial innovation emerged continuously, especially the rise of venture capital is of great importance. The combination of venture capital and the growth enterprise market has helped create a large number of small high-tech companies, largely promoted the development of information technology. In addition, the direction of US financial policy changed after 1980 and began to take the inflation control as the priority. Interest rates declined with the decrease of the inflation rate. The financial environment of low inflation and low interest rates also strongly stimulated investment growth.
The market structure: in the last 30 years of the twentieth century, the market structure of the USA had undergone new changes. After the neoliberalism prevailed once again, the anti-trust policy tended to ease, and governments increasingly deregulated markets. The use of information technology reduced the average size of enterprises, strengthened the competitiveness of small enterprises and improved the market competitiveness of the general industries. However, while the general industry turned to competitive market structure, the high-tech sector strengthened the monopolistic trend of internationalization. In the last 20 years of the twentieth century, mega-merger and cross-border acquisition further reinforced this trend. The dual evolution of American market structure reflected the structural adjustment of the American economy after the 1970s: the high-tech sector was growing, and the production and labor services of low technology and labor-intensive transferred out of the USA, and the service industry developed rapidly. This market structure was very favorable to the US economy at that time. The monopolistic high-tech enterprises remained dominant in the key sectors of the world economy and gained high profits. The increasingly competitive nature of general sectors temporarily promoted economic prosperity and increased the import of cheap commodities, thus helping to maintain relatively low rate of unemployment and inflation in the USA.

4.3 The expansion of the world market

The focus is on economic globalization. Although the globalization of capitalism has already begun for a long time, the process has changed in terms of quantity and quality after the 1970s. International flows of goods (services) and production factors increased significantly, and most foreign trade was dominated by multinational corporations. International capital flows have expanded rapidly, and the globalization of money flows has dramatically increased. The worldwide foreign exchange trading volumes, the stock of transnational bank loans and the cross-border transactions of bonds and stocks were all on the increase. Financial globalization has become the most prominent feature of the new economic globalization since the 1970s. The rapid development of economic globalization in this period reflects the significant institutional changes of international economic relations. First, the transnational operation system of enterprises has developed unprecedentedly, and the global allocation of production resources has been realized. Developed countries have transferred a large number of labor-intensive production enterprises and production procedures to developing countries or regions of low wages. Second, the international financial system changed much. Under the neoliberalism policy, the government relieved the regulation of capital accounts and the financial industry, and removed the institutional obstacles to the international flows of currency capital. The collapse of the Bretton Woods System in the early 1970s opened up the era of the floating exchange rate system, and promoted the international currency flow further. The foreign exchange trading then grew rapidly. Since then, US$ have eliminated the limitations of gold. It made it easier for the USA to use monetary instruments to serve its economic interests and strengthen the international hegemony of the dollar.

The expansion of world market caused by economic globalization is crucial to this long wave expansion in the USA. First, economic globalization has provided favorable production conditions and broad foreign markets for high-tech companies which emerged during the information technology revolution in the USA. The US imports and exports have expanded rapidly, far exceeding the growth rate of GDP. During the period from 1983 to 2007, the average annual growth rate of GDP in the USA increased by 3.4 percent, while the average annual growth rate of exports reached 6.5 percent, and the average annual growth rate of imports reached 7.8 percent[4]. The expansion of the world market has provided huge
demand for information technology products and has promoted the rapid development of information technology companies in the USA. In 1996, among the world’s largest 20 information technology companies, 13 were American companies. The expansion of the world market has also created the conditions for global allocation of resources for the US high-tech industries so as to reduce costs and increase profits. The international division of high technology industry developed from an inter-industry division, intra-industry division to intra-product division, and has formed a global industrial chain. Second, economic globalization has helped to keep a relatively low inflation rate in the USA. A large number of low-end manufacturing industries have been transferred to developing countries and the products are then returned to the USA with a lower price. The developed countries’ traditional trading mode of importing primary products and exporting industrial products has evolved into a trading model, where developed countries like America export new and high-tech products while developing countries export general industrial and primary products. Third, economic globalization has also strengthened the financial hegemonic status of the US$. Under the tide of economic globalization, the American international trade deficit continues to expanding. The USA maintained the payment imbalance by just relying on the hegemonic status of the US$. It imported a significant amount of goods abroad by issuing the US$, which is not restricted by gold, and took back the dollars that flow abroad through the international financial market, in order to balance the international payment of deficit caused by large imports. This mode of international trade enabled the USA to exchange dollars for a large number of cheap goods from other countries and got a huge amount of low-cost financial capital from abroad.

5. The inevitability of the transformation from the long wave of expansion to the long wave downswing

The financial-economic crisis that occurred in 2008 formed the turning point of the long wave; from then started the downward phase of the long wave. The inevitability of the transformation means that various factors which are beneficial to a long wave of expansion gradually changed to the direction which is not conducive to accumulation.

First, the impact of the information technology revolution on investment is waning. The investment driven by information technology revolution was most powerful in the 1980s and the 1990s. However, after a period of rapid capital accumulation, the driving effect and related investment demands of information technology inevitably declined with the spread and updating of computers and related equipment, as well as the improvement of internet infrastructure. A series of economic indicators shows that the IT revolution’s positive impacts on the American economy have gradually weakened since the beginning of the new millennium, especially around 2005. It first reflects on the change of the investment rate. The sharp decrease of US investment rate after the beginning of the new millennium reflects that the accumulative effects of information technology revolution are diminishing.

In addition, in terms of growth rate of labor productivity, the average annual growth rate was 1.44 percent in 1977–1994, 2.06 percent in 1995–2004 and 1.3 percent in 2005–2014. Regarding the growth rate of total factor productivity, the average annual growth rate was 0.57 percent in 1970–1994, 1.03 percent in 1994–2004 and 0.4 percent in 2004–2014 (Gordon, 2016a).

It should be pointed out that the leading role of the information technology revolution in investment and economic growth is far less powerful than the technological revolution based on electricity and internal combustion engines at the turn of the twentieth century. Robert J. Gordon stressed: the “Great Inventions” of the Second Industrial Revolution utterly changed living and working conditions, particularly in urban America, within half a century and their full impact was largely complete during the century following 1870 (Gordon, 2012). The second industrial revolution not only revolutionized industrial production, but also modernized social life. It promoted large scale of infrastructure construction of social
production and life. It also created longer term and large scale of investment demands. The information revolution cannot be compared with the second industrial revolution in this respect.

Second, the rising trend of profit rate is reversed. From the early 1980s, the profit rate of American economy tended to rise, which opened a new stage of the long wave of expansion. However, the rising trend of profit rate began to decline in the late 1990s. According to Roberts’ (2016b) calculation, the profit rate of the economy increased by 15 percent from 1982 to 1997, and dropped by 12 percent from 1997 to 2008. The reversal of the profit rate increasing trend would inevitably cause the slowdown of capital accumulation and economic growth, preparing the conditions for the outbreak of economic crisis and the downturn of the economic long wave. Why did the slowdown of profit rate of the American economy happen in the late 1990s? The inherent causes can be analyzed on the basis of several key factors that influence the profit rate.

The first factor is the profit share. The primary factor driving the recovery of the profit rate was the gradual increasing of profit share from the early 1980s, which was the result of the real wages of workers lagged behind labor productivity for a long time. In the mid-1990s, the unemployment rate fell because of continuous economic growth. This triggered the slow rise of real wages since 1996. During the period from 1995 to 2007, the real hourly earnings and real weekly earnings rose by 10.4 and 8.8 percent, respectively. However, the increase in real wages did not squeeze the profit share due to the rapid growth of productivity driven by the information revolution. During the period from 1996 to 2003, the average annual productivity growth rate of non-farm business sector reached 3.1 percent, much higher than the rate of 1.6 percent from 1984 to 1995. Labor productivity increased by 38 percent during the period from 1995 to 2007[5].

This shows that the decline of the profit rate in the late 1990s was not mainly caused by the shrinking profit share and the decrease of the rate of surplus value. Actually, the intensity of exploitation of workers was not relieved during the entire period of the long wave of expansion. From 1984 to 2007, the real GDP rose by 101 percent, and the productivity of non-farm business sector grew by 64 percent. But the real wages of worker were basically in stagnation with a 4.5 percent increase in average hourly earnings and a 0.7 percent increase in average weekly earnings, none of which reached the level of 1973[6]. The benefits of economic growth were mainly obtained by the few richest people. The increasingly serious social economic inequality and the stagnant earnings of general public were bound to cause insufficient effective demand, thereby aggravating the contradiction between production and consumption. The overproduction is directly reflected in the under-utilization of production equipment. Statistical data show that the capacity utilization rate of the US industry peaked in 1997 and then declined. Capacity utilization rate of all industries grew from 73.6 percent in 1982 to 84.2 percent in 1997, decreased to 74.9 percent in 2002 and returned to 80.4 percent in 2007. However, this rate is significantly lower than that of 1997. It dropped to 68.6 percent in 2009 after the crisis broke out. If we observe the annual average rate of capacity utilization over a longer period of time, it was 82 percent in 1984–1997, and decreased to 79.1 percent in 1998–2007[7]. Therefore, it was the insufficient social demands and low capacity utilization rate that caused the decrease of profit ratio after 1997.

The second factor is the organic composition of capital. The long wave of expansion based on information technology revolution will certainly increase the technical composition of capital because of a rapid increase in the investment of information equipment. However, the increase of the value composition of capital will slow down and even decline due to the quick depreciation of information technology equipment. This favorable technical condition for profit rate changes with the diminishing role of information technology revolution. An important indicator of the information technology equipment depreciation is the ratio of price to performance. The 1996–2000 interval witnessed the most rapid rate of decline in
performance-adjusted prices of ICT equipment. The rate of decline of the ICT equipment deflator peaked at $-14\%$ in 1999 but then steadily diminished to barely $-1\%$ in 2010–2014. Moore’s law also changed. Although the time for the double the efficiency of the chip during 1999–2003 has been reduced to less than 18 months, since 2006, Moore’s law has gone off the rails: The time to double chip efficiency increased dramatically. It soared to eight years in 2009 and then declined gradually to four years in 2014. The change in “Moore’s Law” is closely related to the ratio change of Price-to-Performance for computer equipment (Gordon, 2016d). The changes in the above economic indicators suggest that the factors conducive to curbing the rise in the organic composition of capital during the climax of the information technology revolution gradually began to disappear around 2005. As a result, the reduction of capital productivity and the increase of organic composition of capital were inevitable. In addition, capacity utilization rate decline caused by insufficient effective social demand was also an important factor to push up the organic composition of capital after 1997. As the capacity utilization rate decreases, the relatively enlarged amount of idle fixed capital still should be counted into the total capital stock. This is precisely the mechanism that the profit rates decline due to the insufficient effective demand and the exacerbation of realization problems. According to Roberts’ (2016c) calculation, the organic composition of capital in the US economy declined by 5.2 percent from 1982 to 2002 but increased by 41.3 percent from 2002 to 2011.

Another important factor influencing the change trend of profit rate involves the rapidly expanding debt economy in the financialization of economy. The interest rate in the US economy shifted toward long-term decline after a sharp rise from 1979 to 1981. According to the interest change trajectory of USA three-month treasury bond, Shaikh (2014) figured out two phases of interest rate change trends of the post-war period: the first phase was from 1947 to 1981, when the interest rate rose from 0.59 to 14.03 percent; the second phase began in 1981, with the interest rate dropping from 14.03 to 0.16 percent in 2009. Low interest rates have contributed directly to the expansion of borrowing and the boom of stock market. It also formed financial bubbles twice in the late 1990s and in the first seven years of the new century. The interaction between financial bubbles and debt inflation expanded total demands during certain period of the long wave of expansion, ensuring market conditions for profit rate increase. It also reflected the weakness of the basis of this economic expansion and intensified the inherent contradictions gradually, and eventually led to the decrease of the profit rate and the break-out of structural crisis. The first stock market bubble occurred in the second half of 1999; it was a financial bubble formed on the basis of IT technological revolution such as personal computer and the internet. There was a rare stock market boom in the US history. The easy financial environment encouraged unscrupulous financial manipulation by non-financial companies and led to an unprecedented expansion of corporate debt. Meanwhile, the household debt has risen sharply. The wealth effect of the extraordinary stock market boom has led to a rapid expansion of household borrowing. Developing the debt economy through financialization has become a major means for the USA to expand its domestic market by increasing household consumption in the context of wage stagnation. But the frenetic debt economy also carries a hidden curse: the collapse of the stock market bubble could trigger a financial and economic crisis. The bursting of the IT bubble in the late 1990s was the first indication of the above-mentioned process during this period. Interest rates rose to the highest level since 1991 in 2000, and prompted a cyclical crisis in the first quarter of 2001.

However, this crisis was relatively moderate, and the USA did not learn from it. After the bursting of the information technology bubble in 2001, the real estate bubble began to expand and debt consumption was fueled again. Financial institutions enforced the implementation of the financialization of personal income, especially housing financialization, including offering subprime mortgages for poorer people. Low-interest
rate policies and securitization of financial sector have greatly encouraged this trend, and formed an increasingly inflated property bubble rapidly. This not only stimulated the housing consumption, but also ensured the debt consumption, and led to a decrease in saving rate and a sharp increase in debt due to the wealth effect of continuously rising housing prices. As a result, the bursting of the bubble at the beginning of the twenty-first century was finally repeated. The credit crunch of the monetary authorities in 2006 and 2007 immediately triggered the “subprime mortgage” crisis, leading to the great crisis of 2008–2009. This crisis was no longer the moderate periodical crisis as in 2001, but a combination of periodical and structural crisis, which was an eruption of deep contradictions accumulated throughout the long wave of expansion. And it became the turning point from the long wave of expansion to a long wave downswing.

Third, the world market influenced by economic globalization is also changing. The economic globalization has indeed brought multiple benefits to the USA at first, and provided favorable production and market conditions for the acceleration of capital accumulation and economic growth. However, the capitalist economy always contains unsolvable inner inherent contradictions. Its temporary advantages will become disadvantages over time, and will gradually cause various unfavorable consequences. The most important of these was the hollowing out of the American manufacturing, which weakened the international competitiveness of the American industry. The USA has obtained high profits from investment and trade in developing countries with the help of economic globalization and industrial transfer, however, which, in turn, cultivated a number of new competitors, especially emerging economies such as China, in addition to the former rivals such as Japan and Germany. Through technology introduction, product quality improvement and added value increase in their products, these emerging economies not only squeezed imports from developed countries such as the USA, but also expanded their market shares in the USA. Although the USA’s economic performance was strong in the second half of the 1990s, it was unable to change the downtrend of its international industrial competitiveness and its share in the world market. The potential market contradictions became fierce again, and squeezed the profit rate by the difficulties of value realization. This was also reflected in the changes of American import and export situation. During the period from 1995 to 2007, the average annual growth rate of import goods was 8.4 percent, which is basically equal to that of 8.3 percent from 1985 to 1995. However, the average annual growth rate of exports dramatically decreased from 10.3 percent of the prior period to 5.9 percent[8]. The relative shrink of foreign market share would inevitably worsen the realization conditions of the US economy, and it was an important reason why the great crisis of 2008 broke out and began to turn into a long wave of depression.

6. Further discussion on this long wave of expansion

Academia offers different opinions on whether this long wave of expansion exists in developed countries. Some left-wing scholars deny the existence of this long wave of expansion. They believe that the long depression since the 1970s has continued till now, during which there was a period of rapid productivity growth, especially the prosperities in 1990s may just be a short periodic expansion mainly. It did not change the basic situation of the long wave of depression fundamentally (O’Hara, 2003). Such views are open to discussion, especially the two “arguments” that negate the long wave of expansion.

First, some scholars believe that there was no institutional environment for the long wave of expansion after the 1980s. They put the liberalization and globalization of economy and the formation of a new social structure of accumulation in opposition, and asserted that economic globalization intensifies international competition, and it weakens the ability of the nation state to intervene and regulate the economy independently. Countries without self-regulation can hardly form a new social structure of accumulation, let alone the long
wave of expansion (Kotz, 2003). I think this point of view is too absolute. In the context of economic globalization, it is an objective fact that the increasingly fierce international competition has restricted the ability of the nation state to regulate itself to some extent, as well as the rise of neoliberalism in the USA, the UK and other countries after the 1980s. But it should be noted that with the serious contradictions between production socialization and capitalism, the economic regulation of government is necessary. The regulation degree depends on the needs of large capital and the changes of the real economic situation. Not only has the globalization and liberalization of economy not impeded the establishment of the new social structure of accumulations, but also it has reflected the adjustment of domestic and international economic system itself, becoming the basic components of the new social structure of accumulation.

Some scholars believe that a long wave upswing of the US economy is unlikely to be in operation because the neoliberal mode of regulation is highly contradictory. The regime of accumulation is full of active conflicts and instabilities. It is likely that an adequate regime of accumulation has not yet emerged (O’Hara, 2003). In fact, the nature of capital determines that any institutional structure of capital accumulation contains contradictions, and the difference is the depth and the expression form of the contradictions. In the view of some leftists, if an institutional relationship leads to the decline in the real wages of worker, the widening of social inequality and the reduction of general social welfare, it seems unlikely to promote economic growth and form the long wave of expansion. Part of the reason why radical political economists have misread the expansion seems to be their choice of questionable criteria for economic recovery and expansion – a problem which perhaps can be called “moralization of capitalism.” They seem to conflate issues of productivity, efficiency and economic growth with those of equity, income distribution, and prosperity for all (Hossein-Zadeh and Gabb, 2000). By analyzing this long-wave of expansion that started from the 1980s, we can find that the institutional adjustment which leads to the stagnancy and decline of employee wages is the significant conditions for rebound in profit rate. The financialization, stock market prosperity, wealth effect and debt inflation have also promoted investment, consumption and economic expansion at a certain period. There is no denying that the neoliberal institutional structure contains profound contradictions and vulnerabilities (to be discussed later), but we must analyze it dialectically; we cannot deny its real role in boosting economic growth for a certain period of time, as it may become the institutional condition for a new long wave of expansion.

Second, some left-wing scholars believe that we cannot assert a worldwide long wave of expansion that has emerged only taking the relative prosperity of USA after 1980s as the evidence because some developed countries such as Japan are still in stagnation in the meantime. In this regard, we think that the long wave, an international phenomenon of the capitalist economy, has performed most prominently in the dominant countries historically. The economic aggregate fluctuation of non-dominant countries may be inconsistent with that of dominant countries due to historical and practical reasons. For example, during the second downward period of the long wave that from the 1870s to the 1890s, as the dominant country, the economic growth rate declined obviously in UK, but it was not the same in the USA. And during the third rising period of the long wave that from the 1890s to the 1920s, the economic growth rate of the USA, which is the dominant country, increased significantly, but the UK did not show any sign of the rise of the growth rate. The situation is the same during the long wave of expansion that started from the 1980s. Table VI shows the average annual growth rate of Group of Seven (G7) and OECD countries in several post-war periods.

Table VI shows that during the long wave of expansion from 1983 to 2007, the growth rates of the USA and the UK rose most significantly, while the growth rates of Japan, France and Italy actually slowed down. However, this is not a reason to deny this long wave of expansion. Because not only did the GDP of USA and UK account for over 50 percent
of G7’s GDP, but the overall growth rate of OECD countries also increased. More importantly, the technological foundation, institutional foundation and market foundation of all advanced capitalist countries have undergone major structural adjustments during this period. This is the fundamental basis for judging whether the long wave of expansion emerges. Freeman and Louçã once pointed out that some economists take the rapid growth of the US economy after the Civil War of 1861–1865 as the evidence for no decrease at the end of second Kondratieff’s long wave and no increase from 1895 to 1913. This view based on the general trend of GDP ignores the adjustment and the structural crisis that the USA experienced in the 1870s, 1880s and the early 1890s, when some Western European countries also experienced similar crises (Freeman and Louçã, 2007b). In the 1970s, there was also a structural crisis in other major capitalist countries like the USA that experienced significant structural adjustments from the 1980s to the 1990s. The sharp decline in profit rates was a central feature of the 1970s structural crisis. Compared with the period from 1952 to 1973 and from 1974 to 1981, the average annual net profit rate in manufacturing industry decreased from 19.5 to 10.4 percent in all capitalist countries except the USA[9]. It is the drop in the profit rate that caused the sharp decrease in capital accumulation rate and economic growth rate.

The decline in profit rate and capital accumulation rate was the inevitable result of the serious structural imbalance in the advanced capitalist countries. The period from the 1980s to the 1990s witnessed structural adjustment in this regard. In terms of technology, all advanced capitalist countries experienced the information technology revolution that began in the USA. In terms of the institutional environment, neoliberalism, replacing Keynesianism, was adopted by developed countries in different degrees, which introduced systems and policies conducive to big capital, as well as promoted privatization, liberalization and financialization. Regarding market conditions, all developed countries were involved in economic globalization. These profound structural adjustments formed the technology, institution and market foundation of the long wave of expansion from the early 1980s to 2007. The growth rate of several developed countries did not accelerate during the period of the long wave of expansion, which, however, cannot be taken as the evidence for negating this capitalism long wave of expansion due to the historical background and special reasons of related countries.

7. Principal features of this long wave downswing
The global financial and economic crisis from 2008 to 2009 was the turning point of the fifth long wave of expansion. The advanced capitalist countries thus entered a long wave downswing featured by slow accumulation.

The particularity of the long wave of expansion must be understood in order to judge and observe this long wave downswing. Compare with the long wave of expansion of the Golden Age during the post-war period, the most significant difference of the long wave of

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<thead>
<tr>
<th>Period</th>
<th>USA</th>
<th>UK</th>
<th>Canada</th>
<th>France</th>
<th>Germany</th>
<th>Italy</th>
<th>Japan</th>
<th>OECD countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>1961–1973</td>
<td>4.4</td>
<td>3.4</td>
<td>4.9</td>
<td>5.7</td>
<td>5.3</td>
<td>9.4</td>
<td>5.2</td>
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<tr>
<td>1974–1982</td>
<td>2.0</td>
<td>0.9</td>
<td>2.7</td>
<td>2.6</td>
<td>2.9</td>
<td>3.5</td>
<td>2.4</td>
<td></td>
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<tr>
<td>1983–2007</td>
<td>3.4</td>
<td>2.9</td>
<td>2.9</td>
<td>2.2</td>
<td>1.5*</td>
<td>1.9</td>
<td>2.4</td>
<td>3.0</td>
</tr>
<tr>
<td>2008–2016</td>
<td>1.3</td>
<td>1.0</td>
<td>1.5</td>
<td>0.5</td>
<td>1.0</td>
<td>−0.8</td>
<td>0.4</td>
<td>1.2</td>
</tr>
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</table>

expansion that began in the 1980s is that it occurred in the context of global excess capital and overcapacity. The long wave of expansion from 1894 to 1929 has also caused serious overcapacity. But a large amount of excess capital was discarded, depreciated or directly destroyed during The Great Depression in the 1930s and the Second World War. Therefore, when the long wave of expansion emerged in the 1950s and 1960s, there was not serious overproduction. On the contrary, the social consumption demand postponed by the world war, the large-scale post-war economic reconstruction, the expansionary economic policies by Keynesian and the long-term growth of real wages for workers all provided favorable market conditions for the strong economic growth of capitalist countries during the Golden Age. But the long wave of expansion since the early 1980s was different from this. The unprecedented rapid economic development in the “Golden Age” expansion stage will eventually surpass the growth of social demand and cause severe overproduction. This sign appeared in the late 1960s. With the rapid development of West Germany and Japan, the trade competition among the developed capitalist countries had become increasingly fierce. The insufficient effective demand, with the increase in both labor costs and capital costs driven by long-term over-accumulation, will inevitably squeeze the profit. The average rate of yields of G7 countries had fallen by 25 percent from 1965 to 1973 (Brenner, 2003b). The oil crisis of the 1970s further aggravated the capitalist economic crisis and turned the post-war long wave of expansion to the period of depression. But the long wave downswing was very short, and did not destroy excess capital as it did during the Great Depression in the 1930s and the Second World War. Instead, it transformed into a new long wave of expansion in the early 1980s. Therefore, this new long wave of expansion occurred in the context of overcapacity globally.

At the first glance, there seems to be a paradox. How can new long waves of expansion emerge in the global context of excess capacity? In fact, the market problem is, of course, the fundamental problem in the development of capitalism. Theoretically, capital surplus generally leads to crisis and stagnation. However, under the conditions of major technological revolution and institutional reform, it is possible to be partly overcome in a certain period. The appearance of a new long wave of expansion is possible. Every occurrence of a long wave of expansion is the result of structural crisis and major structural transformations based on the combination of scientific and technological revolutions and institutional adjustments in the capitalist economy. It was the information technology revolution that began in the 1980s, the neoliberalism-oriented institutional adjustment and the economic globalization that promoted this major structural transformation in the capitalist countries and drove it into a new rising phase of the long wave. It also should be noted that the above-mentioned special economic background made the long wave of expansion not robust enough. It is mainly reflected in two aspects. First, this long wave of expansion was not as robust as that of the Golden Age. The relatively rapid economic growth mainly occurred in dominant countries, such as the USA. Even in the USA, the major economic indicators including GDP growth were lower than that of the previous long wave of expansion in the 1950s and 1960s (see Table V). In addition, the major structural adjustments that had driven the economic growth acceleration of the USA, Britain and other major countries in this long wave of expansion indeed contained profound contradictions and vulnerabilities. Although the information technology revolution promoted the capital accumulation and the economic growth, as a technological basis, it was much weaker than that of the previous two long waves of expansion. At the same time, in the context of overcapacity, big capital had to implement neoliberalism-oriented institutional adjustment with the help of the government in order to advance capital accumulation by regaining profit growth. It was mainly featured by exploitation rate growth and financialization popularity. And this kind of technical and institutional evolution contains potential risks of new structural contradictions and crises.
The long wave of expansion and its features determine that the financial-economic crisis of 2008–2009 is not a simple periodic economic crisis or a general financial crisis, but a great structural crisis that formed a turning point of long wave and opened a long wave downswing. Some western left-wing scholars distinguish it from periodic recession or crisis by calling it “The Great Recession.” First, the duration of this crisis was the longest compared with other twelve crises after the 1929–1933 crisis. It lasted for 18 months, which almost doubled the average length of the previous 12 recessions (10 months) (Roberts, 2016a, Table 1-1). Second, the depth of the crisis has also been rarely seen since the Great Depression of the 1930s. Its economic decline degree has exceeded all previous crises after the war. In 2009, the US GDP decreased by 2.8 percent, which is even higher than −1.9 percent in 1982 of severe recession[10]. Third, the depth of the crisis was also reflected in the significant drop in investment. In 2009, the gross private domestic investment sharply decreased by 21.6, which is extremely rare in the recessions during post-war periods. Residential investment declined by over 20 percent from 2008 to 2009 for two consecutive years. Non-residential fixed assets investment declined by 15.6 percent in 2009, which set a post-war record of this indicator[11]. Fourth, even “The Great Recession” began in the USA, but it rapidly spread to all the other capitalist countries. All of the global capitalist economies are involved in the worst crisis since the 1930s. For the developed countries of OECD, the overall GDP declined by six percentage points from the peak point in 2007 to the trough in 2009, industrial production reduced by 13 percent, the world trade declined by 20 percent and world stock market fell by 50 percent on average (Roberts, 2016d). This was certainly a great crisis and recession.

More importantly, the USA and the rest of the capitalist countries did not enjoy a period of prosperity after “The Great Recession,” but entered the stage of relative stagnation—“The Long Depression.” It clearly shows that “The Great Recession”, indeed as a turning point, led to a downward phase of this economic long wave. This can be observed from the following aspects. First, the US economy began to recover from the recession in the second half of 2009. The economic boom that should have occurred during the expansion period has not emerged yet. The average annual growth rate of GDP for the seven years from 2010 to 2016 was only 2.1 percent (2.08 percent), which was the most sluggish recovery of all the post-war recoveries. It is significantly lower than the 2.7 percent during the expansion phase of the cycle that from 2002 to 2007, 3.8 percent of 1992–2000 and 4.4 percent of 1983–1989[12]. The recovery in other major capitalist countries was even worse. The average annual economic growth rates for 2010–2016 were as follows: 2.0 percent in Germany, 2.0 percent in the UK, 1.4 percent in Japan, 1.1 percent in France and −0.1 percent in Italy[13]. This situation had never occurred after all previous post-war crises. Second, the transition from a periodic recovery to prosperity is mainly driven by investment. But there has been no sustained increase in investment after “The Great Recession.” The crisis of 2009 witnessed the rare capital accumulation collapse since “The Great Depression” with a 21.6 percent sharp decrease in gross private domestic investment and a 15.6 percent sharp decline in non-residential fixed assets investment. After such a serious accumulation crisis, the economic recovery should have witnessed the sharp rebound and acceleration in the investment rate that would drive new periodic growth. However, except for a slightly higher accumulation rate in 2010 and 2012, the investment in other years was relatively weak and tended to decline. In 2016, it even fell into negative growth. During the whole “recovery” lasting from 2010 to 2016, the average annual growth of gross private domestic investment in the USA was 6.1 percent. However, the growth rate was only 3.5 percent from 2013 to 2016. The growth rate of non-residential fixed assets investment was even worse, with 4.3 percent from 2010 to 2016 and only 2.8 percent from 2013 to 2016[14]. It is the weakness of capital accumulation that determines the current situation of depression in economy in the USA. The investment in other developed countries was also stagnant. Third, the sluggish nature of the US economy was also reflected by a marked decline in productivity growth.
During the “recovery” stage after “The Great Recession,” the growth rate of labor productivity was unprecedentedly low since the Second World War. In the seven years from 2010 to 2016, the annual growth rate of the labor productivity had never exceeded 1 percent except for the 3.3 percent increase in 2010. The average annual growth rate in these seven years was only 0.9 percent, which was significantly lower than 2.6 percent during the periodic expansion from 2002 to 2007, 2.2 percent from 1992 to 2000 and 2.0 percent from 1983 to 1989. It was even 0.7 percentage points lower than 1.6 percent, the average annual growth rate during the upward phase in the cycle of 1970s (1976 to 1979) when the economy was in depression[15].

The unprecedented low rate of labor productivity growth was a prominent feature of this “Long Depression.” Fourth, the unemployment rate during the recovery was also higher than that of all previous post-war periodic recoveries. The average unemployment rate from 2010 to 2016 was 7.2 percent, which was remarkably higher than the 5.3 percent from 2002 to 2007 and 5.5 percent from 1992 to 2000. It is even higher than the 6.8 percent from 1983 to 1989 and 6.7 percent from 1976 to 1979[16]. The primary reason that cause the high average annual unemployment rate during this recovery is the unprecedented surge of unemployment during the Great Recession. The percentage fall in US employment was 6.3 percent from the peak to the trough, which was nearly one and a half times higher than the average percentage fall (2.6 percent) during the six recessions from 1957 to 2001 (Roberts, 2016d). The unemployment rate soared from 4.6 percent in 2007 to 9.3 percent in 2009. Another reason is that the employment increased slowly during the first few years after entering the recovery phase. By 2013, it had not yet returned to the pre-crisis level in 2007, and the unemployment rate had remained high. It was not until 2014 that the employment growth gradually accelerated. The unemployment rate began to decline significantly, which reached 4.9 percent in 2016[17]. The other factor that could not to be neglected for the unemployment rate decline is the decrease in the labor-force participation rate, which has dropped from 66.0 percent in 2007 to 62.8 percent in 2016[18]. The dropping out of a large number of laborers from the labor market contributed to lowering the unemployment rate. The lower unemployment rate also covered up massive underemployment. Many employees who wish to do full-time jobs can only do part-time jobs.

8. Prospect

Many scholars call the downward phase of the long wave from the Great Recession in the capitalist world as “The Long Depression.” Its formation is no accidental. The fifth section of this paper made concrete analysis regarding the causes. Generally speaking, it was the inevitable outcome of the acute structural contradictions accumulated during the long wave of expansion. In terms of technology-based structural contradictions, the positive effect on the economy from the Third Industrial Revolution centering on information technology has declined, while the climax for the new technological revolution is yet coming. The whole society lacks the technological impetus to drive rapid productivity and investment growth. From the perspective of institution-based structural contradictions, the major active role played by neoliberalism on capital accumulation has turned to be negative. The new institution structure in favor of capital accumulation is still not available and the deep-rooted economic imbalances remain unresolved, delaying the recovery of profit rate and investment rate. In terms of market-based structural contradictions, the global market development effect of the economic globalization has transformed into a more serious worldwide overproduction. The new market development is confronted with strong political and social resistance. In this case, the severe deficiency of effective demand remains unresolved, failing to create market conditions for accumulation and more rapid economic growth. Therefore, whether the capitalist countries could get out of the “long depression” and start a new long wave of expansion depend on the time and extent of these three elementary structural contradictions could be solved, and really realize the deep structural
adjustment and transformation. It has been ten years since the break-out of the capitalist financial-economic crisis in 2007, and eight years for economic recovery since the second half of 2009. How about the resolution of the structural contradictions of capitalism?

At this moment, there is no sign indicating that the technical base for a new long wave of expansion takes shape regarding scientific and technological revolution. It is undeniable that the current pace of technological progress is very rapid. The Fourth Industrial Revolution centered on artificial intelligence has begun to come into being. New technologies are emerging, such as 3D printing, robotics, Big Data, cloud computing, clean energy, driverless vehicle and artificial intelligence. Many people are optimistic about the prospects of the science and technology revolution as well as its economic effect. But Robert Gordon threw a wet blanket over it. Some of his ideas are worth pondering. First of all, he distinguished between the pace of innovation and the impact of innovation on the growth rates of labor productivity and TFP. He underlined that there is no controversy over the frenetic development in innovation activities, especially in digital technologies, including robotics and artificial intelligence. However, the standard scale to measure the influence on the economy by innovation and technological changes should be productivity growth. Evaluate by this standard, even the current American innovation activities are extremely active, but they exert a very weak influence on productivity. Annual growth rate in total factor productivity from 2004 to 2014 was merely 0.4 percent (Gordon, 2016b). Why cannot vigorous innovation translate into productivity growth? Gordon talks a little about the reasons, but it seems worth delving into further. Second, as Gordon also pointed out, historically, there exists a long delay from the time when great inventions of industrial revolution emerge to the point when they exert strong economic implications. For instance, electricity and the combustion engine, as two core inventions during the second industrial revolution, both emerged between 1870 and 1900. But it was not until the 1910s that they were widely applied in industry. It was only in the 1920s that they had a tremendous influence on productivity growth. The same story goes with the Third Industrial Revolution. Although large computers were used by some big companies in the 1960s and personal computers popularized in 1980s, its strong driving force on productivity mainly happened from 1994 to 2004 (Gordon, 2016c). In this sense, it will still take time to have significant effect on productivity and economic growth, even though major inventions of the Fourth Industrial Revolution have already appeared. It is also hard to predict how much this technological revolution will boost productivity growth.

A new institutional basis in favor of capital accumulation has not yet come into being regarding institutional structures. What the USA and other major capitalist countries promoted during the Great Recession and its recovery period are still neoliberalist policies basically. This is prominently reflected in the following aspects.

First, the American Government has implemented large scale of rescue measures since the outbreak of the subprime crisis and financial crisis at the early stage of the Great Recession. The government was afraid that the bankruptcy of financial enterprises may drag down the production industry. It had to bail out big Banks, mortgage companies, insurance companies and others, which were on the brink of collapse. It is partly financed by high taxes on taxpayers, and mostly by borrowing. The huge losses of the vast majority of financial giants, with the exception of a few, such as Lehman Brothers, because of their greed and recklessness, were compensated by government rescues and ultimately paid by taxpayers. This is what other major developed countries did during the crisis. As a result, the debt in the USA and major capitalist countries soared to record levels since the Second World WarI, and government budget deficits ballooned. After coming out of the recession, the government started to implement the so-called “austerity” plan to reduce the budget deficit and government debt, cut government spending, especially government investment and social welfare spending, and raised taxes on working people. All these “austerity”
measures merely shifted the cost of the great recession onto the working class. The seemingly anti-liberal government intervention in the capitalist countries during the crisis and the recovery period is still a measure to maintain and compensate for the large capital by hard-earned money of the labor masses in essence. As for the economic effects of these measures, they seem to mitigate the damage of the crisis, but due to the excess capital that had not been fully destroyed and devalued, it is not conducive to the recovery of profit rates and the resumption of economic expansion. One of the inevitable consequences of rescuing the financial crisis was to turn corporate debt into national debt, and some European countries even developed a sovereign debt crisis that severely restricted government investment and prevented a rapid economic recovery. The compensation for the loss of crisis born by the broad working class will certainly weaken the purchasing power of the masses, which is also not conducive to the alleviation of the realization problem and the real recovery of the economy.

Second, a basic feature of the neoliberal institution structure is to increase the rate of exploitation by strengthening the extraction of employed labor. Now, after the USA got out from the crisis in the second half of 2009 and entered the recovery phase, has this labor disadvantage improved? It seems not yet. According to the US official statistics alone, real wages for a wide range of workers have continued the downward and stagnant trend since the 1970s. Average real hourly earnings of production and non-supervisory employees (1982-1984 $) are: $8.85 in 2014, lower than $8.88 of 2009; which rose to $9.08 in 2015, but only $0.2 more than that of 2009, and lower than $9.26 in 1972. The average real weekly earnings of employees are: $305.91 in 2015, which is only $12 higher than that of 2009, but still about $36 lower than that of 1972[19]. In the recovery stage, the stagnation of real wages of the vast number of employees has further expanded income inequality, severely restricting the purchasing power of ordinary residents, and the growth of consumer demand is bound to be sluggish. The average annual growth rate of personal consumption expenditures, the largest component of GDP, increased only 2.3 percent from 2010 to 2016. It is far lower than 4.4 percent in the 1980s, the periodic expansion during 1983–1989, 4.1 percent in 1990s, periodic expansion during 1992–2000 and 3.0 percent from 2002 to 2007[20]. The sluggish growth of consumer demand has become the main constraint that the US economic recovery has not been able to turn into an economic upsurge.

Third, another fundamental feature of the neoliberal institutional structure is the financialization of the economy. The development of financialization and virtualization of American economy once played a role in the long wave of expansion that started in the early 1980s, but the financial bubble formed and its burst also became an important factor that triggered the financial crisis and the “Great Recession.” The post-crisis rectification of the US financial sector was harsh, but the trend of the economy toward financialization does not appear to be reversing. In this crisis, the US Government not only saved the financial giants on a large scale through fiscal policy, but also saved the market through unconventional “monetary policy.” The main measure is monetary expansion, which has been followed by several rounds of so-called “quantitative easing” so as to cut interest rates. The interest rate on the three-year Treasury note dropped sharply from 4.41 in 2007 to 0.16 in 2009. After entering the recovery phase, the interest rate continued to fall to near zero. The average of 2011–2015 was only 0.06[21]. The Federal Reserve has been counting on this ultra-easing monetary policy to boost investment and consumption, so as to promote the economy growth, but it has not. Cheap and readily available dollars did encourage non-financial companies to borrow heavily, but they used much of their borrowed money to speculate on financial assets, buying back corporate shares, driving up stock prices and making financial profits. The result is the sluggish growth in the real economy and soaring stock prices. At the same time, the debt economy, accompanied by financialization, expanded further.
Total liabilities of US non-financial companies rose sharply to $18.72 trillion in 2016 from $12.91 trillion at the start of the financial crisis in 2007[22]. The federal government’s own debt ballooned as a result of the rescue measures of the financial crisis. Between 2007 and 2016, federal government debt soared from $8.95 trillion to $19.45 trillion, and its ratio to GDP soared from 62.5 to 106.0 percent[23]. Such high debt is one of the main reasons why US companies and governments have been slow to invest in the real economy. It severely hampers the strong recovery.

In terms of market conditions, the decline in the growth rate of international trade after the Great Recession has not yet been reversed. During the long wave of expansion, higher import and export growth in the USA have declined sharply after the Great Recession. The growth rate of imports (goods and services) dropped from an average of 7.8 percent a year in 1983–2007 to 1.7 percent in 2008–2016. Growth in exports (goods and services) fell from an average of 6.5 percent a year to 3.0 percent over the same period. Moreover, the USA’s export growth has slowed markedly during this period. In 2010 and 2011, the annual export growth rate was 11.9 and 6.9 percent, respectively. By 2015 and 2016, it had fallen to 0.1 and 0.4 percent, respectively[24]. The overall situation of the G7 is similar to that of the USA. The average annual export growth rate of the G7 fell from 5.7 percent in 1983–2007 to 2.4 percent in 2008–2015. The average annual growth rate of imports and exports fell from 5.9 to 2.2 percent[25]. For developed countries such as the USA, slowing import growth means weak domestic demand, while slowing export growth means a relatively smaller market share abroad. Their international competitiveness has not improved significantly during this recovery phase, and even relative declined compared to China and other newly industrialized countries. That leads their export markets have been squeezed. Instead of deeply reflecting on its own “industrial hollowness” and decline in competitiveness, and taking reform measures, the USA angered at the trading countries involved and embarked a countercurrent of “anti-globalization.” The new President of the USA, Donald Trump, publicly advocates the protectionism policy, the “America first,” provoking trade disputes with many countries. This is obviously not conducive to the healthy development of international trade. The depression of the world market will, in turn, be a constraint on the robust recovery in the developed world.

In short, from the perspective of the structural contradictions in the technological, institutional and market foundations, it seems that eight years after entering the recovery phase, the major capitalist countries have not yet undergone significant adjustment and transformation and formed the basic conditions for leaving the “long-term depression.” Economic conditions in the USA appear to have improved since this year (2017). The GDP growth rate reached 3.1 percent in the second quarter and 3.3 percent in the third quarter, a significant rebound from the sluggish 1.2 percent in the first quarter and a relatively strong consecutive quarterly data in recent years. As a result of the improved state of the US economy and the impact of the tax reform bill’s gradual implementation, Wall Street economists’ expectations for US economic growth have clearly turned positive, seeing a real GDP growth of 2.5 percent in 2017, 2.6 percent in 2018 and 1.7 percent in 2019, according to the Wall Street journal website. Others even predict that the expansion will continue into 2020. Even extending into the second half of 2019, it would form the longest expansion cycle in the US history, and breaking the record for the duration of the economic boom set in the 1990s[26]. Let us leave these predictions to chance. Assuming all these optimistic predictions come true, this record expansion cycle is hardly called booming. Because even with these projections, the average annual growth rate of real GDP in the USA for the ten years from 2010 to 2019 is only 2.14 percent, well below the pace of periodic expansion phase in the 1970s, 1980s, 1990s and the first seven years of the new century. If such an expansion cycle is a record of duration, it is also one of the weakest cycles in history, and it is fair to call it a “sluggish” expansion cycle.
Considering the slow coordination of structural contradictions in developed countries, the long wave downswing may last for some time. But the specific year of recovery is hard to predict. Certainly, no matter how long the time is, depression or recession in a capitalist economy will not last forever. With the upsurge of the fourth industrial revolution, a relatively favorable institutional structure for capital accumulation was gradually formed, and the global market was further expanded, a new rising period of long wave will come. The gradual development of the fourth industrial revolution is certain, but the adjustment of the institutional structure is still uncertain. Against the backdrop of this “Great Recession” and “Long Depression,” there has been a significant political polarization in developed capitalist countries, with the traditional political elite being rejected and more voters turning to non-mainstream political figures. Political polarization is similar to what happened in the 1930s during the Great Depression. The reform of institutional structure depends largely on the class power contrast, the changes of the strength of political parties’ power and the political choice of the broad electorate in different countries. As for the expansion of world markets, despite the signs of revival in global trade in 2017, the growth rates are still far below the pre-crisis level, and threatened by “anti-globalization” protectionism. But the historical trend of globalization is irreversible, and the world economy has already been integrated. Emerging market economies represented by China are growing rapidly. In particular, the “Belt and Road” initiative proposed by China is promoting the economic construction of Asian, African and European countries, and also promoting the development of international trade and the expansion of the world market. In recent years, China’s economic development, mainly driven by domestic demand, has contributed more than 30 percent to world economic growth alone. The developed capitalist countries are more dependent on foreign markets today than ever before. The economic growth and market expansion of emerging industrialized economies and developing countries may provide favorable market conditions for developed capitalist countries to move into a new long wave of expansion.

Capitalist economy develops and evolves in the economic cycle and long-term fluctuations. From the actual evolution of global economy and politics in recent decades, the world capitalist economy shows a clear trend of decline. Even during the long wave upswing from 1983 to 2007, developed countries such as the USA were in relative decline. If you look at the major capitalist countries today, they are not only economically hobbled, but also politically chaotic. The US President D. Trump has stirred up national infighting, social division and allies disputes with his freewheeling speeches and policies. His business-like approach may help domestic manufacturing investment and job growth in the short term, but it remains to be seen whether his “America first” approach will really drive many fundamental structural reforms. Europe is in multiple predicaments: sovereign debt crisis, Brexit, the rise of separatism, constant terrorist attacks, refugee crisis and populism is rampant. Japan’s economy has been sluggish for years. Compared with the economic and social stability and prosperity in the “Golden Age” after the war, developed countries such as the USA, Europe and Japan are no longer the same. In the evolution of world economic and political situation, the rise of socialist China is of special significance. After decades of rapid development, China has entered the ranks of middle- and high-income countries. The 19th National Congress of the Communist Party of China was just convened successfully. It has set well-defined objectives and a clear roadmap in a bid to make China become a modern and powerful socialist country by the middle of the century. No power in the world can block the rise of socialist China and its rise will be a fundamental guarantee for the victory of the international communist movement. China’s economy has been closely linked with the global economy. It is very important for China to correctly understand the basic situation of the world capitalist economic development. During the long wave of expansion in
western countries from the early 1980s to 2007, China’s economy achieved rapid growth for nearly 30 years. However, since the global financial and economic crisis broke out in 2008 and turned into a long wave of depression, the international political, economic and trade environment has undergone tremendous changes. We should have a clear understanding of this special historical stage of capitalist evolution, and make effective use and positive response.

Notes

1. Similar to the “Social Structure of Accumulation” School, the French “Regulation School” also emphasizes institutional analysis.

2. *Economic Reports of the President* (2009), p. 287 Table B-4, p. 334 Table B-42, p. 357 Table B-63. The rate of capital accumulation is represented by the growth rate of non-residential fixed assets investment, and the inflation rate is represented by the rate of change in the consumer price index. The annual average figure is calculated according to the values of each year.


5. Calculation basis: *Economic Reports of the President* (2015), Statistical Appendix, p. 402 Table B-15, p. 403 Table B-16.

6. Calculation basis: *Economic Reports of the President* (2013), Statistical Appendix, p. 324 Table B-2; *Economic Reports of the President* (2015), Statistical Appendix, p. 402 Table B-15, p. 403 Table B-16.


8. Calculation basis: *Economic Reports of the President* (2009), Statistical Appendix, p. 402 Table B-103.


10. US Bureau of Economic Analysis (June 29, 2017): “Table 1.1.1. Percent Change From Preceding Period in Real Gross Domestic Product.”

11. US Bureau of Economic Analysis (June 29, 2017): “Table 1.1.1. Percent Change From Preceding Period in Real Gross Domestic Product.”


22. Non-financial Corporate Business; Total Liabilities: Federal Reserve Bank of St. Louis (September 2017), https://fred.stlouisfed.org/series/TLBSNNCB
23. *Economic Reports of the President* (2017), Statistical Appendix, p. 584 Table B-17, p. 585 Table B-18. The 2016 figures are estimates.
24. US Bureau of Economic Analysis (June 29, 2017): “Table 1.1.1. Percent Change From Preceding Period in Real Gross Domestic Product.”

References


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Pro-poor growth and the realization of common prosperity of socialism with Chinese characteristics

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Abstract

Purpose – As the essential requirement of socialism with Chinese characteristics, common prosperity stands for both the goal of and the approach to economic growth. Shared development is a new stage of the process of common prosperity. From the perspective of economic growth, it requires the low- and middle-income groups to gain more from the growth than high-income groups. The paper aims to discuss these issues.

Design/methodology/approach – Based on provincial panel data, the random effect model and the dynamic panel model are used in this paper to analyze the path to achieve pro-poor growth.

Findings – The keys to achieve pro-poor growth are first to promote new urbanization with people at the center, diversify the forms of employment and improve the income structure of the residents, and second to improve the accuracy in designing redistribution policies.

Originality/value – After the realization of “some get rich first” policy, it is important to swiftly adapt to a new mindset of shared development, which charters a new course to the Marxist common prosperity. There exist few established economic theories or action plans with respect to shared development. Pro-poor growth, however, offers a perspective to achieve both sharing and development.

Keywords Path, Pro-poor growth, Common prosperity, Shared development

Paper type Research paper

As the essential requirement of socialism with Chinese characteristics, common prosperity stands for both the goal and the final result. The former is to follow the path that takes common prosperity as a goal, and the latter is to make common prosperity the principle of distribution. China is still at the primary stage of socialism, and its productivity has not yet been highly developed. At this stage, the mentioning of common prosperity mainly refers to the path toward common prosperity. So how can common prosperity be achieved? From the perspective of economic growth, common prosperity is only possible when the low- and middle-income groups, thanks to economic progress, enjoy higher income growth rate than the average. Such a pro-poor growth is the essential approach to achieve common prosperity.

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1. Common prosperity is the intrinsic requirement of socialism with Chinese characteristics

1.1 The connotation of common prosperity

The idea of common prosperity goes back a long way. Marx and Engels founded the scientific socialism and transformed common prosperity from a utopian concept into science. What essentially distinguishes socialism from other social regimes is that it, through scientific analysis, recognizes that the future society should achieve common prosperity for all its workers and provide them with the best and the happiest lives (Wei, 2012).

China’s reform and opening-up has constantly enriched the Marxist concept of common prosperity. For China, common prosperity has become the only way to and the essential requirement of socialism with Chinese characteristics. Comrade Deng (1993) reiterated that “the goal of socialism is to achieve common prosperity for the whole population, and not to polarize them. If our policies lead to polarization, it would mean that we had failed; if a new bourgeoisie emerges, it would mean that we had strayed from the right path”. The concept of common prosperity with Chinese characteristics is to encourage everyone to create wealth and strive for prosperity, and to liberate workers to promote common prosperity (Research Center for the Theories of Socialism with Chinese Characteristics of the Chinese Academy of Social Sciences, 2011). Therefore, the common prosperity of socialism with Chinese characteristics is to follow the path toward common prosperity (Fan, 2017).

1.2 Shared development is a new stage on the path toward common prosperity of socialism with Chinese characteristics

Restrained by productivity and relations of production, common prosperity cannot be achieved overnight. In analyzing the fundamental contradiction of capitalism, Marx (1972) pointed out that “then, on one side, necessary labor time will be measured by the needs of the social individual, and, on the other, the development of the power of social production will grow so rapidly that, even though production is now calculated for the wealth of all, disposable time will grow for all”. It shows that the continuous development of productivity is an important prerequisite for the realization of common prosperity. Given the dialectical relationship between productivity and relations of production, the continuous development of productivity will accordingly bring about changes to the institutional arrangements for common prosperity.

China’s exploration of common prosperity has experienced different stages, including the confiscation and distribution of the landlords’ properties during the liberation war, the communal meals and lifelong secured jobs during the planned economy, the policy of “allowing some people to get rich first and then help those legged behind” at the early stage of reform and opening-up, and the goal of ensuring all the people to share the fruits of development proposed at the 16th National Congress of the Communist Party of China in 2002. At the current stage, based on the policy of “allowing some people to get rich first and then help those legged behind,” the Party has put forward the concept of shared development, that is, “development for the people, by the people and with the people sharing its fruits.” Over the years, China has explored a unique path toward common prosperity.

The notion of shared development has further enriched people’s understanding of common prosperity. For a long time, people had regarded common prosperity as a static concept and only a result of the distribution of material wealth (Chen, 2016). However, common prosperity is actually a dynamic process, and the development shall be shared in the process of co-construction. Shared development involves not only the result but also the dynamic process. It is the dialectical unity between “sharing” and “development” – maintaining a rapid and stable economic growth, and at the same time appropriately distributing the economic development results, so as to achieve common
prosperity and sustain the virtuous interaction between distribution and growth. The "objects" to be shared become much broader, including not only economic aspects, but also democratic rights, spiritual culture, ecological environment, etc.

2. Shared development and pro-poor growth
The development concept provides guidance to development actions. Common prosperity can only be a castle in the air without the correct path and methods. As a new stage on the path toward common prosperity, shared development needs to address many problems existing in the current economic and social development. One of the key challenges is to promptly accelerate the income growth of low- and middle-income groups.

This paper uses the calculation of growth elasticity of poverty reduction to illustrate the necessity and urgency for China’s path to common prosperity to usher in a new stage. To this end, first the standard of poverty needs to be determined. This paper adopts the extreme poverty standards defined by the World Bank. In 1990, the World Bank set the poverty line standard at $1.01 per day based on the purchasing power parity of 1985. In 2005, the World Bank raised the standard to $1.25 per day based on the updated purchasing power parity. Therefore, this paper adopts the poverty line standard of $1 per person per day for years before 2005, and $1.25 per person per day for years after 2005. Since the World Bank’s poverty line is calculated on purchasing power parity, this paper, limited by data availability, calculates the fixed-base consumer price index from 1985 to 2004 with the 1985 US price index as base value, and then calculates the poverty line in US dollars of each corresponding year. Next, the paper converts the poverty line in RMB for the corresponding years at the actual exchange rate, which was deducted from the change rate of China’s general price level, and then adjusts (with) the fixed price index to eliminate the impact of price changes. The poverty lines from 2005 to 2015 are determined in the same way[1]. The annual poverty lines are then calculated by multiplying the daily minimum standards of living by 365 days.

As for the measurement of poverty, Kakwani and Son (2008) adopted the additively decomposable poverty measures, which they considered to be the most universal method. In the case where the sample size of household survey data is \( n \), the household consumption or income per capita is \( x_i \), and the poverty line is \( z \), then there are three ways in measuring poverty of a society. The first measurement is the number of people below the poverty line as a percentage of the total population. This method is intuitive but less accurate, and cannot measure poverty at an individual level. The second measurement is the sum of the "gaps" between the poverty line and the per capita income of the poor. This indicates the average degree of poverty at individual level, but everyone in the calculation is treated as the same, while the reality is that some people are farther from the poverty line than others, and they are poorer and harder to be alleviated from poverty. The third measurement is to give greater weight to those who are further below the poverty line, that is, the weighted sum of "gaps." Poverty is measured through Foster–Greer–Thorbecke, the measurement index of the additively decomposable poverty measures:

\[
P_x = \sum_{i=1}^{n} I_i \left[ \frac{z - x_i}{z} \right]^\alpha w_i.
\]

In the equation, \( I_i \) is the characteristic coefficient with a value of either 0 or 1, and it equals 1 when the household income or consumption per capita \( x_i \) is below the poverty line \( z \), otherwise it equals 0. \( w_i \) is the weight coefficient of the households at the number of \( i \), which can be expressed with the ratio of the household headcounts to the sample size. When \( \alpha = 0 \), the poverty measurement index stands for the proportion of the population in poverty, that is, the incidence of poverty \( P_0 \). When \( \alpha = 1 \), the poverty measurement index
represents the poverty gap, that is, the depth of poverty $P_1$. When $\alpha = 2$, the poverty measurement index stands for the square of the poverty gap, that is, the poverty severity $P_2$. $\alpha$ is the inequality aversion parameter, and the greater the value of $\alpha$, the greater the weight is given to poverty.

Before 2013, China had been carrying out urban and rural household statistical surveys separately. Since 2013, it has been implementing an integrated sample survey of urban and rural household on their income, expenditure and the living conditions, and at the same time releasing data of disposable incomes in categories of national residents, urban residents and rural residents. For data of and prior to the year 2012, only the disposable income of urban residents and the net income of rural residents are available. The data of net per capita income of rural residents and overall disposable income per capita are released in five evenly divided groups. The data released on the disposable income per capita of urban residents further divided the low-income group into the lowest (10 percent) and the relatively low (10 percent), and the high-income group into the highest (10 percent) and the relatively high (10 percent). Taking this into consideration, this paper divides the urban disposable incomes per capita of each year before 2013 into five even groups, namely, taking the simple average values of the lowest income and the low income, as well as the high income and the highest income. Because of the different distribution of income groups in urban and rural areas, with the data released by the National Bureau of Statistics, this paper calculates $\Delta$, the gap between the disposable incomes of urban and rural residents in each of the quintile groups in 2013, and $c$, the gap between the disposable incomes of urban residents and the national average in each of the quintile groups in 2013. In doing so, $c/\Delta$ is the weight coefficient of per capita disposable income of urban residents to that of the whole population in each of the quintile groups[2]. In this way, the average per capita disposable income of the whole population from 2002 to 2012 can be calculated.

Figure 1 shows the changes of poverty indicators from 2002 to 2015 as calculated based on national household disposable income by quintiles. The incidence of poverty is the proportion of the population below the poverty line to the total population. The figure shows that the incidence of poverty has declined rapidly, to the current level of less than 10 percent. The poverty depth and severity are the weighted sum of income gaps between the poverty line and the income of the poor, and they also demonstrate similar trends to the incidence of poverty. It could be inferred that China has achieved great results in poverty reduction.

![Figure 1. Poverty indicators](image-url)
The paper further calculates the growth elasticity of poverty ($\eta$), which is defined as the proportional change in poverty when there is a growth rate of 1 percent. If $\eta$ is negative, it means that economic growth reduces poverty – such alleviation thanks partly to a “bigger pie” as well as enhanced distribution. If $\eta$ is positive, economic progress comes with greater poverty. The results are shown in Figure 2.

The growth elasticity of poverty in Figure 2 stays negative, indicating that economic growth contributes to poverty reduction. However, the pro-poor effect of economic growth has been moderated since 2012.

To understand the impact of growth and distribution in the growth elasticity of poverty, this paper introduces the notion of poverty equivalent growth rate raised by Kakwani and Son (2008). $\eta$ can be decomposed into two components, pure growth effect ($\delta$) and distribution effect ($\varepsilon$) such that $\eta = \delta + \varepsilon$. Pure growth effect will always be negative, whereas distribution effect can be either positive or negative. If $\varepsilon$ is negative, it means that with improving distribution poverty is further reduced. Thus, the degree of pro-poor growth can be measured by an index:

$$\phi = \frac{\eta}{\delta} \quad (2)$$

When $\varepsilon < 0$, which means narrowed income disparity and increased income for the poor, $\phi$ will be greater than 1. Thus, the growth is pro-poor, according to the definition of which the poor benefit proportionally more than the non-poor. When $\varepsilon > 0$, which suggests narrowed income disparity yet decreased income for the poor, growth is not strictly pro-poor even though it still reduces poverty if $0 < \phi < 1$. This situation may be characterized as trickle-down growth (Kakwani and Son, 2008). Economic growth, however, aggregates poverty if $\phi < 0$. This paper calculates pro-poor growth index based on poverty incidence, poverty depth and poverty severity, the results of which are shown in Table I.

As presented in Table I, China’s economic growth in the twenty-first century is in general pro-poor. But before 2005, economic growth cannot be considered highly pro-poor because 2002–2003 indices based on poverty depth and severity are less than 1, though the index based on poverty incidence is greater than 1. This shows that the growth is not technically pro-poor. The income of the low-income population, especially those far below the poverty threshold, grows slower than that of their high-income counterparts. For 2004–2005, the
pro-poor growth indices become negative. The growth effect is positive, though small in number, but the economic growth comes with greater poverty. Since 2002, China has undergone a golden period featuring high growth and low inflation. The soaring food price in 2004–2005, however, caused a moderate increase in CPI. Food price went up by over 26 percent in 2004 and cast a deeper impact on the low-income population given the drastic differences in consumption structures of different income groups. That fully justifies the necessity to depart from the “some get rich first” policy adopted at the beginning of the reform and opening-up to shared development, a new phase toward common prosperity.

Referring to Rongxin Cai’s (2009) interpretation of the relationship between economic growth and income, the paper applies also the distribution curve of population and income (Figure 3) to analyze the ways how fast economic growth, shared development and common prosperity are interrelated with one another.

<table>
<thead>
<tr>
<th>Period</th>
<th>By poverty incidence</th>
<th>By poverty depth</th>
<th>By poverty severity</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>ηδφ</td>
<td>ηδφ</td>
<td>ηδφ</td>
</tr>
<tr>
<td>2002–2003</td>
<td>-0.70 -0.58 1.20</td>
<td>-0.72 -0.85 0.85</td>
<td>-0.69 -0.79 0.87</td>
</tr>
<tr>
<td>2003–2004</td>
<td>-0.79 -0.81 0.97</td>
<td>-1.13 -1.17 0.97</td>
<td>-1.35 -1.38 0.98</td>
</tr>
<tr>
<td>2004–2005</td>
<td>-0.033 0.01 -1.25</td>
<td>-0.02 0.01 -1.63</td>
<td>-0.02 0.01 -1.91</td>
</tr>
<tr>
<td>2005–2006</td>
<td>-1.30 -1.06 1.23</td>
<td>-1.93 -1.52 1.27</td>
<td>-2.35 -1.85 1.27</td>
</tr>
<tr>
<td>2006–2007</td>
<td>-1.72 -1.26 1.37</td>
<td>-2.41 -1.74 1.38</td>
<td>-2.87 -2.07 1.39</td>
</tr>
<tr>
<td>2007–2008</td>
<td>-1.73 -1.30 1.33</td>
<td>-2.20 -1.74 1.27</td>
<td>-2.50 -1.92 1.30</td>
</tr>
<tr>
<td>2008–2009</td>
<td>-2.62 -1.75 1.49</td>
<td>-3.34 -2.26 1.48</td>
<td>-3.82 -2.56 1.49</td>
</tr>
<tr>
<td>2009–2010</td>
<td>-1.62 -1.15 1.41</td>
<td>-2.23 -1.46 1.53</td>
<td>-2.66 -1.89 1.41</td>
</tr>
<tr>
<td>2010–2011</td>
<td>-1.75 -1.30 1.35</td>
<td>-2.10 -1.62 1.30</td>
<td>-2.33 -1.75 1.34</td>
</tr>
<tr>
<td>2011–2012</td>
<td>-2.41 -1.70 1.42</td>
<td>-2.96 -2.06 1.43</td>
<td>-3.35 -2.38 1.41</td>
</tr>
<tr>
<td>2012–2013</td>
<td>-0.28 -0.20 1.40</td>
<td>-0.34 -0.24 1.42</td>
<td>-0.38 -0.28 1.38</td>
</tr>
<tr>
<td>2013–2014</td>
<td>-2.46 -1.88 1.31</td>
<td>-2.90 -2.21 1.31</td>
<td>-3.23 -2.50 1.29</td>
</tr>
<tr>
<td>2014–2015</td>
<td>-2.29 -1.76 1.30</td>
<td>-2.76 -2.05 1.34</td>
<td>-3.11 -2.45 1.27</td>
</tr>
<tr>
<td>2015–2016</td>
<td>-2.29 -1.76 1.30</td>
<td>-2.76 -2.05 1.34</td>
<td>-3.11 -2.45 1.27</td>
</tr>
</tbody>
</table>

Note: *Figures in the table are rounded, and refer to Kakwani and Pernia (2000) for the decomposition methodology of δ and ε*
The economic performance of a developing country in its early stage could be represented by A1, in which scenario most people live under the poverty line with relatively equal income distribution. By letting some get rich first, rapid economic growth brings about higher average income yet broadened inequality. As the economy prospers, the majority’s living standards are enhanced while the effect of poverty reduction is diminished, with some stuck in poverty. At this stage, the income distribution is like A2. Further development might be conducive to increase the income of the poor but with limited impact on inequality as demonstrated by A3 – all are out of absolute poverty but distribution gap remains large. After the eradication of absolute poverty, ensuring the proportional benefit that flows to the poor is higher than that to the average will increase income yet narrow its gap, ultimately forming a positively reinforcing interaction as A4.

The analysis suggests the “some get rich first” policy was meant to unleash productivity and get China out of the “low-income trap” in a quick manner. After its realization, it is important to swiftly adapt to a new mindset of shared development, which charters a new course to the Marxist common prosperity.

3. Pro-poor growth: new insight into common prosperity

As suggested by Figure 1, from 2004 to 2012, the pro-poor effect of China’s economic growth was intensified after the notion of shared development was put forward. However, since China’s economy entered a New Normal in 2009 with slowing-down growth, its marginal effect on poverty reduction has been weakened progressively, which put in front of us an issue – how to further promote common prosperity in the context of the New Normal? There exist few established economic theories or action plans with respect to shared development. Pro-poor growth, however, offers a perspective to achieve both sharing and development.

The World Bank raised in 1990 the notion of broad-based growth featuring equal benefits, and the Asian Development Bank put forward in 1999 pro-poor growth as one of its three pillars for poverty reduction strategy. Pro-poor growth shares the same merits with concepts such as broad-based growth and inclusive growth and is typically defined as the poor benefitting proportionally more from economic growth than the average. Such growth is apparently conducive to common prosperity.

A basic thinking behind pro-poor growth is allowing the low-income population to receive more benefits. It is further categorized in terms of relative, absolute and broad pro-poor growth. The relative concept arises when the income of the poor increases faster than that of the non-poor (Kakwani and Pernia, 2000); pro-poor growth is absolute if the poor receives more absolute benefits than the non-poor (Grosse et al., 2008); and the broad concept defines growth as pro-poor as long as it reduces poverty (Ravallion and Chen, 2003). The absolute pro-poor growth is clearly the strictest definition, followed by relative and then broad ones. This paper adopts the definition of relative pro-poor growth. It first requires increasingly equal opportunities. Second, it emphasizes a fair amount of attention on the poor, making economic growth favorable and sustainable for the majority. Third, it facilitates full employment. To narrow the distribution gap, the poor needs to be fully employed and the increase of labor income should outpace that of capital return.

Pro-poor growth is defined to be favorable for the low-income population, allowing them to enjoy faster income increase. Primary distribution and redistribution determine directly to what extent the economic growth is pro-poor. From that perspective the paper will explore how can the concept of pro-poor growth be made operational.

With the statistics of urban household per capita disposable income by quintiles[3], this paper first applies aforementioned methodologies to calculate pro-poor growth index by poverty incidence. The reason to take poverty incidence as a dependent variable (y) is that poverty incidence, poverty depth and poverty severity are consistent in general. Furthermore, as presented in Figure 1, poverty, however, declines with more weight being added to the...
poorer, suggesting that after years of development China is above subsistence level and absolute poverty is rare. Existing studies have discussed the approach of pro-poor growth (Xie et al., 2017). Based on that, this paper examines provincial panel data and takes provincial per capita GDP changing rate ($pgdp_{it}$), proportion of the tertiary and secondary industries ($ind_{it}$) and urban employment rate ($urb_{it}$) as control variables[4]. The paper includes these control variables because, in the progress of China’s dualistic economy, rural labor has embraced increasing job opportunities in non-agricultural sectors, which narrows the urban-rural income gap, thus improving distribution in general (Cai, 2013). For primary distribution, the paper takes into account indicators such as labor market, general commodity price and housing price. For the measurement of labor market, urban registered unemployment rate ($ru_{it}$) and wage index of urban employees ($wit$) are listed as proxy variables. Price of general commodities is represented by consumer price index in different provinces ($cpi_{it}$). And housing price ($hp_{it}$) is measured by the average price of commercial residential building. Among redistribution factors, expenditures related to well-being are significantly pro-poor for the low-income groups (Lu and Zhang, 2010; Lin, 2005; Zhou et al., 2015), this paper therefore represents redistribution factors with the proportion of government spending in local public expenditure as regards education, healthcare and pension ($pub_{it}$)[5]. Minimum wage ($mw_{it}$), the protection of which benefits the poor, is also taken as a redistribution factor. Above data come from Wind Database and provincial statistical yearbooks.

Limited by data availability, provinces without publishing disposable income by quintiles or only covering a short time span, and those with high data deficiency as regards dependent variables are excluded – in total 15 provinces (autonomous regions) including Tianjin, Shanxi, Jilin, Heilongjiang, Shandong, Hubei, Hunan, Hainan, Guizhou, Yunnan, Tibet, Shaanxi, Gansu, Qinghai and Xinjiang. That leaves a sample pool consisting of 16 provinces and autonomous regions with data from 2006 to 2015. Missing data of a certain year for Hebei, Inner Mongolia, Guangdong, Sichuan and Ningxia are replaced by the average increase rate within the period. Before 2013, a small number of provinces publish household disposable income by septiles, and this paper uses simple average to combine the lowest (10 percent) and the relatively low (10 percent) into the low-income group (20 percent), and similarly the highest (10 percent) and the relatively high (10 percent) into the high-income group (20 percent).

The regression equation can be expressed as follows:

$$y_{it} = \pi + \beta_1 con_{it} + \beta_2 x_{1it} + \beta_3 x_{2it} + \beta_4 x_{3it} + \epsilon_{it},$$

(3)

here $con_{it}$ refers to control variables of $x_{1it}$, $x_{2it}$ and $x_{3it}$, $x_{1it}$ stands for labor market indicators of registered unemployment in urban areas ($ru_{it}$) and the wage index of urban employees ($wit$). $x_{2it}$ stands for price indicators of consumer price index ($cpi_{it}$) and average housing price ($hp_{it}$). $x_{3it}$ represents government-led redistribution, including public spending as a ratio of fiscal expenditure ($pub_{it}$) and minimum wage ($mw_{it}$). In particular, $hp_{it}$ and $mw_{it}$ are put in as logarithms. Descriptive statistics of the variables are shown in Table II.

Based on the Hausman test, the paper adopts the random-effects model and panel data analysis to estimate the impact of primary distribution and redistribution on the degree of pro-poor growth[6]. Since the pro-poor index used in the paper is monotonic, regression coefficients serve as signals for potential pro-poor growth policies. The results are shown in Table III.

Panel data can address inherent problems arising from missing variables. However, due to complex relationship between income distribution and economic growth as well as the continuity issue of poverty changes, this paper has cautiously used the dynamic panel data of the preceding time period for estimation[7]. Despite slightly different estimations based on random-effects panel data and dynamic panel data, variable coefficients are of the same sign.
It could be seen from Table III that per capita GDP coefficients are all positive and significant, meaning that a certain level of economic growth is an important precondition for pro-poor growth. As one should make the cake bigger before dividing it, economic growth is essential for raising income. To achieve common prosperity and make growth more pro-poor, policymakers should focus on sustained and stable economic development. With regard to Equation (1), the coefficient of variation of per capita GDP stands at 0.0245. In other words, when per capita GDP growth rate increases by 1 percent, pro-poor index is up by 0.02. The industry coefficients are all positive but insignificant while employment coefficients are all positive and significant, standing at 2.6155 in Equation (1). It suggests that 1 percent increase in urban employment comes with a significant pro-poor index growth of 2.6155.

In terms of economic size and structure, stable economic increase is conducive to pro-poor growth. However, in the current phase, it is outweighed by structural adjustment. The industry coefficient is not significant but regression analysis shows that urban employment plays a bigger role than economic output. It provides clear policy implication
that the new form of urbanization featuring higher population density should be carried out to promote shared development. According to China’s National Bureau of Statistics, urbanization measured by the number of permanent urban residents reached 57.4 percent in 2016, marking an increase of 4.8 percentage points compared to the end of 2012. With new people-centered urbanization, those who have left the rural areas should be encouraged to settle and work in cities. Moreover, city clusters with dense population and modern infrastructure need to be built for human resources improvement, economic boost and promotion of collaborative and shared development.

In addition, the coefficient of registered unemployment and that of wage growth are negative and significant, pointing to the fact that the labor market is directly linked with pro-poor growth. First, higher unemployment reduces the pro-poor nature of growth. In Equation (1), the coefficient for registered unemployment stands at $-0.1826$, meaning that a 1 percent increase in unemployment leads to a decline of pro-poor index by 0.1826. Second, the coefficient of wage growth is also negative. It suggests that more rapid wage increase comes with increasingly weakened pro-poor growth, which may sound counter-intuitive. Given that the sample period is from 2007 to 2015 when China faced downward economic pressure, overemphasis on wage increase could lead to profit erosion, heavier costs and lower productivity. Wage is more inelastic than profit margin and more discussion is needed to address the relationship between the two variables. A comprehensive analysis of the control variables and labor market indicators makes the case for a shift of development mentality. Efforts should be made to build a macro-policy system centered on higher employment and to improve structure of the resident income by enhancing the proportion of business income (Fan and Xie, 2017).

The results also shed light on price factors in primary distribution. Equation (1) studies the impact of price changes on pro-poor growth. In particular, 1 percent increase of CPI comes with a decline of pro-poor index of 1.9345 but the coefficient is not significant in Equation (1). Based on dynamic panel model, Equation (3)’s estimation has significance and the variable sign remains the same. This shows that price changes have a key impact on pro-poor growth and rapid price increase affects low-income groups more than high-income groups (Zhou et al., 2011). Therefore, from the policy perspective, maintaining price stability is an important leverage for pro-poor growth. The government should follow CPI changes, especially the fluctuation of core price level. In Equation (1), the coefficient of housing price is $-0.7801$, making evident the negative consequence caused by excessively high housing price. Therefore, a pro-poor initiative is to create virtuous interaction between land resources integration/supply and housing price through institutional innovation.

With regard to redistribution factors, the public spending regression coefficients are stable in the three equations and the estimation in Equation (1) is $-2.0678$. The minimum wage variation coefficient stands at 2.1610, suggesting that 1 percent increase in minimum wage leads to pro-poor index going up by 2.1610. A contrast of the regression coefficients of the two variables shows that not all redistribution factors are pro-poor. As a way of “dividing the cake,” public spending is generally considered favorable to the poor. However, different public spending structures generate different pro-poor results (Luo, 2011). Due to traits of high-income groups, they directly benefit more from the government’s spending than low-income groups. Since the minimum wage is designed to protect unskilled workers, it produces better pro-poor growth. The contrast also gives a clear policy signal that redistribution policies should be calibrated to take into account traits of unskilled, low-income groups and that improving public spending structure can better serve pro-poor growth.

By controlling per capita GDP and structural variables, the analysis of primary distribution and redistribution reveals two keys to pro-poor growth. One is carrying out new urbanization with people at the center and the other is making redistribution policies more targeted.
Shared development enriches the meaning of common prosperity as a goal and approach. On the path toward common prosperity based on shared development, it is important to accelerate income growth of low- and medium-income groups through collaborative and shared growth to balance growth and distribution as well as efficiency and equality. The paper uses provincial-level panel data to discuss ways of achieving pro-poor growth. In the New Normal, China’s economy has shifted from high growth to medium to high growth. Focus should be placed on pursuing people-centered new urbanization, creating more job opportunities and enhancing employment as a part of primary distribution, rather than increasing salaries alone. Overly rapid salary growth could lead to erosion of profit and backfire on collaborative and shared growth. In the process of redistribution, traits of low-income groups should be considered for developing accurate policies and systems so as to achieve common prosperity.

Notes
1. The year-on-year US consumer price index is from the Wind Database.
2. The results of calculation are ranked from low- to high-income groups, which are 0.22, 0.32, 0.46, 0.60 and 0.72, respectively.
3. As many provinces do not publish rural household new income by quintiles, this paper takes urban ones to do the math.
4. Among which urban employment rate is represented by the proportion of urban employed population in the entire working population.
5. Only local expenditure is adopted due to the unclear distribution of central expenditure among localities.
6. In the Hausman test, the p-value is 0.99 and the null hypothesis is accepted.
7. The paper uses System GMM two-step estimation for the model. Sargen test p-value stands at 1.0000 and AR(2) test p-value stands at 0.4462, showing that instrumental variables are valid.

References


Further reading


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China’s Belt and Road Initiative and large-scale outbound investment

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Abstract
Purpose – The purpose of this paper is to comprehensively examine the influence of formal and informal institutional differences on enterprise investment margin, mode and result.
Design/methodology/approach – This paper is based on 2,440 micro samples of large-scale outbound investment from 609 Chinese enterprises from the years 2005 to 2016.
Findings – The study has found that formal institutional differences have little impact on investment scale, but significantly affect investment diversification. In order to avoid the management risks brought by formal institutional differences, enterprises tend to a full ownership structure. However, the choice between greenfield investment and cross-border mergers and acquisitions is not affected by formal institutional differences. In contrast, the impact of informal institutional differences is more extensive. Both formal and informal institutional differences significantly increase the probability of investment failure. Further research found that the Belt and Road Initiative (BRI) bridges the formal institutional differences.
Originality/value – The study concludes that developing the BRI, especially cultural exchanges with countries alongside the Belt and Road, will help enterprises to “go global” faster and better.
Keywords Formal institutional differences, Informal institutional differences, Belt and Road Initiative, Large-scale outbound investment
Paper type Research paper

1. Introduction
Despite the late start of Chinese enterprises’ outbound investment, in recent years, under the initiative and guidance of the Chinese Government, the pace of “going global” of Chinese enterprises has accelerated rapidly. According to the 2016 World Investment Report of the United Nations Conference on Trade and Development (UNCTAD), China’s outbound investment ranked second in the world for the first time in 2015, which exceeded the amount of inward foreign investment of the same year for the first time, thus becoming a net exporter of capital. Better enterprises outbound investment will not only meet the investment needs of other countries in the world, especially developing countries, but is also conducive to China’s overcapacity reduction and industrial upgrading. However, at present, international protectionism characterized by anti-globalization prevails, and Chinese enterprises are facing challenges relating to host country’s legal regulations and social culture in further deepening outbound investment cooperation. Therefore, it is of great significance to examine the institutional factors behind the decision making and result of
enterprise outbound investment from the micro perspective of enterprise large-scale outbound investment.

Unlike global outbound investment, which mainly takes place between developed countries, China's outbound investment not only goes into developed countries, but also flows to many developing economies (Jiang and Jiang, 2012a). The diversification of investment targets determines that in outbound investment, Chinese enterprises not only face the challenges of formal institutional differences such as property rights protection, legal norms and judicial systems, they are also challenged by differences in culture, psychology, customs and other informal institutional differences. Moreover, Chinese outbound investments are mainly carried out by state-owned enterprises, which often enjoy ownership advantages such as soft budgetary constraints. They also have certain non-market-driven motives, so a single investment often amounts to hundreds of millions of dollars or even billions of dollars. Compared with small-scale outbound investment, these large-scale investments are more likely to induce discriminatory policies in the host country. Consequently, their investment scale, scope, model and result are special. The existing literature mostly studies from the perspective of Chinese enterprises' total investment and lacks a focused discussion on this issue. Moreover, after China announced the Belt and Road Initiative (BRI), whether the impact of institutional differences between the countries alongside the Belt and Road and China on the decision making and result of large-scale investment will change is vital to the implementation of the BRI in the future. Since few papers have discussed this issue, this paper tries to fill the gap. Specifically, this paper uses 2,440 micro samples of 609 Chinese enterprises outbound investment from 2005 to 2016 to discuss the effects of formal and informal institutional differences on the decision making and result of enterprise investment. The paper shall also discuss whether the impact varies due to the host country's participation in the BRI.

This study has discovered that, first, formal institutional differences significantly hinder the scope of large-scale outbound investment by enterprises but have no significant impact on the scale of investment. At the same time, formal institutional differences drive enterprises to adopt a full ownership structure but have no impact on the investment establishment model. Second, in contrast, the informal institutional differences have more extensive influence on large-scale outbound investment decision-making: expanding the scale of enterprise investment, reducing the scope of enterprise investment and driving the enterprise to adopt a full ownership structure and merger and acquisition mode. Third, both formal and informal institutional differences significantly increase the probability of failure for enterprise large-scale outward investment. Fourth, the complementarities created by the BRI on institutional differences are mainly reflected in formal institutions, while the Initiative's function of bridging the gap between different cultures is relatively inadequate.

The contributions of this paper are as follows: first, this paper provides a comprehensive framework to study the outbound investment by enterprises. Most of the existing literature that discussed the decision making of enterprises' outbound investment focuses on the location choice of enterprises' investment (Jiang and Jiang, 2012b; Wang et al., 2014; Qi and Yang, 2012). The author believes that the outbound investment by enterprises is a systematic process, which includes the decisions of investment scale, investment scope, ownership structure and establishment mode besides location selection. It is of great significance to analyze these aspects of decision-making into a unified research framework for a comprehensive understanding of enterprises' outbound investment behavior.

Second, this paper expands the study of the BRI. Most of the existing literature uses qualitative methods to analyze the effect of the BRI on the countries alongside the Belt and Road (Zhang and Liu, 2015). Only few literatures use a quantitative method, but they fail to analyze the complementation of the BRI and institutional differences (Sun et al., 2017).
This study provides reliable empirical evidence to understand the policy effects of the BRI and its relevant conclusions provide guidance for further implementation of the BRI.

Finally, this paper analyzes detailed micro data of large-scale investment. The existing studies mostly use the data of the total amount of Chinese enterprises’ outbound investment, and it is difficult to reveal the structural characteristics of the outbound investment (Chen, 2014). The use of microdata on large enterprises’ outbound investment (over US$100m) helps to analyze the structural characteristics of the enterprises’ outbound investment. In addition, compares with small scale investment, large outbound investments are more susceptible to institutional differences between home and host countries, then the use of micro data allow for a more accurate estimation of the relationship between the two.

The rest of this paper is arranged as follows: the second part is literature review and research hypothesis, the third part is research design, the fourth part is the results analysis, the fifth part is further discussion and the sixth part is the conclusions and policy implications.

2. Literature review and research hypothesis

2.1 Literature review

The research on Chinese enterprises’ outbound investment is mainly carried out from three aspects. First, some literature has demonstrated the motivation of Chinese enterprises’ outbound investment from the perspective of enterprises’ individual characteristics. These studies generally believe that companies with stronger competitive advantages and higher productivity are more likely to invest abroad and are more likely to make larger investments (Tian and Yu, 2012; Ge and Luo, 2013). Second, some literature has studied the impact of enterprise outbound investment. Li and Jin (2011) found that Chinese enterprises’ outbound investment creates reverse technology spillover in the regions where the enterprises are located. Yu and Yang (2014) and Jiang and Jiang (2014) studied the export effects of outbound investment, but due to the differences in research perspectives, the conclusions were different. Furthermore, some literature studies the influencing factors of Chinese enterprises’ outbound investment from the institutional environment of the host country and the institutional differences between the home country and the host country (Habib and Zurawicki, 2002; Zong et al., 2012). Among them, how the institutional differences affect the location choice of enterprises’ outbound investment has received the most attention (Jiang and Jiang, 2012b; Wang et al., 2014). And, both formal and informal institutional environment and their differences are seen as important factors influencing enterprises’ outbound investment (Jiang and Jiang, 2012a; Qi and Yang, 2012).

While the existing literature mostly focused on location selection, the process of enterprises’ outbound investment involves not only location selection, but also the selection on investment scale and scope, ownership structure and investment modes. Although some papers have analyzed the investment decisions of enterprises from different perspectives, they lack a unified framework in discussing investment scale and scope, as well as the ownership structure and investment mode (Liu and Yang, 2016; Zhou and Zhang, 2014). Furthermore, the ultimate goal of enterprises’ outbound investment decision making is to improve the investment performance, so it is necessary to examine the enterprises’ investment decision making and performance at the same time (Liu and Yang, 2016; Yang et al., 2016). In view of this, this paper attempts to construct a complete research framework in order to comprehensively examine the impact of institutional differences on enterprises’ outbound investment decisions and results.

2.2 Theoretical analysis and research hypotheses

Generally speaking, to avoid risks, enterprises tend to choose a host country with a formal institutional environment that is similar to that of its home country. Therefore, the smaller the formal institutional differences between the home country and the host country, the large the
scale of outbound investment (Habib and Zurawicki, 2002). A number of studies have pointed out that this theory is only applicable to international investment between developed countries, while Chinese enterprises are special in their outbound investment. Specifically, since China’s outbound investment is mainly carried out by state-owned enterprises, they have “two motives” and ownership advantages in outbound investment and may prefer to invest in host countries whose formal institutions are very different from China (such as African countries) (Jiang and Jiang, 2012a; Morck et al., 2008). However, when investing in host countries with similar formal institutions, Chinese enterprises can replace formal institutions with “connections” to enjoy many conveniences brought by “non-market skills”, thus greatly reducing the costs of institutional adaptation and organizational coordination (Kolstad and Wiig, 2012). For multinational enterprises, the external environment is far more complex than that of domestic operations, and the similarity of formal institutions makes it easier for Chinese enterprises to understand the environments in both countries, which is crucial for both market and non-market investment incentives. Therefore, when the formal institutions of the host country and China differ greatly, the possibility of Chinese enterprises’ outbound investment is reduced. Enterprises’ foreign investment involves not only the scope of investment, but also the scale of investment. For large enterprises, once they decide to enter a certain host country, then the decision is a dominant strategy, and the impact of formal institutional differences on investment scale may be extremely limited.

Similar to formal institutional differences, informal institutional differences such as culture differences between home country and host country are also important factors affecting enterprises’ outbound investment. Peretiatko and D’Souza (2005) pointed out that cultural similarity can promote enterprises’ outbound investment. For example, similar cultural backgrounds allow Australia to receive more outbound investment from US companies than any other countries in the Asia-Pacific region. Chang and Rosenzweig (2001) found that cultural differences can prevent firms from entering a host market. The influence of cultural differences stems from the fact that different cultures contain different business philosophy. Enterprises that have experienced the cultural influence of their home country may face cultural conflicts when investing abroad, and their original internal management model and organization strategy may not adapt to the cultural background of the host country. Even large enterprises with a good management system and strong adaptability cannot fully avoid such influence. Therefore, when the cultural and other informal institutions between the host country and China differ greatly, the possibility of large-scale outbound investment by Chinese enterprises will also decrease. However, informal institutional differences such as cultural difference are different from formal institutional differences. Compared with formal institutions, which is displayed through explicit knowledge, the informal institutional differences such as cultural difference are more hidden. Even when the home country and the host country share great similarities in the formal institutions, the social culture of the host country may still hide resistance to transnational corporations. Therefore, when enterprises decide to invest in a host country, in order to avoid the cultural divergence, they tend to make a large investment in order to strengthen the cultural attributes of the home country (Cui and Jiang, 2009).

Based on the above analysis, this paper proposes the following hypothesis:

**H1.** Formal institutional differences significantly reduce large-scale outbound investment scope but have no significant impact on investment scale. Informal institutional differences such as cultural differences significantly reduce the scope of investment and help to expand the scale of outbound investment.

As for outbound investment, enterprises not only need to decide the scope and scale of investment, but also need to choose an appropriate ownership structure and establishment mode. According to the transaction cost theory, both formal institutional difference, such as
law, and informal institutional difference, such as cultural difference, will significantly increase the cost of information exchange and technology transfer between the home country and the host country. Therefore, when there is a large institutional difference between the home country and the host country, the enterprise tends to adopt a prudent investment strategy to reduce the intensity and control of investment in the host country, resulting in the joint venture model in the ownership structure (Pan and Lu, 2006). However, the institutional differences between the home country and the host country may also make it difficult to effectively transplant internal regulations and corporate culture into the joint venture, which could incur risk for outbound investment. Therefore, enterprises may choose to gain absolute control of the host country subsidiaries and to reduce the potential risk of internal management when faced with institutional differences (Brouthers and Brouthers, 2000). For enterprises making large outbound investments, risk aversion is clearly a higher priority than reducing the cost through share transfer. Moreover, factors such as sufficient funding and bargaining power often drive enterprises to favor the wholly-owned equity mode.

Enterprises choose the mode of cross-border merger and acquisition can also reduce the intensity of outbound investment. In cross-border merger and acquisition, the parent company directly acquires or merges foreign companies. While another important mode, greenfield investment, means that the parent company establishes a brand-new enterprise in the host country (Zhang et al., 2012). Through cross-border mergers and acquisitions, the parent company can obtain the resources of the acquired company. Through greenfield investment, the parent company can gain absolute control over the new company. But, of course, it also needs to bear more fixed investment costs (Jiang and Jiang, 2017). For enterprises that make large-scale outbound investments, fixed costs are not the main constraint, and companies tend to grasp control in order to maximize the company’s unique advantages. Due to the existence of control claims, the positive relationship between institutional differences and corporate bias toward cross-border M&A entry patterns may be greatly weakened. However, when multinational companies invest in other countries’ markets, compared with formal institutional differences, cultural and other informal institutional differences are more prominent sources of risk at the national level and cannot be eliminated in a short period of time. For large multinational corporations, operating risks caused by cultural differences are especially serious. Therefore, when faced with huge cultural differences, these corporations are more inclined to choose the entry mode of cross-border mergers and acquisitions. Therefore, this paper proposes the following hypothesis:

H2. Formal institutional differences drive companies to adopt a full ownership structure, but doesn’t induce them choose cross-border M&A mode more. Informal institutional differences such as culture not only increase the probability of companies adopting a full ownership structure, but also make them choose cross-border mergers and acquisitions rather than greenfield investment.

Institutional differences not only affect the enterprises outbound investment decision making in many aspects, they ultimately will also increase the risk of investment failure. Formal institutional differences between the home country and the host country can easily trigger political conflicts between the two countries. Although the risks of direct confiscation, expropriation and nationalization of enterprises’ outbound investment assets by the host country have been significantly reduced, the host country government may transfer the cost of political conflict caused by formal institutional differences to the enterprises through discriminatory policies and other means and increase the probability of failure of outbound investment (Yang et al., 2016; Yang, 2012). Moreover, when the cultural differences between the home country and the host country are relatively large, in the context of counter-globalization and increasing national sentiment, multinational corporations with the cultural
imprint of the home country may become the target of public criticism and bear high operational risks. In case of an outbreak of national sentiment, enterprise outbound investment projects are likely to fall victim to the cultural gap. Especially in cases of large-scale outbound investment, the impact on the host country’s economy, employment and culture will be enormous, so these enterprises often bear the brunt in the conflict. Therefore, this paper proposes the following hypothesis:

H3. Both formal and informal institutional differences will significantly increase the probability of failure of large-scale enterprise outbound investment.

The impact of institutional differences on enterprises outbound investment is not static. It may depend on the bilateral investment agreements and political relations between the home country and the host country (Zong et al., 2012; Liu and Yang, 2016; Yang et al., 2016). China launched the BRI at the end of 2013, which is conducive to achieving connectivity and expanding exchanges and cooperation among the governments of countries alongside the Belt and Road. As of August 2016, as many as 34 countries and international organizations have signed intergovernmental cooperation agreements with China. One of the priorities of the BRI is to speed up the implementation of the bilateral national free trade zone strategy, which will promote the improvement of investment rules between China and the countries alongside the Belt and Road, overcome the investment risks brought about by formal institutional differences and create a formal institutional environment conducive to outbound investments. However, in addition to the formal institutional environment, cultural factors such as social customs, religious beliefs and social credit in countries alongside the Belt and Road are also important factors that determine whether foreign capital can be recognized by the host country. At present, the BRI still mainly focus on intergovernmental cooperation and exchanges and lacks functional arrangements of informal institutions. Therefore, this paper proposes the following hypothesis:

H4. The complementarities created by the BRI are mainly shown in formal institutional differences. However, the Initiative still lacks functional arrangements to bridge cultural differences.

3. Research design
3.1 Regression method
First, in order to analyze the influence of institutional difference between China and host countries on the dual margin of large-scale outbound investment, the following model is proposed:

\[ \text{ofdi}_{ijt} = x_0 + x_1 \text{diff}_{jt} + \beta X_{jt} + \lambda_i + \mu_t + \epsilon_{ijt}. \] (1)

In this model, i, j and t represent the enterprise, the host country and year, respectively, and \( \text{ofdi} \) represents the dual margin of outbound investment, which is decomposed into intensive (investment scale) and extensive margin (investment scope). \( \text{diff} \) denotes the institutional difference between China and the host country, including both formal and informal institutional difference. Control variables on the national level are expressed as \( X \), industry fixed effect of investing enterprises as \( \lambda_i \), time fixed effects as \( \mu_t \) and the residual as \( \epsilon_{ijt} \).

Second, the following model is created to demonstrate the influence of institutional difference between China and the host country on enterprises’ investment mode:

\[ \text{Prob}(\text{mod } e_{ijt} = 1) = x_0 + x_1 \text{diff}_{jt} + \beta X_{jt} + \lambda_i + \mu_t + \epsilon_{ijt}. \] (2)

Outbound investment mode by enterprises is investigated from two perspectives, ownership structure and mode of entry. In Equation (2), mode represents, on the one hand, different
ownership structures. The value of this variable is 1 for wholly owned subsidiaries and 0 for joint ventures. On the other hand, it also represents different modes of entry. The value of mode is 1 for greenfield investment and 0 for mergers and acquisitions.

Third, the following model is constructed to analyze the influence of institutional difference between China and the host country on investment result:

\[
\text{Prob}(\text{trouble}_{ijt} = 1) = \frac{1}{C_0} = a_0 + a_1 \text{diff}_{jt} + \theta X_{jt} + \lambda_i + \mu_t + e_{ijt}
\]  

In this equation, trouble represents the investment result. The value is 1 when the outbound investment failed and 0 when succeeded.

Finally, to explore whether the BRI has changed the influence of institutional difference between China and countries along the Belt and Road on outbound investment by enterprises, the following model is constructed:

\[
\text{Prob}(\text{mode}_{ijt} = 1) = \frac{1}{C_0} = a_0 + a_1 \text{diff}_{jt} + \frac{a_2 \text{diff}_{jt}}{C_2} \text{bar}_{jt} + \theta X_{jt} + \lambda_i + \mu_t + e_{ijt}
\]  

In this model, \text{bar}_{jt} represents whether the host country \text{j} has been influenced by BRI in year \text{t}. As President Xi Jinping proposed the BRI at the end of 2013, for countries along the Belt and Road, when \text{t} \geq 2014, \text{bar}_{jt} is 1. Otherwise, the value is 0. \text{diff}_{jt} and \text{diff}_{jt} \times \text{bar}_{jt} are two core explanatory variables to pay attention to. If \alpha_2 and \alpha_1 are both positive or negative, it indicates that BRI has reinforced institutional difference’s influence on outbound investment. If the signs of \alpha_2 and \alpha_1 are opposite, it indicates that BRI has weakened institutional difference’s influence on outbound investment.

3.2 Variables and data
3.2.1 Dependent variables. There are three types of variables: investment margin, investment mode and investment result.

3.2.1.1 Investment margin. Referring to Liu and Yang (2016) and Yang et al. (2016), this paper divides large-scale outbound investment margin into intensive and extensive margins. Intensive margin refers to the average outbound investment by enterprises to country–industry pairs in one year, and extensive margin refers to the quantity of country-industry pairs of outbound investment by enterprises in one year. The equation is as follows:

\[
of di_{ijt} = \sum_{j=1, h=1}^{\text{int ensive}} \text{of di}_{ijht} = (\text{of di}_{\text{value}_{ijt}}) \times \left( \sum_{j=1}^{\text{extenive}} \text{of di}_{\text{num}_{ijt}} \right),
\]

where \text{of di}_{ijt} stands for the total outbound investment by enterprise \text{i} in year \text{t}, and \text{of di}_{ijht} stands for the investment by enterprise \text{i} in year \text{t} to industry \text{h} of country \text{j}. \text{of di}_{\text{value}_{ijt}} represents the average investment made by enterprise \text{i} in year \text{t} to the country–industry pair, i.e. the intensive margin. \text{of di}_{\text{num}_{ijt}} represents the number of industries in country \text{j} that enterprise \text{i} has invested in year \text{t}, and the total sum on national level is the extensive margin.

3.2.1.2 Investment mode. The outbound investment mode is investigated from two perspectives: the ownership structure and the mode of entry. First, in terms of ownership
structure, enterprises have two options: fully owned subsidiaries and joint ventures. According to Zhou and Zhang (2014), a subsidiary is considered wholly owned by its parent company if over 95 percent of its share is held by the parent company. Otherwise, it is a joint venture. Thus a dummy variable sharemode is introduced to represent the ownership structure of the outbound investment. The value of this variable is 1 for wholly owned subsidiaries and 0 for joint ventures. Second, in terms of mode of entry, two options are available: greenfield investment and mergers and acquisitions. Thus, a dummy variable greenmode is introduced to represent the mode of entry. The value of this variable is 1 for greenfield investment and 0 for mergers and acquisitions.

3.2.1.3 Investment result. A dummy variable trouble is introduced to denote the result of the investment made to host country \( j \) by enterprise \( i \) in year \( t \). The value is 1 if the investment failed and 0 if succeeded.

3.2.2 Independent variables. Institutional difference variables are classified into formal and informal institutions variables.

3.2.2.1 Formal institutional difference (\( \text{Idiff} \)). Referring to Jiang and Jiang (2012a), Wang et al. (2014) and Kolstad and Wiig (2012), this paper intends to evaluate the quality of formal institutions of different countries based on World Bank’s Worldwide Governance Indicators. The indicators include six dimensions, i.e., Political Stability, Government Effectiveness, Regulatory Quality, Rule of Law, Voice and Accountability and Control of Corruption. The average of the six indicators is taken as each country’s final score of formal institutions. Formal institutional difference is calculated by the score difference between China and the other countries. When the direction is not considered, then the absolute difference of the two is taken. When the direction is considered, if the host country’s formal institution is better than China, then there is a positive difference; if the host country’s formal institution is worse than China, there is a negative difference.

3.2.2.2 Informal institutional difference (\( \text{Cdiff} \)). The most important aspect of the informal institution of a country is the culture; therefore, this paper adopts culture difference as the indicator to measure informal institutional difference between countries. According to Hofstede (2005), cultural difference index incorporates four dimensions, namely, power distance, uncertainty avoidance, individualism vs collectivism and masculinity vs femininity. Considering states visits and cultural exchange activities after the establishment of diplomatic relations will help narrow down the culture difference, this study includes the history of diplomatic relations to the cultural difference index. The equation for evaluating the informal institutional difference between countries is as follows:

\[
\text{Cdiff}_j = \frac{\sum_{i=1}^{t} \left( \frac{(I_{ij} - I_{ic})^2}{V_i} \right)}{4} + \frac{1}{T_j},
\]

where \( \text{Cdiff} \) denotes the informal institutional difference between China and country \( i \). \( I_{ij} \) is the value of the \( i \)th dimension of cultural indicator of country \( j \), and \( I_{ic} \) is the value of the \( i \)th dimension of cultural indicator of China. \( V_i \) denotes the variance of the \( i \)th dimension of cultural indicator. \( T_j \) is the years of diplomatic relation between China and country \( j \). \( 1/T_j \) shows that the longer the diplomatic relation, the smaller the informal institutional difference.

3.2.3 Control variables. Referring to previous studies, this paper adds a series of control variables in the regression model (Buckley et al., 2007; Qi and Wang, 2012): labor standard of the host country (Labor), measured by natural logarithm of tuberculosis incidence (per
100,000 persons); natural resource of the host country (Resource), measured by the percentage of ores and metals export to the total export; signing of Avoidance of Double Taxation Agreement (Sign): if agreement was signed between China and the host country in that year, the value is 1, otherwise the value is 0; host country being a member of GATT or WTO (Gatt): if so, the value is 1, otherwise the value is 0; economic development level of the host country (lnGdp), measured by natural logarithm of total GDP of the country or region; years of diplomatic relationship (time), calculated based on the establishment year of diplomatic relationship between China and the host country; geographic distance (Distance), the natural logarithm of the geographic distance between China’s capital city and that of the host country.

3.2.4 Sample and data. The data of outbound investment by enterprises are from China Global Investment Tracker 2005–1016 created by American Enterprise Institute and the Heritage Foundation. The data set documented all outbound investment over US$100m (including verifiable investment and construction contracts) made by Chinese enterprises, which can be used to study large-scale investment decisions by Chinese enterprises. The data set provides detailed information about the volume, industry, country and result of each investment, based on which the dual margin, investment mode and investment result can be obtained. Data of formal institution quality are retrieved from Worldwide Governance Indicator of World Bank; data of culture distance is from Hofstede’s website; and the establishment year of diplomatic relationship is inquired from website of Ministry of Foreign Affairs, the People’s Republic of China. Countries along the Belt and Road are listed in the Statistical Communiqué on China’s Foreign Investment. Development indicators including host country’s total GDP, GDP deflator, tuberculosis incidence, ratio of ores and metals export to the total export are from the database of World Bank. Information of Avoidance of Double Taxation Agreement between China and the host country is from the website of State Administration of Taxation. The list of GATT and WTO members and geographic distance between China and the host country is inquired from CEPII. Partially missing values are filled with linear interpolation. Table I summarized descriptive statistics of major variables.

4. Results
4.1 Baseline regression
4.1.1 Influence of institutional difference on investment margin. Table II presents the regression result of the impact of institutional difference and the BRI on outbound investment dual margins. Based on columns (1)–(4), formal institutional difference exerts a positive influence on the intensive margin of outbound investment, but the influence does not prove a statistical significance. While informal institutional difference has a significant positive influence on the intensive margin of outbound investment, that is, the greater the informal institutional difference, the larger the outbound investment scale. The results show that cultural difference could bring about “Benefit of Foreignness.” Neither the estimated cross-term between BRI and the formal institutional difference nor that between BRI and informal institutional difference is significant, showing that in terms of an outbound investment scale, BRI fails to be complementary to institutional difference.

Based on columns (5)–(8), both formal and informal institutional differences exert significant negative influence on the extensive margin of outbound investment. This means that similar institution is significantly preferred by large-scale outbound investment enterprises. The more institutional similarities China and the host country share, the lower the cost of policy adaptation and organizational coordination, so that the more likely Chinese enterprises are to invest in the host country. Furthermore, compared with formal institutional difference, informal institutional difference exerts greater
negative influence on the extensive margin, which means it is more difficult to bridge informal institutional difference including cultural and psychological gaps than to adapt to policies, laws and other formal institutional difference. It takes time to better understand the condition of host countries and effectively replicate the recessive knowledge of enterprises when faced with wide cultural gaps. The estimated cross-term between BRI and formal institutional difference is significantly positive and that between BRI and informal institutional difference failed the test of significance, showing that BRI helps to overcome formal institutional difference and expand investment scope, yet lacks the function of bridging cultural and psychological gaps. The abovementioned results proved $H1$ and $H4$.

4.1.2 Influence of institutional difference on investment mode. Table III shows the regression result of the impact of institutional difference and the BRI on outbound investment mode. From columns (1) to (4), estimated coefficients of formal institutional difference are positive; the value in column (1) is not significant, and the value in column (2) is significant at the 5 percent level. This means that the greater the institutional difference between China and the host country, the more likely the enterprises are to invest through wholly-owned subsidiaries. Estimated coefficients of informal institutional difference are also positive, and the value in columns (3) and (4) are significant. This also indicates that the greater the cultural difference, the more likely the enterprises invest through wholly owned subsidiaries. When faced with great institutional difference, for the purpose of risk aversion, having absolute control of overseas subsidiaries to reduce potential risks of internal management outweighs the consideration of reducing information transaction costs through equity transfer (Brouthers and Brouthers, 2000).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Connotation</th>
<th>Sample size</th>
<th>Mean value</th>
<th>SD</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extensive</td>
<td>Extensive margin of outbound investment</td>
<td>2,440</td>
<td>6.784</td>
<td>7.494</td>
<td>1</td>
<td>28</td>
</tr>
<tr>
<td>Sharemode</td>
<td>Ownership structure (wholly-owned = 1, joint venture = 0)</td>
<td>709</td>
<td>0.230</td>
<td>0.421</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Greenmode</td>
<td>Mode of entry (Greenfield = 1, M&amp;A = 0)</td>
<td>2,440</td>
<td>0.134</td>
<td>0.340</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>trouble</td>
<td>Investment result (fail = 1, success = 0)</td>
<td>2,440</td>
<td>0.083</td>
<td>0.276</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Idiff</td>
<td>Natural logarithm of formal institutional difference</td>
<td>2,440</td>
<td>−0.607</td>
<td>1.248</td>
<td>−7.711</td>
<td>0.866</td>
</tr>
<tr>
<td>Cdiff</td>
<td>Informal institutional difference</td>
<td>1,806</td>
<td>2.211</td>
<td>1.382</td>
<td>0.322</td>
<td>5.626</td>
</tr>
<tr>
<td>bar</td>
<td>Influenced by the Belt and Road Initiative or not</td>
<td>2,440</td>
<td>0.134</td>
<td>0.341</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Labor</td>
<td>Natural logarithm of tuberculosis incidence (per 100,000 persons)</td>
<td>2,440</td>
<td>3.288</td>
<td>2.073</td>
<td>0.470</td>
<td>6.884</td>
</tr>
<tr>
<td>Resource</td>
<td>Natural logarithm of percentage of ores and metals export to total export</td>
<td>2,440</td>
<td>0.949</td>
<td>1.589</td>
<td>−8.756</td>
<td>4.459</td>
</tr>
<tr>
<td>Sign</td>
<td>Signed Avoidance of Double Taxation Agreements with China or not</td>
<td>2,440</td>
<td>0.792</td>
<td>0.406</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Gatt</td>
<td>Whether the host country is a member of GATT or WTO</td>
<td>2,440</td>
<td>0.716</td>
<td>0.451</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Gdp</td>
<td>Natural logarithm of host country’s economic development level</td>
<td>2,440</td>
<td>25.980</td>
<td>4.057</td>
<td>19.223</td>
<td>30.460</td>
</tr>
<tr>
<td>Time</td>
<td>Years of diplomatic relation</td>
<td>2,440</td>
<td>42.680</td>
<td>13.230</td>
<td>0</td>
<td>68</td>
</tr>
<tr>
<td>Distance</td>
<td>Natural logarithm of geographic distance between the host country and China</td>
<td>2,440</td>
<td>8.825</td>
<td>0.997</td>
<td>6.696</td>
<td>9.668</td>
</tr>
</tbody>
</table>

Table I. Descriptive statistics of main variables
### Table II

Institutional difference, BRI and investment margins

<table>
<thead>
<tr>
<th>Variables</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
<th>(8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Idiff</td>
<td>0.014 (0.015)</td>
<td>0.008 (0.017)</td>
<td>–</td>
<td>–</td>
<td>-0.071*** (0.020)</td>
<td>-0.092*** (0.022)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Idiff × bar</td>
<td>–</td>
<td>0.020 (0.033)</td>
<td>–</td>
<td>–</td>
<td>0.050** (0.025)</td>
<td>0.305** (0.043)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Cdiff</td>
<td>–</td>
<td>–</td>
<td>0.063*** (0.022)</td>
<td>0.050** (0.025)</td>
<td>–</td>
<td>–1.12*** (0.029)</td>
<td>0.113*** (0.030)</td>
<td>0.050 (0.063)</td>
</tr>
<tr>
<td>Cdiff × bar</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>0.003 (0.047)</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>bar</td>
<td>–</td>
<td>-0.052 (0.063)</td>
<td>–</td>
<td>-0.073 (0.100)</td>
<td>–</td>
<td>0.374*** (0.079)</td>
<td>–</td>
<td>0.016 (0.136)</td>
</tr>
<tr>
<td>Constant term</td>
<td>5.092*** (0.361)</td>
<td>5.928*** (0.360)</td>
<td>5.901*** (0.357)</td>
<td>5.901*** (0.357)</td>
<td>1.249*** (0.243)</td>
<td>1.166*** (0.241)</td>
<td>1.823*** (0.339)</td>
<td>1.751*** (0.366)</td>
</tr>
<tr>
<td>lnalpha</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>-0.344*** (0.027)</td>
<td>-0.359*** (0.027)</td>
<td>-0.331*** (0.031)</td>
<td>-0.323*** (0.031)</td>
</tr>
<tr>
<td>Control variable</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Industry fixed effect</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Time fixed effect</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Sample size</td>
<td>2,440</td>
<td>2,440</td>
<td>1,806</td>
<td>1,806</td>
<td>2,440</td>
<td>2,440</td>
<td>1,806</td>
<td>1,806</td>
</tr>
</tbody>
</table>

**Notes**: Values in brackets are heteroscedasticity-robust standard errors; the same with the tables below. The generalized least squares approach is adopted from column (1) to (4), and negative binomial regression is used from column (5) to (8). ****, ***Significant at the 5 and 1 percent significant levels, respectively.
Table III.
Institutional difference, BRI and investment mode

<table>
<thead>
<tr>
<th>Variables</th>
<th>Sharemode</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>Greenmode</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
<td>(6)</td>
<td>(7)</td>
<td>(8)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$Idiff$</td>
<td>0.150 (0.101)</td>
<td>0.312** (0.125)</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>0.004 (0.035)</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$Idiff \times bar$</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>0.186*** (0.051)</td>
<td>–</td>
<td>–</td>
<td></td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>$CIdiff$</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>0.001 (0.071)</td>
<td>–</td>
<td>–</td>
<td></td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>$CIdifff \times bar$</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>0.033 (0.107)</td>
<td>–</td>
<td>–</td>
<td></td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Constant term</td>
<td>4.340*** (0.343)</td>
<td>1.731*** (0.345)</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>2.897*** (0.529)</td>
<td>–</td>
<td>–</td>
<td></td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Control variable</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td></td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Industry fixed effect</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td></td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Time fixed effect</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
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<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Sample size</td>
<td>709</td>
<td>709</td>
<td>593</td>
<td>593</td>
<td>2,391</td>
<td>2,391</td>
<td>1,775</td>
<td>1,775</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: ***, ** Signiﬁcant at the 10, 5 and 1 percent signiﬁcant levels, respectively.
When carrying out a large-scale outbound investment, well-funded parent enterprises pursuing discourse power are inclined to invest through wholly owned subsidiaries. The estimated coefficient between BRI and formal institutional difference is significantly negative and that between BRI and informal institutional difference failed the test of significance. It shows that BRI can be a complement to the formal institution and reduce risks of joint ventures, yet still lacks the function of bridging cultural gaps.

Based on columns (5)–(8), in terms of investment mode, estimated coefficients of formal institutional difference in columns (5)–(6) failed the test of significance, while the estimated coefficients of informal institutional difference in columns (7) and (8) are significantly negative. This means that the formal institutional difference does not promote cross-border M&A, while the larger the cultural difference is, the more likely the company is to adopt cross-border M&A. The parent company obtains the technology, brand, marketing network and other resources of the acquired enterprise through cross-border M&A; through greenfield investment, the parent company obtains more control but has to bear more fixed costs. For a parent company carrying out a large-scale outbound investment, its investment decision is less likely to be constrained by fixed costs, but it is more difficult to manage operational risk brought up by cultural difference than institutional difference. Therefore, enterprises tend to acquire cultural identity through cross-border M&A. The estimated cross terms between BRI and formal and informal institutional difference both failed the test of significance, showing that the general tendency of going global at a rapid pace is not influenced by BRI. Chinese enterprises tend to invest through cross-border M&A rather than greenfield investment in the pursuit of high-speed internalization. The abovementioned results proved $H_2$ and $H_4$.

### 4.1.3 Influence of institutional difference on investment results

Table IV shows the regression results of the impact of institutional difference and the BRI on investment performance. Based on columns (1)–(4), estimated coefficients of formal and informal institutional difference are significantly positive, meaning that the possibility of outbound investment failure grows with institutional difference. Compared with the research of Liu and Yang (2016), this result further proves that informal institutional difference can also enlarge risk of investment failure. The estimated coefficient between BRI and formal institutional difference is significantly negative, while that between BRI and informal institutional difference failed the test of significance. Thus, BRI can effectively reduce risk of investment failure due to BRI as a complement to formal institutional difference, yet it is not complementary to informal institutional difference. The abovementioned results proved $H_3$ and $H_4$.

<table>
<thead>
<tr>
<th>Variables</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$Idiff$</td>
<td>0.112**</td>
<td>0.174***</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>$Idiff \times bar$</td>
<td>–</td>
<td>–0.248**</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>$Cdiff$</td>
<td>–</td>
<td>–</td>
<td>0.134***</td>
<td>0.136**</td>
</tr>
<tr>
<td>$Cdiff \times bar$</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>0.011 (0.108)</td>
</tr>
<tr>
<td>$bar$</td>
<td>–0.216 (0.283)</td>
<td>–0.015 (0.179)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Constant term</td>
<td>1.325*</td>
<td>1.496*</td>
<td>2.391</td>
<td>2.391</td>
</tr>
<tr>
<td>Control variable</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Industry fixed effect</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Time fixed effect</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Sample size</td>
<td>2,391</td>
<td>2,391</td>
<td>1,753</td>
<td>1,806</td>
</tr>
</tbody>
</table>

**Notes:** *, **, ***Significant at the 10, 5 and 1 percent significant levels, respectively.

*Belt and Road Initiative*
4.2 Robustness checks

Table V shows the results of robustness checks carried out with different variables and different estimation methods. First, the formal and informal institutional difference used in the baseline regression was the average value of various sub-parameters; thus, it is necessary to verify the robustness with the sub-parameters. The parameter of "judicial effectiveness" is used in columns (1) and (3) to measure the formal institutional difference, and the results are basically the same as that of the baseline regression. The parameter of "individualism and collectivism" is used in columns (2) and (4) to measure informal institutional difference, and the results are basically the same as that of the baseline regression. Second, when explaining variables are dummy variables, the Probit model was adopted in this paper; thus, it is necessary to verify the robustness by Logit model. Results in column (5)–(10) demonstrate that the conclusions are still valid under a different estimation method.

4.3 Endogeneity

The core explaining variables of the paper are institutional difference and BRI, which are less threatened by endogeneity. Because, on the one hand, the institution of a country, which is a result of long-term evolution, is unlikely to change in a short term; on the other hand, shock from BRI comes up randomly, since the time when China proposes the initiative depends on if consensus has been reached with other countries. Hardly can any country predict when China will reach the equilibrium with other countries during the dynamic process of gaming (Sun et al., 2017). Besides, nations are included into the BRI span because of their geographical locations and historical backgrounds, which are exogenous in nature. However, errors may exist in the measurement of institutional difference, and in order to ensure a certain level of freedom, the author did not control fixed effect of country. Therefore, it is still necessary to test the endogeneity that may exist in institutional difference. The lagged variable of institutional difference after one year is adopted as the instrumental variable for TSLS regression. F-value is larger than 10 in the first stage, indicating little problems exist in weak instruments. A detailed report is omitted on account of space limitation. Table VI shows the results in the second stage, demonstrating that the main conclusions of the paper are still valid considering endogeneity.

5. Further discussion

5.1 Estimates of different industries

The above analysis shows that the institutional differences between China and the host country have an impact on the large-scale outbound investment by enterprises, and the BRI also bridges institution difference to some extent. The next question is whether the conclusion still holds for different industries. To answer this question, the author analyzes the heterogeneity between manufacturing and service industries, and the results are showed in Table VII[1].

Panel A in Table VII shows estimates based on samples of the manufacturing sector. It shows that the formal institutional differences between the host country and China have significantly hindered the diversification of enterprises’ outbound investment in the manufacturing industry, increased the probability of enterprises adopting a full ownership structure and raised the possibility of enterprises’ failure in outbound investment in the manufacturing industry. Similarly, informal institutional differences also significantly hinder the diversification of enterprises’ outbound investment in the manufacturing industry and increase the probability of failure of enterprises’ outbound investment in the manufacturing industry. What is different is that informal institutional differences also significantly reduce the probability that enterprises will adopt the greenfield investment when investing in the manufacturing industry. In addition, the complementarities created by the BRI are more conspicuous in formal institutional differences than in informal institutional differences.
<table>
<thead>
<tr>
<th>Variables</th>
<th>Intensive</th>
<th>Extensive</th>
<th>Sharemode</th>
<th>Greenmode</th>
<th>trouble</th>
</tr>
</thead>
<tbody>
<tr>
<td>Idiff</td>
<td>0.016 (0.018)</td>
<td>–</td>
<td>0.688** (0.271)</td>
<td>–</td>
<td>0.009 (0.063)</td>
</tr>
<tr>
<td>Idiff x bar</td>
<td>–0.046 (0.056)</td>
<td>–</td>
<td>–1.112*** (0.417)</td>
<td>–</td>
<td>–0.006 (0.122)</td>
</tr>
<tr>
<td>Cdiff</td>
<td>–</td>
<td>0.006 (0.009)</td>
<td>–</td>
<td>0.163 (0.081)</td>
<td>–</td>
</tr>
<tr>
<td>Cdiff x bar</td>
<td>–</td>
<td>–0.029 (0.068)</td>
<td>–</td>
<td>–0.496 (0.528)</td>
<td>–</td>
</tr>
<tr>
<td>bar</td>
<td>–</td>
<td>–0.110 (0.061)</td>
<td>–</td>
<td>–0.191 (0.118)</td>
<td>–</td>
</tr>
<tr>
<td>Constant</td>
<td>5.925*** (0.261)</td>
<td>6.127*** (0.356)</td>
<td>1.368*** (0.552)</td>
<td>–8.797*** (2.702)</td>
<td>–1.847*** (1.550)</td>
</tr>
<tr>
<td>Control variable</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Industry fixed effect</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Time fixed effect</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Sample size</td>
<td>2,440</td>
<td>1,806</td>
<td>2,440</td>
<td>1,806</td>
<td>709</td>
</tr>
</tbody>
</table>

Notes: **, ***Significant at the 5 and 1 percent significant levels, respectively.
### Table VI: Endogeneity testing

<table>
<thead>
<tr>
<th>Variables</th>
<th>Intensive (1)</th>
<th>Extensive (2)</th>
<th>Sharemode (3)</th>
<th>Greenmode (4)</th>
<th>trouble (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Idiff</td>
<td>0.024 (0.022)</td>
<td>–</td>
<td>0.049** (0.023)</td>
<td>–</td>
<td>0.023** (0.007)</td>
</tr>
<tr>
<td>Idiff × bar</td>
<td>0.008 (0.002)</td>
<td>–</td>
<td>0.169** (0.073)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Cdiff</td>
<td>–</td>
<td>0.058** (0.028)</td>
<td>–</td>
<td>0.031 (0.024)</td>
<td>–</td>
</tr>
<tr>
<td>Cdiff × bar</td>
<td>–</td>
<td>0.022 (0.050)</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>bar</td>
<td>–</td>
<td>0.065 (0.084)</td>
<td>253*** (0.771)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Constant term</td>
<td>6.088*** (0.218)</td>
<td>5.798*** (0.479)</td>
<td>11.888*** (2.547)</td>
<td>12.723*** (5.585)</td>
<td>–</td>
</tr>
<tr>
<td>Industry fixed</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Time fixed effect</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
</tbody>
</table>

**Notes:** **,** ***Significant at the 5 and 1 percent significant levels, respectively.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Intensive</th>
<th>Extensive</th>
<th>Sharemode</th>
<th>Greenmode</th>
<th>trouble</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
</tr>
<tr>
<td>Panel A: manufacturing industry</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$Idiff$</td>
<td>$-0.027 (0.020)$</td>
<td>$0.194*** (0.047)$</td>
<td>$0.214* (0.126)$</td>
<td>$0.214*** (0.023)$</td>
<td>$0.171*** (0.056)$</td>
</tr>
<tr>
<td>$Idiff \times \text{bar}$</td>
<td>$0.039 (0.039)$</td>
<td>$-0.118*** (0.039)$</td>
<td>$-0.074*** (0.023)$</td>
<td>$-0.013 (0.040)$</td>
<td>$-0.284*** (0.107)$</td>
</tr>
<tr>
<td>$Cdiff$</td>
<td>$-0.004 (0.033)$</td>
<td>$-0.083 (0.072)$</td>
<td>$-0.003 (0.033)$</td>
<td>$-0.109 (0.106)$</td>
<td>$0.389*** (0.076)$</td>
</tr>
<tr>
<td>$Cdiff \times \text{bar}$</td>
<td>$0.068 (0.057)$</td>
<td>$0.083 (0.057)$</td>
<td>$-0.286 (1.897)$</td>
<td>$-0.028 (0.127)$</td>
<td>$-0.222 (0.139)$</td>
</tr>
<tr>
<td>Sample size</td>
<td>1,515</td>
<td>1,100</td>
<td>1,515</td>
<td>1,100</td>
<td>1,515</td>
</tr>
</tbody>
</table>

| Panel B: service industry | | | | | |
| $Idiff$ | $0.150*** (0.036)$ | $-0.092* (0.054)$ | $0.925** (0.421)$ | $0.103 (0.036)$ | $0.242 (0.219)$ |
| $Idiff \times \text{bar}$ | $0.051 (0.090)$ | $0.066 (0.128)$ | $0.732 (1.331)$ | $0.158 (0.309)$ | $0.299 (0.308)$ |
| $Cdiff$ | $0.191*** (0.045)$ | $-0.085 (0.057)$ | $0.512** (0.121)$ | $0.175 (0.152)$ | $-0.039 (0.113)$ |
| $Cdiff \times \text{bar}$ | $-0.191** (0.085)$ | $-0.109 (0.119)$ | $-0.419 (0.315)$ | $-0.262 (0.295)$ | $0.699*** (0.213)$ |
| Sample size | 743 | 559 | 743 | 559 | 743 |

Notes: Regression includes dummy variable (bar), control variables, the fixed effect of industry and year. **Important** Significant at the 10, 5 and 1 percent significant levels, respectively.
Panel B in Table VII shows the estimates based on the service industry samples. It can be seen that both formal and informal institutional differences have significantly expanded the scale of enterprises’ outbound investment in the service industry. However, formal institutional differences have significantly reduced the scope of enterprises’ outbound investment in service industries. This supports the fact that China’s outbound investment in service industry is mainly concentrated in a few developed countries. In addition, the bigger the difference between the formal and the informal institutions, the more likely for enterprises to adopt a full ownership structure when investing in the service industry. It is worth mentioning that the differences between formal and informal institutions have not significantly affected the results of enterprises’ outbound investment in service industry. This shows that the receiving countries of Chinese enterprises’ service industry investment have effective market mechanisms and strict institutional norms, which, to some extent, alleviates the risks brought about by institutional differences.

5.2 Estimates of positive and negative institutional differences.
The above analysis does not distinguish positive and negative institutional differences when examining formal institutional differences. Therefore, the author further studies whether the above conclusion still holds true in countries with superior and inferior institutions compared with China, and the results are shown in Table VIII.

Panel A in Table VIII reports the estimates based on positive institutional difference samples. It showed that the enterprises' outbound investment scale did not increase as the institutional differences for the host country whose formal system is superior to China. This shows that the escape response theory cannot effectively explain the outbound investment behavior of Chinese enterprises (Zong et al., 2012). Formal institutional differences have not significantly hindered the diversification of enterprises’ outbound investment, indicating that a strong institutional environment has a moderating effect on formal institutional differences. In sharp contrast to this, informal institutional differences still significantly hinder the diversification of enterprises' outbound investment, indicating that the strong institutional environment has failed to effectively bridge cultural differences.

Panel B in Table VIII reports the estimates based on samples of negative institutional differences. It can be found that for the host country whose formal system is inferior to China, the formal system differences have not significantly increased the scale of enterprises’ outbound investment, but have significantly reduced the scope of enterprises’ outbound investment. This shows that Chinese enterprises prefer a good market economy system for outbound investment. Although a host country whose formal institution is inferior to China may have a large market and rich natural resources, Chinese enterprises still favor a good institutional environment (Wang et al., 2014). It is worth noting that neither formal nor informal institutional differences have significantly affected the ownership structure and establishment of enterprises’ outbound investment. The possible reason is that Chinese enterprises have a strong unique advantage when investing in a host country whose formal system is inferior to China; therefore, the host country’s environmental factors have limited influence on the decision-making of investment.

6. Main conclusions and policy implications
The report of the 19th National Congress of CPC clearly pointed out that “We should pursue the Belt and Road Initiative as a priority, give equal emphasis to ‘bringing in’ and ‘going global’; We will develop new ways of making outbound investments, promote international cooperation on production capacity.” Optimizing outbound investment concerns not only location decisions, but also the investment structure, equity mode, establishment pattern and investment performance. However, most of the existing studies are focused on one aspect of outbound investment; they lack a global vision and a unified framework. Moreover, among
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<td>Idifff</td>
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<td>Panel B: negative institutional differences</td>
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Notes: Regression includes dummy variable (bar), control variables, the fixed effect of industry and year. *, **, ***Significant at the 10, 5 and 1 percent significant levels, respectively.
quantitative analyses of the BRI, few studies have been carried out on the relationship between the BRI and institutional differences. Based on the micro data of 2,440 large-scale outbound investments of 609 enterprises in China from 2005 to 2016, this paper examines the institutional factors affecting large-scale outbound investment decision-making and result, as well as the functional arrangement of the BRI from the perspective of formal and informal institutional differences, thus filling the gap in the existing research field.

The study shows that formal and informal institutional differences have different impacts on large-scale outbound investment decisions of enterprises. Formal institutional differences have significantly hindered the scope of large-scale outbound investment by enterprises, but have no significant impact on the scale of investment. At the same time, with formal system differences in place, enterprises are more likely to adopt a full ownership structure, yet their choose greenfield investment or not remain unaffected. In contrast, informal institutional differences have a wider impact on large-scale outbound investment decisions of enterprises: they expand the scale of enterprise investment, hinder the scope of enterprise investment and are more likely to give rise to a full ownership structure and a merger and acquisition mode. As for the performance of large-scale outbound investment by enterprises, both formal and informal institutional differences have significantly increased the probability of failure. The complementarities created by the BRI is mainly reflected in formal institutions, and its function of bridging cultural differences is still insufficient.

There is heterogeneity among different industries and institutions about the above conclusions: on the one hand, unlike the manufacturing industry, formal institutional differences have significantly expanded the scale of enterprises’ outbound investment in service industry, and none of the institutional differences has significantly increased the probability of enterprises’ investment failure in service industry. On the other hand, the negative impact of formal institutional differences on the diversification of investment by Chinese enterprises is only reflected in cases where the formal institution is inferior to that of China, reflecting that Chinese enterprises tend not to invest in countries with inferior institutions. Compared with the host country whose institution is superior to China, the outbound investment mode and performance of Chinese enterprises are less related to the institution difference when investing in a country with an inferior institution, which may be due to the ownership advantage of state-owned enterprises.

The policy implication of this paper is that in helping enterprises to make better and faster outbound investment, the government should accurately assess the risks that may be brought about by institutional differences, and put in place relevant preventive measures and risk guarantees. Based on the institutional environment of the host country and the specific attributes of industry of the enterprise’s investment, government can guide enterprises in decision-making regarding a reasonable investment scale, an appropriate investment scope, a suitable percentage of ownership and an establishment mode. In addition, deepening the BRI and building closer regional cooperation is one of the key strategies to be considered in the top-level design to help Chinese enterprises’ large scale outbound investment. We should not only strengthen the interconnection with the official institutions of the countries along the Belt and Road through exchange of visits between political leaders and building sister cities, but also carry out functional arrangements to bridge cultural differences such as establishing Confucius Institute and holding cultural festivals.

Note
1. In this paper, the number of outbound investment in agriculture is only 26; therefore, the sample size is too small to be taken in to consideration.
References


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R&D value of Chinese manufacturing listed companies
Based on the financial market’s valuation of corporate assets

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School of Economics, Nanjing University, Nanjing, China, and
Wang Wenyi
Shen Wan & Hong Yuan Securities, Shanghai, China

Abstract
Purpose – The way to measure the value of an enterprise’s R&D investments remains elusive for theoretical and empirical study on innovation economics. The paper aims to discuss this issue.
Design/methodology/approach – This paper expands the asset-value model pioneered by Griliches (1981) and applies it for the first time to the Chinese stock market to calculate the value of R&D investment instilled by Chinese manufacturing listed companies (CMLCs) from 2003 to 2014.
Findings – The authors find that: the assets-value model can better explain the enterprise value composition of CMLCs; with equal input, the value of R&D is higher than that of tangible assets, and lower than that of organizational assets; compared with the developed countries, the R&D value of CMLCs is lower; and the R&D value of CMLCs saw a downward trend from 2007 to 2014.
Originality/value – Furthermore, by rationally estimating the value of organizational assets and non-tradable shares, and innovatively introducing semi-annual momentum indicators from the perspective of behavioral finance to control the influence of investor sentiment on enterprise value, this paper tries to develop the asset-value model and provides a feasible solution to the problem of measuring the value of Chinese enterprises’ R&D investment.

Keywords Innovation, Investor sentiment, Market valuation, Asset-value model

Paper type Research paper

1. Introduction
As the key source and the inexhaustible driving force of economic growth, innovation primarily originates from the research and development (R&D) behavior of enterprises. Measuring the value of corporate R&D activities is of pivotal importance to corporate management, market investment, academic research and policy development, but the nature of innovation activities (high risk, inter-temporal revenue span and severe information asymmetry) makes such measurement a hard nut in both the theoretical and empirical study of innovation economics.

In this regard, there are three major research paths in academia, which estimate the R&D value of enterprises from three aspects: productivity, performance indicators and market value. The most common approach is the use of various production function models to measure the contribution of R&D inputs to total factor productivity (Mairesse and Mohnen, 1995), which is mainly guided by the theory of endogenous growth, and model estimates based upon Cobb Douglas functions, transcendental logarithmic functions, etc. However, this approach has the...
following defects: R&D activity is highly uncertain, and even experienced industry experts can hardly estimate the final result in the R&D process; R&D activities are of a hysteretic nature that renders the current index very indirect and imperfect in terms of R&D value, and the lagging indicator often means that the data length is not enough to accurately estimate the overall effect; and the determination of the production function parameters is highly controversial and has undue influence on the final result. The second approach is to use performance indicators such as patents, technology licenses, profits or outputs to directly measure R&D value. This method also has certain defects: the number of patents is not comprehensive and sufficient. Because the value distribution of patents is extremely skewed, some patents are very valuable, and many are worthless (Harhoff et al., 1999; Scherer et al., 2000); the value of a technology license constitutes only a small part of the direct return of R&D, and most firms’ innovations do not take the form of technology licenses to generate revenue; and the profit or output at the enterprise or industry level is affected by many other factors, from which the impact of R&D is difficult to be separated. Aside from the above two approaches, the market value method borrows a specific method in the commodity demand literature, namely, the hedonic price equation, to measure the values of knowledge assets formed by different corporate investments into R&D. The underlying assumption is that: a listed company is a combination of assets (usually including plant and equipment, inventory, intellectual property, trademarks and reputation), whose value is determined by the financial market every day, and the margin shadow value (total return) of knowledge assets in the market can be obtained from the regression coefficient. Estimating R&D value using market value method has its own advantages: perspectiveness (forward-looking): since the shadow price of the intellectual property formed by R&D contains all current information about the success or failure of the R&D investment, it relies on the valuation of corporate assets in the financial market, which is more concerned with expected returns than historical returns. Second is rationality: because asset prices are fair pricing formed by full transactions of the market, they are not easily manipulated by financial personnel. Third is feasibility: the public financial statement of listed companies form the basis for market investors to price the company, and can also be used to price different types of assets. Griliches (1981) first adopted this method to determine the marginal value of adding one unit of investment to R&D assets by regressing the assets of firms. Following this groundbreaking work, many studies have adopted hedonic price equation in the capital market, namely, an assets-value model to analyze relationships between R&D (in stock and in flow) and market value (Griliches, 1981; Hall, 1993a; Blundell et al., 1999; Toivanens et al., 2002; Munari and Oriani, 2005; Nagaoka, 2006; Greenhalgh and Rogers, 2006; Chadha and Oriani, 2010; Sandner and Block, 2011).

These early researches focus mostly on US-listed companies, and then gradually on other countries and regions, such as Europe, Australia, Japan, India, Chinese Taiwan and South Korea. However, these studies ignore the impact of market volatility and investor sentiment on enterprise value, and nor do they notice the impact of organizational assets on the firm’s market value. In China, only Wang and An (2014) studied the impact of the size of Chinese manufacturing listed companies (CMLCs) on R&D investment performance in 2003–2011 with the assets-value model, but the research variables were relatively unitary. To this end, this paper introduces investor sentiment variables from the perspective of behavioral finance, estimates organizational assets, comprehensively expands the assets-value model pioneered by Griliches (1981), and uses the panel financial data of CMLCs in 2003–2014 to measure the value of their R&D investment and its changes.

2. Theoretical framework and econometric model

2.1 Theoretical framework

The basis for applying the hedonic price equation in the capital market is the Tobin’s Q theory: the long-term equilibrium market value of a company’s assets should equal the replacement value of these assets. When the market is in an unbalanced state, i.e. Tobin’s
If $Q \neq 1$, the firm has the incentive to increase or decrease the investment; otherwise there should be unmeasured assets or rents, rendering a difference between the market value and the book value. Firm value is seen as a dynamic optimization strategy for a given portfolio of assets to maximize the discounted value of future cash flows generated by that portfolio. Since asset adjustment is not cost-free, the current state of the company’s capital determines the optimal value of the existing portfolio. This means that the company as a continuing entity can have its market value represented as a function of this group of assets. R&D inputs generate knowledge and experience, and their accumulation constitutes the company’s technical knowledge stock, ultimately forming a knowledge asset whose value is equal to the present value of its future returns. Assuming that the intellectual assets created by R&D investment will generate profits in the future, and that these profits are capitalized by the stock market as part of the company’s stock price, the contribution of intellectual assets should be reflected in the company’s market value. It is thus possible and economically meaningful to use the company’s market value as an indirect indicator of R&D’s expected future returns.

The intellectual asset created by R&D investment has been the focus of many researches. However, as an important part of intangible assets, the impact of organizational assets on firms’ market value has not received due attention. As an intangible asset that exists in corporate organization, organizational capital (assets) encompasses explicit or tacit knowledge of the organization’s proprietary experience, rules and culture. Although organizational assets are not reflected in financial statements, they constitute an important part of intangible assets of firms, affecting the portfolio of physical capital, human capital and intellectual capital, enabling enterprises to smoothly produce products or provide services. Organizational assets include three aspects: the framework of rational allocation of power as a resource in an organization; the operational processes, regulations and unwritten practices formed by the organization; and the mechanisms for promoting knowledge creation, dissemination and communication in the organization (Liu and Chen, 2007). Studies outside China have shown that organizational assets have a significant contribution to market value (Brynjolfsson et al., 2002; Hulten and Hao, 2008; Piekkola, 2016), but the author has not seen similar studies China. Therefore, this paper attempts to estimate the organizational assets of CMLCs and incorporate them into the assets-value model to control the impact of organizational assets on the company’s market value.

In the assets-value model pioneered by Griliches (1981) and expanded by future generations, the company’s market value is seen as a function of corporate assets consisting of tangible and intangible assets, and a series of control variables reflecting corporate risk-taking, market position and financial performance have been incorporated. However, this framework suffices not to explain the substantial fluctuations in corporate market value during the bull or bear capital markets, wherein the sharp rise and fall of the stock price of listed companies often embodies not the big changes in firms’ own operating conditions, but those in the market environment. Environmental factors that affect all listed companies, such as macroeconomic conditions, can be controlled by using time dummy variables. In addition, investors who are both parties to the market are themselves part of the market environment and have a significant impact on company pricing. Since behavioral finance believes that investors are not “rational man” but “run-of-the-mill (ordinary normal) man,” the existence of cognitive bias makes it impossible for investors to reflect and process information objectively, fairly and unbiasedly; hence, the market is not effective, the asset price is also irrational and the asset price is determined not only by the intrinsic value of the asset, but also by the psychological and emotional factors of the investors (Han Zexian, 2005). Many studies have shown that investor sentiment has an important impact on stock market returns and volatility (Shiller, 1980; Daniel et al., 1998). Especially in the peak of the bull market and the trough of the bear market, the influence
of investor sentiment on stock prices (accounting for about 60 percent) far exceeds that of the company’s fundamental factors on prices (Darst, 2003). Therefore, this paper innovatively incorporates market sentiment factors in the assets-value model to represent the impact of investor sentiment on firms’ market value. The model framework for this paper is shown in Figure 1.

2.2 Econometric model

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The hedonic price equation describing firms’ market value can be written as a function of the various assets that company \( i \) has at time \( t \):

\[ V_{it} = f(A_{it}, K_{it}); \tag{1} \]

where \( V_{it} \) denotes the market value of company \( i \) at time \( t \) (the value of all shareholders’ equity plus long-term and short-term liabilities, minus cash), \( A_{it} \) denotes the book value of the company’s tangible assets at time \( t \), such as plant, equipment, inventory and financial assets, etc., \( K_{it} \) denotes the intangible asset of company \( i \) at time \( t \), including intellectual assets, organizational assets, creditworthiness and brands, etc.

In Equation (1), labor and other inputs are ignored because this paper assumes that they can always adjust to the greatest value, so they are a function of various assets. This means that the correlation coefficient obtained in the study will cover the indirect effects of capital and knowledge stock through the adjustment of the variables used. Referring to the method of Hall (2000), Equation (1) can be written as:

\[ V_{it} = q_{it} \left( A_{it} + \sum_{n} \gamma_{ni} K_{ni} \right)^{\alpha}; \tag{2} \]

where \( Q_{it} \) denotes the multiplier of the total assets of company \( i \) at time \( t \), reflecting the market investors’ estimator coefficients of the operating conditions, future development prospects, bull or bear markets and other factors for the company’s total assets. \( A_{it} \) denotes the company’s tangible assets, \( K_{ni} \) represents the company’s \( n \)th intangible asset, and \( \gamma_{ni} \) is the shadow value of the \( n \)th intangible asset for tangible assets. \( q_{it} \gamma_{ni} \) denotes the absolute shadow value of the \( n \)th intangible asset. In practice, \( q_{it} \gamma_{ni} \) reflects the valuation that investors expect the \( n \)th intangible asset to be discounted to the
company’s current and future returns. \( \sigma \) represents the scale effect of the asset, \( \sigma > 1 \) represents an increasing (returns of) scale effect, \( \sigma < 1 \) represents a diminishing scale effect and \( \sigma = 1 \) represents an invariant scale effect. Since the company investment in R&D activities forms intellectual assets, the intangible assets can be written as \( RD + OC + K' \), where \( RD \) stands for intellectual assets, \( OC \) stands for organizational capital and \( K' \) stands for intangible assets other than intellectual assets and organizational capital. Therefore, Equation (2) can be written as:

\[
V_{it} = q_{it} (A_{it} + \gamma_{1t}RD_{it} + \gamma_{2t}OC_{it} + \gamma_{3t}K'_{it})^\sigma,
\]

(3)

where \( \gamma_{1t}, \gamma_{2t}, \) and \( \gamma_{3t} \) are the shadow values of intellectual assets, organizational capital and other intangible assets for tangible assets, respectively. In principle, they should be allowed to fluctuate over time, but due to the small sample size and short time span, we refer to Hall et al. (2002) for estimates of the US and UK data, and assume \( \gamma_{1t}, \gamma_{2t} \) and \( \gamma_{3t} \) are time-invariant constants, i.e. \( \gamma_{1t} = \gamma_{2t} = \gamma_{3t} \). \( A_{it} \) is extracted uniformly from the parentheses on the right side of the equation, and the natural logarithm is taken on both sides of the equation. Since the research object of this paper is manufacturing companies, assuming that the main part of their assets is tangible assets, the ratio of intellectual, organizational and other intangible assets to tangible assets is thus close to zero. According to the approximate equation \( \lim_{x \to 0} \log(1 + x) \approx x \), Equation (3) can be written as:

\[
\log V_{it} = \sigma \left[ \log A_{it} + \gamma_{1t} \left( \frac{RD_{it}}{A_{it}} \right) + \gamma_{2t} \left( \frac{OC_{it}}{A_{it}} \right) + \gamma_{3t} \left( \frac{K'_{it}}{A_{it}} \right) \right] + m_t + u_t + e_{it} + e_{it},
\]

(4)

where \( m_t \) is a time dummy variable that represents the change in the stock market’s overall price or industry sector price over time. It controls the effects of macroeconomic changes, including changes in overall economic growth expectations. \( u_t \) is a market-independent random error term that represents company-level factors. \( e_{it} \) represents the influence of market investor sentiment. When it is greater than 0, market investors tend to overestimate the company’s value. When it is less than 0, investors tend to underestimate the company’s value. \( e_{it} \) is the error term.

The regression model established by Equation (4) is as follows (Table I):

\[
\log V_{it} = \sigma \log A_{it} + \gamma_{1t} \left( \frac{RD_{it}}{A_{it}} \right) + \gamma_{2t} \left( \frac{OC_{it}}{A_{it}} \right) + \gamma_{3t} \left( \frac{K'_{it}}{A_{it}} \right) + [x_1Mo_{it} + x_2EPS_{it} + x_3Lev_{it} + x_4Growth_{it} + x_5CF_{it}] + \sum_{t=1}^{T-1} \delta_t YrDum_t + e_{it}.
\]

(5)

The description is as follows:

(1) The market value in the model is derived from the company’s enterprise value defined by Tobin’s \( Q \) theory, which can be regarded as the theoretical cost of acquiring a company, given that the acquirer must bear the company’s liabilities.

(2) The R&D value discussed in this paper refers to the contribution of a unit R&D input to the logarithm of the company’s market value, namely, \( \sigma \gamma_{1t} \), in Equation (5). Among them, according to the assets-value model regression, the shadow value of the intellectual property of CMLCs relative to the tangible assets, i.e. \( \gamma_{1t} \), can be regarded as the relative value of R&D investment. If \( \gamma_{1t} = 1 \), it means that the contribution of one unit of currency to the market value of the intellectual assets is equivalent to that of one unit of currency invested in the tangible assets. When \( \gamma_{1t} \) is greater than (or less than) 1, the stock market’s valuation of intellectual assets is

R&D value
greater than (or less than) that of the tangible assets. Note that \( g_i \) is a relative value that represents a multiple of the contribution of an intellectual asset to a market value relative to the contribution of a tangible asset to a market value. The higher the multiple, the higher the expected return of the intellectual asset relative to the tangible asset will be. It represents the economic benefits that the capital market expects the company to obtain from R&D investments, and also reflects the private rate of return on intellectual assets. Due to data limitations, the intellectual assets referred to here only include intellectual assets converted from R&D inputs. Similarly, the value of organizational assets refers to the contribution of unit organizational assets to the logarithm of the company’s market value, namely, \( g_2 \), where \( g_2 \) denotes the relative value of organizational assets.

Our model selects R&D input to measure enterprise innovation without the use of common R&D personnel and patent data because of the following reasons: first, R&D input is more widely used and lasts longer in innovative research. Although it is often seen as one of the many indicators of innovation, the strength of R&D lies in its adequacy of data on time scale, given that many countries have detailed statistical classifications covering innovations in industries, universities and research institutions (Smith, 2004). It is the basis for companies to build knowledge absorption capacity (Cohen and Levinthal, 1990), and reflects the determination and intensity of the company’s implementation of innovation strategy. Second, the number of R&D personnel is generally used to compare innovation ability, also used in innovation-related regression. The underlying assumption is that the number of R&D personnel is directly proportional to the ability to innovate, but it remains elusive that the process of linking innovation capabilities to the number of R&D personnel simplifies the inter-researchers and inter-organizations difference in innovation efficiency. Third, the drawback of patent numbers is that they only indicate new technologies, which do not equal to

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<td><strong>Dependent variable</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logarithm of enterprise value</td>
<td>Log(V)</td>
<td>( V (value) ) before the share reform: tradable shares + non-tradable shares + liabilities – cash ( V (value) ) after the share reform: tradable shares + liabilities – cash</td>
</tr>
<tr>
<td><strong>Explanatory variables</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tangible asset logarithm</td>
<td>Log(A)</td>
<td>( A ): tangible assets, i.e. the company’s total assets – intangible assets(a)</td>
</tr>
<tr>
<td>Intangible asset strength(a)</td>
<td>(K/A)</td>
<td>Company’s intangible assets(a) divided by tangible assets</td>
</tr>
<tr>
<td>R&amp;D flow strength</td>
<td>(RD/A)</td>
<td>Company’s R&amp;D investment divided by tangible assets</td>
</tr>
<tr>
<td>Organizational asset flow intensity</td>
<td>(OC/A)</td>
<td>Company’s organizational assets investment divided by tangible assets</td>
</tr>
<tr>
<td><strong>Control variable</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investor sentiment</td>
<td>(Mo)</td>
<td>The cumulative monthly stock returns from July to December of the current year</td>
</tr>
<tr>
<td>Earnings per share</td>
<td>(EPS)</td>
<td>The current net profit attributable to ordinary shareholders divided by the weighted average of current outstanding ordinary shares</td>
</tr>
<tr>
<td>Asset-liability ratio</td>
<td>(Lev)</td>
<td>The company’s total liabilities for the current year divided by the company’s total assets</td>
</tr>
<tr>
<td>Growth prospects</td>
<td>(Growth)</td>
<td>Three-year average of annual growth rate of main business income</td>
</tr>
<tr>
<td>Cash flow-asset Ratio</td>
<td>(CF)</td>
<td>Cash flow divided by the two-year moving average of total assets</td>
</tr>
</tbody>
</table>

Table I. Variable definition

Note: \(^{a}\)Intangible assets in the model refer to intangible assets in the financial report of the listed company, excluding intellectual and organizational assets
commercial innovation. Many patents do not have significant technical and economic significance, and many types of inventions are not patentable (Kleinknecht and Mohnen, 2002). Fourth are data availability limits. Due to the express regulations of the regulatory authorities, the number of listed companies that disclose R&D investment is the highest, and because the number of R&D personnel and patent data are not within the scope of mandatory disclosure, only a few listed companies disclose this information.

(4) Our model uses the salary of the company’s managers to estimate the company’s organizational assets. The work of company managers in establishing or improving business models, corporate culture, organizational structure, institutional processes, operational practices and other implicit knowledge can be seen as investments in organizational assets. Therefore, this paper uses the salary of management staff to estimate the capital and intermediate expenses associated with the organization. This method was developed by Görzig et al. (2011) and improved by Rahko (2014), similar to the estimation at the national level by Corrado et al. (2005); it focuses on the company’s own accounting investment in organizational assets. The above literature assumes that 20 percent of the company manager’s work time is spent on investing in organizational assets. Based on this assumption, 20 percent of the salary of listed company managers is regarded as the company’s investment in organizational assets.

(5) Our model’s knowledge assets and organizational assets are, invariably, replaced by the current year’s input flow, that is, the R&D input flow is used to replace the current year’s intellectual asset stock, and the organizational asset input flow is used to replace the current year’s organizational stock. Since the source of R&D investment stock is the company’s current and previous R&D investment, it is difficult to determine the depreciation rate of previous R&D inputs into stocks. Therefore, this paper adopts the existing literature method to replace R&D stocks with R&D flows; Hall (1993a, b) showed that these two types of measures have very little difference in estimates, and that because R&D flows reflect higher depreciation rates and temporal randomness, they are more explanatory (Klette and Griliches, 2000). In the same way, organizational assets are treated as such.

(6) Since the samples are sourced from listed companies between 2003 and 2014, it is necessary to consider the calculation of the enterprise value before and after the Split Share Structural Reform started in 2005. Since most of the listed companies before the share reform have state-owned shares and legal person shares whose circulation is restricted, we can neither ignore the value of these restricted circulation stocks nor equate them with the value of fully-circulated stocks. According to the research of Yang et al. (2008), according to the completion time of the share reform of different sample companies, the price of the restricted shares before the share reform is regarded as a certain percentage of the price of the outstanding (circulating) shares, and the ratio is set to 0.43.

(7) Control variables: first, according to Polk and Sapienza (2004) and Hua et al. (2010, 2011), the Model uses the cumulative monthly stock returns of listed companies from July to December of the current year to control the impact of market investor sentiment on corporate valuation. Second, earnings per share, representing profitability, is the potential guarantee for R&D investment. Third, the asset-liability ratio can control company-level risks, and measure financing capabilities. Generally speaking, the higher the debt ratio, the higher the cost of corporate financing, and the less likely it is to invest in R&D. Fourth, the growth prospects
represent the growth potential of the company, and if the future investment will bring higher than average returns, this will make the decision makers of the enterprise more motivated to invest in innovation. Fifth, the cash flow asset ratio represents the market power and long-term profitability unrelated to R&D investment (Hall, 1993a).

3. Data source and description

3.1 Data source

China’s current sources of innovative information can be divided into three categories: innovation data published by official agencies such as the National Bureau of Statistics, the Ministry of Science and Technology or the National Development and Reform Commission; innovation data of small sample surveys conducted by universities and research institutes based on innovation at the enterprise level; and innovation data disclosed by listed companies in the annual reports. At the beginning, the listed companies in China were not required to disclose the innovation data; only a small fraction of companies voluntarily did so. This situation remain unchanged until February 2007, when the China Securities Regulatory Commission (CSRC) issued the “Regulation No. 15 on the Information Disclosure and Reporting of the Publicly Issued Securities – General Provisions on Financial Reporting” and explicitly required that listed companies must disclose relevant innovation information such as R&D. The innovation data obtained from the annual report combine the advantages of the first two types of data: it can be refined to the company level, and it can be easily obtained via public access. Therefore, this paper selects the innovation data of listed companies for 12 consecutive years from 2003 to 2014 as a sample based on the annual reports of listed companies. The selected sample companies must meet the following conditions:

1. Manufacturing as the main business: the stock market has different valuations for intellectual capitals of the manufacturing and service industry, given the big difference between the two manufacturing innovation mainly focuses on technological innovation, including product innovation and process innovation, while industry innovation is mainly based on model innovation and process innovation. The innovation of manufacturing industry is mainly reflected in the introduction of new products, and the improvement of the productivity and technical parameters of existing products. The innovation of service industry is more reflected in the innovation of business model, organization and management.

2. Financial health: the research object of this paper is the enterprises of normal production and operation. Therefore, in the sample companies, we excluded those with net assets, less than 30 employees, ST (special treatment) labels, backdoor listings during the inspection period and annual reports issued by the accounting firm with reservations or no signatures, and those have been disclosed by the media with frauds, investigated or penalized by the CSRC for financial data problems.

3. No abnormality in the R&D input data: some companies disclose excessive R&D investment in some years, even higher than 20 percent of their total assets, which is obviously unreasonable. To avoid the impact of individual outliers on the overall analysis, the R&D capital intensity was used as an indicator to remove the highest and lowest 0.5 percent samples.

As of December 31, 2014, China’s A-shares (RMB ordinary shares) contained 2,587 listed companies. After eliminating companies that did not meet the above criteria, a total of 946 sample companies were selected. The financial data of all listed companies are sourced from their annual report and the Wind Stock Financial Database. The List of Back Door Listing companies, ST (special treatment) companies and delisted companies are from the
Flush Stock Financial Database. The List of special ST (SST) companies, listed companies’ violations and illegal activities data are from the CSMAR Database. The accounting firm’s opinion on the annual report comes from the Wind Financial Stock Database. Table II lists the descriptive statistics for the regression variables.

3.2 Basic situation of innovation of sample companies

(1) Huge gaps in R&D investment: as shown in Table II, the coefficient of variation reached 3.7573, but after the R&D inputs were divided by company’s tangible assets, the difference in R&D capital intensity was much smaller. Moreover, the average and median R&D capital intensity of the sample companies exceeds the internationally recognized level of 2 percent.

(2) The number of companies that disclose R&D and the average input of individual firm’s R&D increased year by year. No listed companies disclosed R&D investment before 1999 (Xue and Wang, 2001). In 2003, there emerged listed companies who disclosed their R&D investment. It is not until 2006 that the Ministry of Finance issued the “Accounting Standards for Business Enterprises” to set clear standards for the accounting treatment of corporate R&D investment. In February 2007, the CSRC issued regulations requiring listed companies to publicly disclose R&D in the 2006 annual report. Therefore, as shown in Table III, the number of companies that disclose R&D has grown rapidly since 2006.

(3) After 2012, the sample companies’ R&D input intensity is higher than the national average. As shown in Table IV, listed companies, as representatives of the national manufacturing industry, have an R&D investment intensity roughly equivalent to the national average, showing no special lead before 2012. Since 2012, the R&D input intensity of CMLCs started to outpace the national average.

4. R&D value of CMLCs

4.1 Empirical premise

To study the R&D value of CMLCs with an assets-value model, it is important to note the conditions under which the model can be established: it can only be applied to public companies trade in a well-functioning financial market (Hall, 1999) – only when the market is effective, can Investors identify the company’s intellectual capital and organizational capital as the basis for the company’s valuation. Nonetheless, the use of capital market valuations can take advantage of market fair pricing for future-oriented valuations and avoid cost-benefit intertemporal issues, which have baffled the traditional productivity methods and indirect indicator methods. However, researchers have always believed that the Chinese stock market is of a serious speculative nature. Its policy-dependent and message-dependent characteristics have further roused the speculative psychology of ordinary investors. Most investors will not use the financial statements of listed companies as the basis for company valuation, if this view holds, then the assets-value model cannot be applied to the Chinese stock market.

Although scholars have long believed that the stock performance signals of Chinese listed companies are distorted, and the market is not effective, fortunately, this situation has improved with the gradual development of China’s securities market. Zhang and Li (2003) used the AR(2) autoregressive model of time-varying coefficients, and considered the influence of heteroscedasticity of “volatility clustering” to determine that China’s stock market has manifested a weak form efficiency since 1997. Wang and Yang (2006) conducted a panel data unit root test on the price indices of the various components of the Shanghai and Shenzhen Stock Exchanges from June 2000 to February 2005. The results
Table II: Descriptive statistical results of the regression variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Sample size</th>
<th>Mean</th>
<th>SD</th>
<th>Coefficient of variation</th>
<th>Minimum value</th>
<th>Quantile 0.25</th>
<th>Quantile 0.50</th>
<th>Quantile 0.75</th>
<th>Quantile Maximum value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enterprise value (100m yuan)</td>
<td>V</td>
<td>6,629</td>
<td>93.7291</td>
<td>220.1989</td>
<td>2.3493</td>
<td>3.2729</td>
<td>23.4794</td>
<td>40.9352</td>
<td>80.1073</td>
</tr>
<tr>
<td>Natural logarithm of enterprise value (yuan)</td>
<td>LogV</td>
<td>6,629</td>
<td>22.2505</td>
<td>1.0153</td>
<td>0.0456</td>
<td>0.0603</td>
<td>19.5603</td>
<td>22.1327</td>
<td>22.8400</td>
</tr>
<tr>
<td>Tangible assets (100m yuan)</td>
<td>A</td>
<td>8,928</td>
<td>44.1297</td>
<td>153.5159</td>
<td>3.4787</td>
<td>0.1888</td>
<td>6.2542</td>
<td>13.5082</td>
<td>29.4749</td>
</tr>
<tr>
<td>Natural logarithm of tangible assets (yuan)</td>
<td>LogA</td>
<td>8,928</td>
<td>21.0792</td>
<td>1.3088</td>
<td>0.0621</td>
<td>0.0210</td>
<td>20.2539</td>
<td>21.0240</td>
<td>21.8402</td>
</tr>
<tr>
<td>Intangible assets (100m yuan)</td>
<td>K’</td>
<td>8,683</td>
<td>1.6927</td>
<td>5.7270</td>
<td>3.3833</td>
<td>0.0000</td>
<td>0.1835</td>
<td>0.4985</td>
<td>1.2251</td>
</tr>
<tr>
<td>Intangible assets/assets</td>
<td>K’/A</td>
<td>8,918</td>
<td>0.0462</td>
<td>0.0447</td>
<td>0.9667</td>
<td>0.0000</td>
<td>0.0190</td>
<td>0.0360</td>
<td>0.0600</td>
</tr>
<tr>
<td>Asset–liability ratio</td>
<td>Lev</td>
<td>8,930</td>
<td>0.4163</td>
<td>0.1938</td>
<td>0.4657</td>
<td>0.0005</td>
<td>0.2646</td>
<td>0.4294</td>
<td>0.5665</td>
</tr>
<tr>
<td>Growth prospects</td>
<td>Growth</td>
<td>8,930</td>
<td>0.2540</td>
<td>2.2513</td>
<td>0.2261</td>
<td>-0.3464</td>
<td>0.0739</td>
<td>0.1866</td>
<td>0.3139</td>
</tr>
<tr>
<td>Cash flow–asset Ratio</td>
<td>EPS</td>
<td>8,930</td>
<td>0.0669</td>
<td>0.0747</td>
<td>1.1160</td>
<td>-0.3749</td>
<td>0.2111</td>
<td>0.0583</td>
<td>0.1031</td>
</tr>
<tr>
<td>Earnings per share (yuan)</td>
<td>CF</td>
<td>8,929</td>
<td>0.4625</td>
<td>0.4802</td>
<td>1.0382</td>
<td>-2.6500</td>
<td>0.1800</td>
<td>0.3900</td>
<td>0.6453</td>
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<td>Semiannual momentum</td>
<td>Mo</td>
<td>6,625</td>
<td>0.0854</td>
<td>0.3637</td>
<td>4.2603</td>
<td>-0.7795</td>
<td>-0.1634</td>
<td>0.0378</td>
<td>0.2804</td>
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<td>R&amp;D investment (100m yuan)</td>
<td>RD Inv</td>
<td>7,139</td>
<td>0.7937</td>
<td>2.9821</td>
<td>3.7573</td>
<td>0.0009</td>
<td>0.1045</td>
<td>0.2281</td>
<td>0.5480</td>
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<tr>
<td>R&amp;D intensity</td>
<td>RD/A</td>
<td>7,026</td>
<td>0.0246</td>
<td>0.0184</td>
<td>0.7472</td>
<td>0.0003</td>
<td>0.0110</td>
<td>0.0210</td>
<td>0.0335</td>
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<tr>
<td>Organizational assets investment (100m yuan)</td>
<td>OC Inv</td>
<td>8,934</td>
<td>0.1218</td>
<td>0.4014</td>
<td>3.2971</td>
<td>0.0001</td>
<td>0.0177</td>
<td>0.0305</td>
<td>0.0940</td>
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<tr>
<td>Organizational asset strength</td>
<td>OC/A</td>
<td>8,934</td>
<td>0.0037</td>
<td>0.0024</td>
<td>0.6572</td>
<td>0.0000</td>
<td>0.0020</td>
<td>0.0031</td>
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</tr>
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</table>

*Note:* The sample size of the assets is greater than that of the company value because these companies disclosed the assets before listing, but there is no market value at this time.
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<tbody>
<tr>
<td>Sample size</td>
<td>3</td>
<td>36</td>
<td>48</td>
<td>294</td>
<td>533</td>
<td>722</td>
<td>868</td>
<td>900</td>
<td>916</td>
<td>939</td>
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<td>RDinv average (100m yuan)</td>
<td>0.0846</td>
<td>0.2158</td>
<td>0.1596</td>
<td>0.1347</td>
<td>0.2345</td>
<td>0.3217</td>
<td>0.4061</td>
<td>0.5603</td>
<td>0.7657</td>
<td>1.1716</td>
<td>1.2899</td>
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<td>RDA average</td>
<td>0.0068</td>
<td>0.0105</td>
<td>0.0089</td>
<td>0.0228</td>
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<td>0.0229</td>
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<tr>
<td>Year</td>
<td>Total expenditure on science and technology activities in the China (100m yuan)</td>
<td>Proportion in main business income (%)</td>
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<td>2005</td>
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<td>2007</td>
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<td>2008</td>
<td>4,616</td>
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<td>2009</td>
<td>5,802</td>
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<tr>
<td>2011</td>
<td>8,687</td>
<td>2.08</td>
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<td>2012</td>
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<td>2013</td>
<td>11,846</td>
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Table IV. R&D investment of sample companies and national expenditure on science and technology activities.
show that the major dependent panel price indexes of China's securities market are subject to the panel data unit root process: this conclusion implies that the market has microcosmic weak efficiency during the study period. Konglai and Jingjing (2013) studied the daily closing price and daily yield of the Shanghai Composite Index (000001) and the Shenzhen Composite Index (399106) from January 4, 2000 to April 1, 2011. According to the Random Walk Hypothesis, the logarithmic dynamic autoregressive model, runs test and unit root test are used to test the market efficiency of the Shanghai Stock Exchange and the Shenzhen Stock Exchange, respectively. The results show that, basically, the two markets both have weak efficiency. Furthermore, the author also excluded companies with unhealthy financial status and serious speculativeness in the sample screening process. Therefore, it can be considered that the sample of our research basically satisfies the assumption of the assets-value model.

4.2 Pre-regression inspection

(1) Correlation coefficient test: if there is a high correlation between multiple explanatory variables in the regression model, it means that the information contained in these variables to explain the change of the dependent variable overlaps, and it is therefore not appropriate to incorporate them into the model regression, otherwise it will lead to severe multicollinearity. The direct consequences are that the standard error of the regression coefficient parameter estimation becomes larger, the confidence interval becomes wider, the stability of the estimated value decreases, the probability of accepting the error of alternative hypothesis increases, the probability that the coefficient cannot pass the $t$-test increases and that the correctly estimated value of the coefficient is often unattainable. Therefore, the correlation coefficient between the explanatory variable and the dependent variable must be calculated before regression (see Table V). The results show that the collinearity problem between the explanatory variables is not serious. The correlation coefficient between the asset-liability ratio Lev and the enterprise scale $\log A$, as well as between earnings per share EPS and growth prospects, and cash flow-asset Ratio CF, is rather large. In practice, these control variables are included separately in the model regression, and the regression results that contain all the control variables need to be carefully explained.

(2) Unit root and cointegration test: the unit root test is to check whether the variables are in a stationary sequence. If the stationarity of the sequence is not checked, direct linear regression can easily lead to spurious regression. With unit root test for regression variables, we found that $\log A$, $K'/A$, RDA, OC/A, Mo, EPS, Lev, Growth and CF are free with unit roots, and are therefore stationary sequences that can be included in model regression (the test results are omitted and available from the author upon request).

4.3 General regression results

The regression results show that:

(1) After incorporating a number of factors related to R&D values, i.e. the $\sigma_{g1}$ values, they are invariably greater than 1 and significant. This shows that R&D investment will bring about an increase in market value, and the Chinese capital market has a higher evaluation of the R&D investment of CMLCs. Although the inclusion of more control variables causes the regression coefficient of RDA/A to fluctuate up and down, the significance and symbols do not change drastically, which indicates that the above conclusions are robust. This is consistent with the results obtained by foreign researchers in the same way to measure the R&D value of listed companies in other countries. Czarnitzki et al. (2006) compiled a total of R&D value
<table>
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<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<th>9</th>
<th>10</th>
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<tbody>
<tr>
<td>LogV</td>
<td>1</td>
<td>0.8465</td>
<td>-0.0253</td>
<td>-0.0678</td>
<td>-0.1029</td>
<td>0.2133</td>
<td>0.2073</td>
<td>0.3978</td>
<td>0.0717</td>
<td>0.1360</td>
</tr>
<tr>
<td>LogA</td>
<td>2</td>
<td>0.8917</td>
<td>-0.0416</td>
<td>-0.1538</td>
<td>-0.1299</td>
<td>0.0344</td>
<td>0.0501</td>
<td>0.5663</td>
<td>-0.0131</td>
<td>0.0040</td>
</tr>
<tr>
<td>K'/A</td>
<td>3</td>
<td>-0.0261</td>
<td>-0.0578</td>
<td>0.0644</td>
<td>0.1984</td>
<td>0.0290</td>
<td>-0.0973</td>
<td>0.0682</td>
<td>-0.0731</td>
<td>-0.0482</td>
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<tr>
<td>RD/A</td>
<td>4</td>
<td>-0.0384</td>
<td>-0.1159</td>
<td>0.0257</td>
<td>0.2323</td>
<td>0.0249</td>
<td>0.1459</td>
<td>-0.2003</td>
<td>0.0539</td>
<td>0.0639</td>
</tr>
<tr>
<td>OCA/A</td>
<td>5</td>
<td>-0.1062</td>
<td>-0.1405</td>
<td>0.1542</td>
<td>0.2110</td>
<td>0.0356</td>
<td>-0.0678</td>
<td>0.0309</td>
<td>-0.0661</td>
<td>0.1067</td>
</tr>
<tr>
<td>Mo</td>
<td>6</td>
<td>0.1909</td>
<td>0.0307</td>
<td>0.0107</td>
<td>0.0248</td>
<td>0.0248</td>
<td>0.0274</td>
<td>0.0665</td>
<td>-0.1415</td>
<td>0.0921</td>
</tr>
<tr>
<td>EPS</td>
<td>7</td>
<td>0.2390</td>
<td>0.0866</td>
<td>-0.1017</td>
<td>0.0807</td>
<td>-0.0733</td>
<td>0.0309</td>
<td>-0.2718</td>
<td>0.4154</td>
<td>0.3869</td>
</tr>
<tr>
<td>Lev</td>
<td>8</td>
<td>0.4294</td>
<td>0.5818</td>
<td>0.0588</td>
<td>-0.1431</td>
<td>0.0160</td>
<td>0.0648</td>
<td>-0.2350</td>
<td>-0.0032</td>
<td>-0.1642</td>
</tr>
<tr>
<td>Growth</td>
<td>9</td>
<td>0.0916</td>
<td>0.0208</td>
<td>-0.0498</td>
<td>0.0205</td>
<td>-0.0674</td>
<td>-0.1028</td>
<td>0.3135</td>
<td>0.0186</td>
<td>0.0455</td>
</tr>
<tr>
<td>CF</td>
<td>10</td>
<td>0.1438</td>
<td>0.0101</td>
<td>-0.0163</td>
<td>0.0653</td>
<td>0.0983</td>
<td>0.0761</td>
<td>0.3713</td>
<td>-0.1848</td>
<td>0.0297</td>
</tr>
</tbody>
</table>

**Notes:** The upper right part of the table shows the Spearman correlation coefficient between the variables, and the lower left part is the Pearson correlation coefficient between the variables. The correlation coefficient without * indicates that 1 percent significance has been reached. Shaded cells indicate that there may be a high degree of collinearity (≥0.3) between the two variables.
16 studies using the assets-value model to estimate the R&D value of listed companies between 1981 and 2005. It was found that the R&D values obtained in the assets-value model were basically all positive and significant for companies listed on the USA, the UK, continental Europe and Australia. This shows that in the well-functioning capital market, the listed company’s investment in R&D will increase the company’s market value.

(2) Organizational asset investment has a higher valuation in the capital market. The regression coefficient $\sigma_{g2}$ of the organizational asset strength (OC/A) is much higher than the regression coefficient $\sigma_{g1}$ of the R&D capital intensity (RD/A), and in models incorporated with different control variables, they are all statistically significant. The reasons may be that: first, organizational assets are more difficult to replicate than technological innovation is. It is the implicit knowledge of information, experience internalized in individuals, teams and organizations through socialization, externalization and integration. Investment that solely relies on tangible assets, human capital, organizational structure and other intangibles is impossible to completely replicate the organization assets. Second, under the system of determining the listing of enterprises by examination and approval, the listing itself is a proof of the company’s management ability. Once listed, the capital market will award higher premium to its organization assets. Third, most Chinese companies still rely on the “rule by man”; the founders of the company have a vital influence on business operations, and professional managers are difficult to replace the original management team. The high valuation of organizational assets represents the capital market’s emphasis on the management team.

(3) The R&D value of CMLCs is rather low. The regression coefficient $\sigma_{g1}$ of the R&D capital intensity (RD/A) that incorporates all control variables is lower than the coefficient of 3.10 (Hall, 1993b) of the US manufacturing companies between 1973 and 1990, and lower than that (3.51) of the British manufacturing companies between 1989 and 2002 (Greenhalgh and Rogers, 2006), and also the coefficient of 3.83 and 8.80 of Taiwan and Korean electronics companies, respectively, in 2000–2008 (Chen, 2010). The reasons may be twofold: first, the development path of technological capabilities of developing countries and regional enterprises is different from that of developed countries. The technological development of late-starter countries like China is mostly derived from the selection, acquisition, assimilation, absorption and improvement of foreign technology (An, 2003). Second, China’s protection of intellectual property rights is insufficient. Even if enterprises invest a lot of resources in R&D, the technological innovations obtained will be quickly copied, and the plagiarists will not be severely sanctioned.

(4) The regression coefficients of the investor sentiment index are all greater than 0 and significant. This proves that investor sentiment will affect the market’s estimation of the value of listed companies’ assets. To compare the relative size of R&D values of listed companies in the bull or bear markets, the impact of investor sentiment on enterprise value should be controlled in the assets-value model.

(5) Discussion of model endogeneity.

In the basic regression mentioned above, it is necessary to consider the problem of endogeneity. There reasons may also bifurcate: First, if there is a correlation between R&D input, organizational capital and random perturbation terms, the estimates for $\sigma_{g1}$ and $\sigma_{g2}$ are biased. In order to deal with this problem, Model (6) is used as the test model, and the current term of R&D input, organizational capital and control variables in the model is replaced with the corresponding lag phase $(T-1)$ terms, and Model (6) is re-estimated by still using the fixed effect model. The main estimates are shown in column (7) of Table VI.
### Table VI.
Least squares estimation results of panel data and endogeneity test results

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
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<th>(8)</th>
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<tbody>
<tr>
<td>$C$</td>
<td>5.4216 (0.3409)</td>
<td>6.8076 (0.3445)</td>
<td>5.9197 (0.3769)</td>
<td>6.9833 (0.3626)</td>
<td>6.0977 (0.3531)</td>
<td>6.0354 (0.3510)</td>
<td>13.9092 (0.6280)</td>
<td>4.5720*** (3.2307)</td>
</tr>
<tr>
<td>$\log A$</td>
<td>0.7802 (0.0156)</td>
<td>0.7127 (0.0158)</td>
<td>0.7611 (0.0176)</td>
<td>0.7070 (0.0167)</td>
<td>0.7484 (0.0162)</td>
<td>0.7489 (0.0164)</td>
<td>0.3845 (0.0292)</td>
<td>0.8100 (0.1368)</td>
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<tr>
<td>$K'/A$</td>
<td>0.4315 (0.1280)</td>
<td>0.5847 (0.1367)</td>
<td>0.4403 (0.1310)</td>
<td>0.4406 (0.1423)</td>
<td>0.4331 (0.1281)</td>
<td>0.6418 (0.1508)</td>
<td>0.9302 (0.1973)</td>
<td>0.2368*** (0.5857)</td>
</tr>
<tr>
<td>$RD/A$</td>
<td>1.8386 (0.3930)</td>
<td>1.2079 (0.3924)</td>
<td>1.7442 (0.4149)</td>
<td>1.6705 (0.4086)</td>
<td>1.7546 (0.4125)</td>
<td>1.2125 (0.3638)</td>
<td>0.2409*** (0.5488)</td>
<td>1.4120*** (3.8609)</td>
</tr>
<tr>
<td>$M_r$</td>
<td>0.2049 (0.0117)</td>
<td>0.2085 (0.0115)</td>
<td>0.2049 (0.0117)</td>
<td>0.2085 (0.0115)</td>
<td>0.2049 (0.0117)</td>
<td>0.2085 (0.0115)</td>
<td>0.2049 (0.0117)</td>
<td>0.2085 (0.0115)</td>
</tr>
<tr>
<td>$E_P$</td>
<td>0.1567 (0.0375)</td>
<td>0.1567 (0.0375)</td>
<td>0.1567 (0.0375)</td>
<td>0.1567 (0.0375)</td>
<td>0.1567 (0.0375)</td>
<td>0.1567 (0.0375)</td>
<td>0.1567 (0.0375)</td>
<td>0.1567 (0.0375)</td>
</tr>
<tr>
<td>$Lev$</td>
<td>$-$0.1945 (0.0511)</td>
<td>$-$0.1945 (0.0511)</td>
<td>$-$0.1945 (0.0511)</td>
<td>$-$0.1945 (0.0511)</td>
<td>$-$0.1945 (0.0511)</td>
<td>$-$0.1945 (0.0511)</td>
<td>$-$0.1945 (0.0511)</td>
<td>$-$0.1945 (0.0511)</td>
</tr>
<tr>
<td>$Growth$</td>
<td>0.2465 (0.0254)</td>
<td>0.2465 (0.0254)</td>
<td>0.2465 (0.0254)</td>
<td>0.2465 (0.0254)</td>
<td>0.2465 (0.0254)</td>
<td>0.2465 (0.0254)</td>
<td>0.2465 (0.0254)</td>
<td>0.2465 (0.0254)</td>
</tr>
<tr>
<td>$CF$</td>
<td>0.6647 (0.0871)</td>
<td>0.6647 (0.0871)</td>
<td>0.6647 (0.0871)</td>
<td>0.6647 (0.0871)</td>
<td>0.6647 (0.0871)</td>
<td>0.6647 (0.0871)</td>
<td>0.6647 (0.0871)</td>
<td>0.6647 (0.0871)</td>
</tr>
<tr>
<td>Firms</td>
<td>5,083</td>
<td>5,083</td>
<td>5,083</td>
<td>5,083</td>
<td>5,083</td>
<td>5,083</td>
<td>5,083</td>
<td>5,083</td>
</tr>
</tbody>
</table>

**Notes:** SZ, sample size; Firms, number of firms; $Ad R^2$, adjusted $R^2$. The Regressions have, without exception, controlled the time and firm fixed effects. *, **Significant at the 10 and 5 percent levels, respectively; ***indicates “not significant.” All other results were significant at the 1 percent level.
Since the variable of the lag \((T−1)\) phase is correlated to the current term, the endogenous problem caused by the correlation between the current variable and the current residual term is effectively avoided. The estimated results are basically consistent with the Model (6). The relative value of the R&D input is still greater than 0, only that the absolute value is slightly lower than Model (6), but not significant enough; the relative valuation of the organizational capital is still positive, and slightly higher than the result of Model (6).

The second possible reason for the endogeneity is that the size of enterprise value will also affect the investment on R&D and organizational capital. Listed companies with higher enterprise value may invest more R&D and organizational capital, that is, there may be a reverse causal relationship between enterprise value and investment on R&D and organizational capital. The standard approach to dealing with this endogenous problem is to find instrumental variables that are correlated to endogenous explanatory variables but not affected by firm value. In practice, most empirical literature usually chooses the \(T−1\) lag phase variable of the explanatory variable; see Wang (2005). This paper also considers the \(T−1\) lag phase of R&D and organizational capital as an instrumental variable for R&D and organizational capital. Model (6) is estimated using the two-stage least squares method. The main estimation results are shown in column (8) of Table VI. Compared with the estimates of Model (6), the estimated coefficients of R&D and organizational capital are also positive, and the absolute values are relatively close, but not so significant as the former estimates. It can be seen that there is a certain endogeneity between enterprise value and R&D and organizational capital investment, but it does not affect the estimation result.

4.4 Time-phased regression results

The previous result is the R&D value obtained from all samples from 2003 to 2014, representing the market valuation of R&D of CMLCs during this time period. Then, has the R&D value of listed companies in the manufacturing industry changed during this time span, and what is the trend of change? Since the section fixed effect model must be calculated in a certain period of time, if the time period is too short, the regression result will be unattainable. In order to observe the change of the R&D value of Chinese listed companies in time, the author segmented the 2003–2014 samples into smaller time periods. Considering that the time of segmentation shall be neither too short nor too long, the time period for segmented regression is set to three or four years. In order to prevent the regression bias caused by simple halving, starting from 2003, this paper calculated once every year with the time period moves forward until the end of the time period arrives in 2014. The results thus obtained are as follows (see Table VII, Figure 2).

Compare the R&D/A regression coefficients for different time periods. The period from 2003 to 2014 can be roughly divided into three periods: the regression results in the first (earliest) period are not significant and will not be discussed; however, it can be found that the R&D value of the second period is always higher than that of the latter period, that is to say, in 2007–2010, the R&D value of CMLCs was higher, and, subsequently, it declined. R&D value represents the expected return of intellectual capital relative to tangible assets. The decline in its value represents a decrease in the relative contribution of R&D investment to enterprise value, leading in return to listed companies’ relatively lower R&D investment. Hall (1993a) conducted a study on the valuation of R&D investment stocks of 2,500 manufacturing companies in the USA from 1973 to 1990. It is also found that between 1986 and 1990, its stock market valuation showed a sharp decline of 20–30 percent as compared with the period of 1973–1982. For this phenomenon, Hall construed as such: the return on R&D investment has indeed decreased; the rate of R&D capital depreciation has been greatly accelerated; and the capital market has become more short-sighted and underestimated the future cash flow that R&D investment may bring. For the time being, this paper shall not discuss the intrinsic reasons for these findings in depth, and the more exact answers await further research.
### Table VII.
Regression results for different time-segmented scenarios

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<tbody>
<tr>
<td><strong>Sample Size</strong></td>
<td>79</td>
<td>184</td>
<td>324</td>
<td>511</td>
<td>794</td>
<td>1,263</td>
<td>1,853</td>
<td>2,400</td>
<td>2,697</td>
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<tr>
<td><strong>Number of firms</strong></td>
<td>45</td>
<td>110</td>
<td>191</td>
<td>265</td>
<td>404</td>
<td>652</td>
<td>833</td>
<td>942</td>
<td>944</td>
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<tr>
<td><strong>Adjusted R²</strong></td>
<td>0.9436</td>
<td>0.9386</td>
<td>0.9624</td>
<td>0.9617</td>
<td>0.9678</td>
<td>0.9678</td>
<td>0.9708</td>
<td>0.9749</td>
<td>0.9735</td>
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<tr>
<td><strong>g₁</strong></td>
<td>1.4924</td>
<td>1.6431</td>
<td>2.0721</td>
<td>3.1891</td>
<td>3.3899</td>
<td>2.6739</td>
<td>2.3563</td>
<td>2.1259</td>
<td>1.5619</td>
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</table>

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<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Sample Size</strong></td>
<td>187</td>
<td>357</td>
<td>554</td>
<td>902</td>
<td>1,436</td>
<td>2,083</td>
<td>2,791</td>
<td>3,339</td>
<td>3,636</td>
</tr>
<tr>
<td><strong>Number of firms</strong></td>
<td>110</td>
<td>192</td>
<td>265</td>
<td>406</td>
<td>656</td>
<td>846</td>
<td>942</td>
<td>944</td>
<td>946</td>
</tr>
<tr>
<td><strong>Adjusted R²</strong></td>
<td>0.9398</td>
<td>0.9609</td>
<td>0.9614</td>
<td>0.9619</td>
<td>0.9713</td>
<td>0.9676</td>
<td>0.9667</td>
<td>0.9713</td>
<td>0.9676</td>
</tr>
<tr>
<td><strong>g₁</strong></td>
<td>1.4924</td>
<td>1.6431</td>
<td>2.0721</td>
<td>3.1891</td>
<td>3.3899</td>
<td>2.6739</td>
<td>2.3563</td>
<td>2.1259</td>
<td>1.5619</td>
</tr>
</tbody>
</table>

**Notes:** The regression also controlled the time and fixed effects of firms. The segmented (subsection) regression and the common regression model (6) used the same model, but to save space, only the regression coefficients of **RD/A** are reported. *,**,***Significant at 10, 5 and 1 percent levels, respectively.
5. Conclusions and implications
The way to measure the value of an enterprise’s R&D investments remains a major challenge for the theoretical and empirical study on innovation economics. By reasonably estimating the value of organizational assets, this paper innovatively introduces semi-annual momentum indicators from the perspective of behavioral finance to control the impact of investor sentiment on enterprise value in the market, and expands the assets-value model pioneered by Griliches (1981) to apply it to China’s securities market. The relative value of R&D investment in China’s manufacturing listed companies from 2003 to 2014 was measured, and the characteristics of R&D value evolution over time were expounded. In the past, the research on R&D value in China has focused on the fields of enterprise productivity, financial performance and output indicators. It remains infrequent to see literature analyzing R&D from the perspective of market pricing. However, the expected benefits of R&D can be measured through the pricing of listed companies in the capital market, thus avoiding the bias that human estimates may bring; therefore, this research has innovative theoretical and practical significance. This paper provides a feasible solution to the problem of measuring the R&D value of Chinese enterprises. Our research shows that the following:

(1) The assets-value model better explains the enterprise value composition of CMLCs. The model was applied to CMLCs in 2003–2014, and the results were robust. The empirical results show that tangible assets, intellectual assets, organizational assets and other intangible assets are the main components of the market value of CMLCs, while market investor sentiment, earnings per share, corporate debt risk, the growth prospects of successful companies and long-term profitability unrelated to R&D investment are also effective control variables.

(2) The results of the model regression show that the R&D value is greater than 1 and significant. R&D investment will raise the market value of listed companies by folds, that is, the capital market’s recognition of R&D investment will increase the company’s knowledge stock, and its shadow price will be higher than the equivalent investment in tangible assets. This fully demonstrates that the capital market regards R&D investment as a powerful means for companies to gain competitive edge, and encourages listed companies to innovate. Listed companies should invest heavily in R&D. On the one hand, R&D activities should be regarded as investment
in the development of business. On the other hand, R&D activities should be recognized as an incentive to win trust from both the investors and the capital market. In fact, in mature capital markets, the more R&D investments a listed company invests in, the higher valuations a company can receive.

(3) Compared with developed countries, CMLCs have lower R&D values. The reason lies in that the path of China’s technological innovation generally starts from imitation (An, 2003). If we aim at maximizing short-term profits, in terms of technology choice, enterprises with limited rationality in a technologically less advanced country will naturally choose the strategy of copinism, given the highest success rate, and then absorb foreign advanced technology through replicative imitation, turning into the company’s own technical capabilities. Then the enterprise will improve foreign advanced technology through innovative imitation, finally, and, gradually, it moves toward independent innovation. To this end, the lower R&D value of CMLCs should be a natural mapping of technical imitation. It should be noted that in the early stage of reform and opening up, China’s manufacturing technology base was weak, so enterprises are therefore encouraged to vigorously introduce foreign advanced technology for imitation and absorption, and the loose intellectual property protection policy was in line with the national conditions at that time. But after more than 30 years since reform and opening up, there are already a considerable number of domestic enterprises that have established their own technological innovation systems and embarked on the road of independent innovation. At this time, the government should beef up the protection of intellectual property rights to encourage Chinese enterprises to gain new competitive edge through independent innovation.

(4) The R&D value of CMLCs saw a declining trend from 2007 to 2014, but the listed companies beefed up the relative investment of R&D in the same period. A similar phenomenon of declining R&D value also appeared in the USA during 1986–1990. There may be many explanations for this, but it is more important to first confirm this surprising phenomenon from more angles. This provides a new perspective on the future evolution of China’s manufacturing industry, and an important orientation for scholars’ further study as well.

References


Wang, Y. (2005), “North-South technology diffusion: how important are trade, FDI and international telecommunications?”, working paper, Carleton University, Ottawa.


Further reading


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A welfare economics analysis of China’s industrial layout restructuring

Wu Fuxiang and Cai Yue
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Abstract
Purpose – At present, China’s industrial spatial layout faces the predicament of over-agglomeration of Eastern China industries and the near disintegration of industrial structure in the central and western regions. The paper aims to discuss this issue.

Design/methodology/approach – Based on the perspective of differentiated inter-regional labor mobility, this paper constructed a model framework of quadratic sub-utility quasi-linear preference utility function, and conducted model deduction and numerical simulation on causal factors of this spatial imbalance along the two dimensions of individual and regional welfare.

Findings – The study finds that in the long run, industrial spatial layout imposes a certain threshold limit on the portfolio proportion of differentiated labor. The dilemma of China’s industrial spatial layout is attributable to the deviation of the market’s optimal agglomeration from the social optimal agglomeration, and to the disfunction of Eastern China’s role as an intermediary between the global and the domestic value chain.

Originality/value – To resolve this predicament of industrial layout, the unitary welfare compensation based on fiscal transfer payment has to be switched to a more comprehensive approach giving consideration to industrial rebalancing.

Keywords Industrial layout, Industrial rebalancing, Differentiated labour, Welfare compensation

1. Introduction
Since the reform and opening up, China’s domestic and international market-oriented industries have, invariably, agglomerated primarily in the eastern coastal areas, where the industrial development is, in a sense, primarily achieved with the assistance of a mass of immigrants from the central and western regions. However, the huge influx of young and middle-aged laborers with relatively higher skills in the Midwest into the eastern coastal areas has given rise to, on the one hand, the phenomenon of “left-behind elderly, women and children,” which is unique to Midwest China at the present stage; on the other hand, behind the veil of prosperity, the long-term aggregation of a large number of migrant workers with relatively low labor skills in the eastern coastal areas. The above phenomena may be related either to China’s specific topography and landforms[1] or to the strong attraction of the urban “conviviality effect” in the eastern coastal areas[2]. At present, due to the excessive agglomeration of population and industries, the eastern coastal areas not only carry huge pressures on resources and the environment, but are also faced with the turbulent changes in the situation around the western Pacific, which are not conducive to China’s development.

A large number of high-quality resources and elements are mainly concentrated in the eastern core area where the modern industrial sector is highly aggregated. The traditional
industrial sector can only passively choose to migrate to the periphery, resulting in the headquarters of large enterprises being clustered in the core area, leaving only manufacturing factories in the periphery, thus forming a spatial separation between the headquarters economy and the factory economy. Since the corporate operating income and tax accounting mainly occur in the core area of the headquarters, the finance and taxation in headquarters area are relatively unfair relative to the factory area. Therefore, the imbalance of industrial spatial layout will inevitably lead to unfair inter-regional welfare. The cause for the persistence of this kind of architecture that separates the headquarters space from the factory space lies in that: first, it enjoys the preferential foreign investment policy that China has long encouraged to attract foreign investment and processing trade. Second, it has the advantage of continuously reaping cheap labor and resources in the central and western regions. The imbalance of industrial distribution, manifested in the over-agglomeration in eastern region and the near disintegration of industrial structure in the central and western regions, is still continuing, resulting in the dual differentiation of individual welfare and regional welfare. The academic community is also very concerned about such problems, and put forward the policy proposition of industrial transfer, but it is still limited to the cognitive and qualitative analysis stage of the phenomenon, and the government’s solution to this problem relies mainly on transfer payment.

Having experienced the “growing pains (problems incidental to growing up)” such as the sharp decline in cultivated land, environmental pollution, energy dilemma, and rising costs, and the “restriction pains” in various aspects, in order to alleviate the predicament of over-concentration of industrial layout, some provinces in the eastern coastal areas endeavor to “vacate cage to change bird Turning cages for birds,” namely, to transfer some traditional industries to the central and western regions through the “double transfer” approach: industrial transfer and labor transfer. However, this transfer is, for the Midwest, mostly passive acceptance. Before the tide of immigration to the eastern coastal areas is effectively alleviated, the dilemma of China’s industrial spatial layout will continue, and the spatial mismatch and inconsistency in terms of talents and industries will continue. Judging from the implementation effect, the central government’s transfer payment by means of “blood (fiscal) transfusion” is not only difficult to compensate for the huge demand gap of transfer payments in the central and western regions, but also unsustainable. The method of industrial transfer of vacating-cage-for-bird-type is merely based on the industrial layout of developed regions, without considering the actual situation and willingness of underdeveloped regions, thus lacking a comprehensive view of industrial linkages.

From the perspective of welfare economics, the imbalance of industrial layout is mainly due to the large deviation between the market’s optimal agglomeration and the social optimal agglomeration. The so-called market optimal agglomeration refers to the equilibrium result of the industrial spatial layout under long-term stability under the free operation of the market; and the social optimal agglomeration refers to the industrial spatial distribution state corresponding to the maximization of social welfare.

Then, given the imbalance of industrial spatial layout and the resulting inequity of inter-regional welfare unfair, how should they be coordinated? Will excessive agglomeration of industries in the core area bring new inefficiencies, and should it be promoted or limited? Which areas can benefit from agglomeration, which areas are damaged from it, and can the beneficiary be able to and required to compensate for the maleficiary? Can the free operation of the market form the optimal agglomeration scale? If these problems cannot be given theoretical solutions, they will affect not only the major decisions of the industrial spatial layout, but also the smooth realization of the strategic goals for regional coordinated development. Based on the perspective of welfare economics of inter-regional mobility of differentiated labor, this paper studies the dilemma and rebalancing of China’s industrial spatial layout.

The research in this paper also stems from the following concerns: since the reform and opening up, many foreign-invested OEM enterprises in the eastern region have integrated
into the manufacturing labor-division system dominated by multinational corporations through processing trade at the expense of regional imbalances. On the one hand, most of the profits reaped by multinational corporations have flowed back to their home countries, and even the profits of local enterprises that have contracted foreign OEM have flowed overseas through disguised channels. On the other hand, regarding the global value chain and the domestic value chain, the eastern region has not played a good role as a “converter” in introducing, digesting and absorbing foreign advanced technology, and has not fulfilled its function as an intermediary that transfers industries to the central and western regions. On the contrary, it has become a conveyor belt for siphoning the cheap resources and elements of the Midwest and then transporting wealth and talents incessantly overseas.

The structure of the rest of the paper is as follows: the second part, based on the relevant theoretical literature, proposes the breakthrough point of the research; the third part constructs the theoretical model to analyze the proportional constraint of the differentiated labor in the industrial layout; the fourth part introduces trade cost, scale economies effect and degree of differentiation, and based on the interpersonal and inter-regional two-dimensional vision, analyzes the dilemma of China’s industrial spatial layout; the fifth part, based on the perspective of market optimum and social optimum deviation, analyzes the principle and mechanism of unitary transfer payment shifting to industrial intervention and industrial rebalancing; the last part constitutes the research conclusion and policy revelation.

2. Literature review
Receives on the imbalance of industrial spatial layout and regional industrial transfer are not uncommon. The representative research results primarily encompass: Lu (2002) analysis of the Changing trends and environmental variations of industrial structure in the western region and counter-measures; investigations by Guo et al. (1994) on the economic development of the six central provinces; Fan (2004) analysis of market integration, regional specialization and the trend of industrial agglomeration; analysis made by Cai et al. (2009). on China’s Flying Geese Model for industrial upgrading. Lu (2002) believes that although the process of industrial structural change in the western region has accelerated significantly since the 1990s, the level of specialization has also increased, but the industrial competitive advantage is still weak, the overall quality of industrial structure is generally low, and the gap relative to the eastern region continues to widen. He also believes that, judging from the external reasons, with the deepening of reform and opening up, elements with strong liquidity such as capital and talents have rapidly flowed to areas with high returns, and the industrial layout has undergone major restructuring with market efficiency as the orientation. These causes have accelerated, in effect, the gradual disintegration of the industrial structure of the western self-contained system.

Guo et al. (1994) have, from the perspective of China’s productivity distribution and industrial structural linkages, advocated that each region should proceed from the local actual situation and seek the best goals conducive to national productivity and overall development. Fan (2004) found that China’s industrial layout has undergone fundamental changes since the reform, and most of the industries have moved to the eastern coastal areas. However, at this stage, it is still in a situation of high agglomeration of industry and low specialization of the region. The overall level of integration of the domestic market is still low, and lags behind that of the external market, rendering the manufacturing industry with excessive agglomeration in the eastern coastal areas unable to transfer to the central region. This has led to an ever widening regional gap.

From the perspective of industrial security, Cai et al. (2009) believe that the impact of the financial crisis on China is related to the structural problems of various regions, industries and even firms themselves. Under crisis conditions, outdated growth patterns, industrial structures and technology choices were the first to be affected. The key to getting over the
crisis and achieving sustained economic growth is to reshape the regional development model. Under the background of the financial crisis and the assumption of big countries, this paper extends the interpretation and prediction range of the Flying Geese Model, and empirically demonstrates the characteristics of the changes in manufacturing growth and productivity growth in China since the turn of the century, which is primarily manifested in that coastal areas have faster rates of increase in total factor productivity and contribution rates. Through the re-deployment of industries in the East, West and Central China regions, namely, the industrial upgrading and transfer of coastal areas and the industrial OEM undertaking of the central and western regions, it is possible to reclaim the labor-rich comparative advantages in the central and western regions while maintaining labor-intensive industries in China.

In addition, the researches of Pan and Li (2007), as well as Wu and Zhu (2008), etc., are also representative. These studies are all based on the perspective of input industry for quantitative analysis of the spillover effects and feedback effects of industrial linkages between different regions of China. Based on the two-region input-output model, Pan Wenqing and Li Zinai concluded that the spillover effects of China’s coastal economic development on inland areas are not obvious, and even less than the spillover effects of inland areas on coastal areas. Wu Fuxiang and Zhu Lei extended the two-region input-output model, and measured the forward and backward linkages of the multiplier effect, inter-regional spillover and feedback effect in China’s eastern, central and western regions. It is found that the spillover effect of the eastern region on the central and western regions is less significant than that of the latter on the former, and the central region has not played a nexus role in the regional economy, this has largely limited the role-play of regional coordination. Therefore, to achieve industrial coordination and inter-regional welfare compensation in the three major regions of eastern, central and western China, it is necessary to accelerate industrial transfer and expand the efficiency of inter-regional public knowledge spillovers.

With differentiated opinions, the above-mentioned researches are not only concerned with the risk of the gradual disintegration of the industrial structure of the self-contained system in the western region under the international background of reform and opening up, but also emphasizes that in view of the excessive concentration of manufacturing in the eastern coastal areas, it is impossible to transfer industries to the central region. As a result, the regional gap has been widening, and it is called for to proceed from the goal of optimal productivity and comprehensive development of China, to promote the comparative advantage of reclaiming the labor force in the central and western regions, and to maintain labor-intensive industries in China. The focus of previous research and analysis is mainly limited to a unitary dimension, or the regional industry dimension, or the labor dimension, to analyze the inter-regional industrial transfer and industrial linkage issues. In fact, if we can start from the two dimensions of industry and labor simultaneously to perform quantitative analysis of the regional and labor welfare status in the wake of the inter-regional imbalance of industrial spatial layout, it may be of more theoretical significance and practical value for improving regional economic analysis methods.

To a certain extent, the introduction of welfare economics analysis methods into regional issues may be an important theoretical issue that endeavors to innovate China’s regional economics research methods, and it is also an important practical issue that desiderates to be resolved in the coordinated development of China’s regional economy. This paper breaks through the limitations of a unitary perspective. From the two dimensions of individual welfare and regional welfare, on the one hand, it compensates for the shortcomings of previous academic researches; on the other hand, it reveals the principle and mechanism, the objective conditions and possible paths of the rebalancing of China’s industrial spatial layout. It reflects not only the innovation in the research methods of China’s regional economic problems, but also the innovation in the research perspective.
The differentiated labor force referred to in this paper is mainly divided into two categories: skilled labor and unskilled labor. The Turing analysis method used in this paper refers to, simply put, the graphical illustration of the method of intuition with spatial visualization of the simulation results through numerical simulation. In addition, the logical starting point of the analysis of welfare economics in this paper is the welfare economic theorem [4]. The framework of modeling follows the analytical framework of linear model of spatial economics. Through the welfare matrix of interpersonal and inter-regional dimensions, the analysis seeks to find the equilibrium point between social optimum and market optimum of industrial spatial layout relative to inter-regional income redistribution, to highlight the two perspectives of equity and efficiency in welfare analysis. We conducted welfare analysis in the order of “equity first, efficiency second.” The so-called equity perspective refers to the comparison of welfare in different agglomeration states; the so-called efficiency perspective refers to the comparison between the market optimum and social optimum effects under different trade costs. The former corresponds to transfer payment, and the latter corresponds to the industrial balance [5]. In this paper, the proposal of welfare compensation mechanism under different agglomeration states is mainly based on the comparison of the above two perspectives.

In contrast to the theoretical system of Western welfare economics, if the compensation measures used in the past are mainly transfer payments, which mainly addresses the problem of inter-regional inequality, then the actual situation in China should be based, furthermore, on efficiency, namely, considering the coordination of regional welfare by rebalancing the inter-regional industrial location. The design of the welfare compensation mechanism from an equity perspective primarily tries to reveal whether the beneficiaries under the change of industrial locations can compensate the maleficiaries, the amount of compensation, and how the nature and intensity of economic variables can affect them. The corresponding compensatory device is, principally, the potential transfer payment based on the Karldor Hicks Principle [6]. From the efficiency perspective of welfare compensation mechanism, researchers tried to examine what kind of industrial layout adjustment between specific trade cost zones can improve market efficiency and balance equity, whether the benefit entity can compensate the damaged entity, and whether the agglomeration formed under market conditions is optimally consistent with social standards. If the objectives are inconsistent, is the agglomeration excessive or insufficient? Especially when the market is found to be over-aggregated, the devices of compensation based on industrial transfer and rebalancing of industrial location will not only improve the overall welfare level of the economy, but also reduce the inter-regional welfare differences.

Charlot et al. (2006) tentatively gave three different evaluation methods to compare the requirements of industrial agglomeration or dispersion for two welfare compensation devices [7]. According to Charlot et al. (2006), the potential transfer payment method of the first welfare compensation mechanism may be the only way to compensate for the loss of the underdeveloped areas due to insufficient agglomeration. However, as far as China’s actual situation is concerned, such conditions are not currently available. There are also many operational difficulties in terms of the second compensation mechanism for balancing industrial locations with a focus on industrial transfer. The main reason is that although the initial population size of the Eastern China is much larger than that of the central and western regions, through the effective intervention of the government’s industrial policies, the promotion of production factors from the eastern region to the central and western regions, and thus the promotion of industrial transfer, may achieve the two-way advancement of regional equity and welfare. However, under the existing fiscal decentralization model, local differentiation makes it impossible for the central government to adopt a “one size fits all” approach to this kind of decentralization and compensation. The imbalance of inter-regional industrial development will almost
certainly strengthen the new core-peripheral structure, which will undoubtedly directly affect the central government’s policy of decentralization and incentives to localities. The next analysis in this paper is mainly based on the trade-off between the above-mentioned inter-regional equity and efficiency. Based on the model of Ottaviano et al. (2002) and Ottaviano and Thisse (2002), new model variables are introduced and a model framework of quasi-linear preference utility function including quadratic sub-utility is constructed, which focuses on the second welfare compensation path to examine the rebalancing of social optimality and market optimality of the industrial spatial layout.

3. The proportional constraint of differentiated labor in the industrial layout
This section first proposes the basic framework of the model, and then conducts long-term equilibrium analysis to reveal the requirements of the industrial spatial layout for the optimal combination ratio of skilled labor and unskilled labor.

3.1 The basic framework of the model
The idea of this model is to first set the consumer’s utility function, the initial factor endowment and the production function of the enterprise, to assume, without losing generality, that there is only one product in the economic system, and the manufacturer uses only one factor (labor). Then, based on utility and profit maximization, the commodity demand, factor supply, commodity supply and factor demand are solved separately. Finally, based on the simultaneous clearing conditions of the commodity and factor market, the general equilibrium’s price ratio, distribution ratio and welfare function matrix are solved.

Assume that the economic system contains two regions, two sectors, and two types of labor. The areas consist of Region A (core area) and Region B (peripheral area) with core-peripheral structure; the sectors are, respectively, the traditional sector “a” characterized by constant returns to scale and perfect competition, and modern sector “m” characterized by increasing returns to scale, i.e., monopolistic competition. The two types of labor are skilled labor ($n = L_S$) and the unskilled labor ($n = L_U$), the skilled labor is only employed in the modern sector “m,” with higher inter-regional mobility, and the unskilled labor is mainly employed in the traditional sector “a,” with lower inter-regional mobility. The spatial distribution of skilled labor in the model is an endogenous variable, and the inter-regional mobility is mainly determined by the difference in inter-regional real labor rates. The output of industrial products in the modern sector of Region A and Region B is, respectively, $n_A$ and $n_B$, and the total amount of industrial products in the economy is $n = n_A + n_B$.

According to the assumption of monopolistic competition and increasing returns to scale, each manufacturer produces only one differentiated product, and the total number of modern sector manufacturers in both regions is also $n$. The total number of laborers in the economy is $L = L_U + L_S$. The unskilled labor is initially distributed symmetrically in the two regions ($L_U/2$). The skill labor force has proportion of $\theta$ in Region A, $n = \theta L_S$, and a proportion of $(1-\theta)$ in Region B, $n = (1-\theta)L_S$. It is assumed that each manufacturer needs to use $f$ units of skilled labor when producing differentiated industrial products. The nominal wage of the skilled labor force in Region A is $w_A$, and the nominal wage of Region B is $w_B$, then there is $n = L_S/f$. It is also assumed here that the marginal cost of the manufacturer is $a_m$, and that a unit industrial product has a linear inter-regional transportation cost of $\tau$.

Similar to the construction method of the model of Ottaviano et al., the personal preference of the author is also given by the quasi-linear preference containing the quadratic sub-utility. Different from the Ottaviano text, this paper introduced the marginal cost variable of industrial production, added the Turing analysis of numerical simulation, constructed the interpersonal and inter-regional two-dimensional welfare function matrix, and based on the efficiency and equity principle, analyzed the inter-regional and
interpersonal welfare in multiple equilibriums of industrial spatial layout. The utility functions of the two-region consumers constructed in this paper are:

\[ U = x \int_0^a c_i di - \frac{\beta - \delta}{2} \int_0^a c_i^2 di - \frac{\beta}{2} \left( \int_0^a c_i di \right)^2 + C_0; \quad x > 0, \beta > \delta > 0, \]  

(1)

where \( c_i \) is the consumption of differentiated industrial products by the consumers in the modern sector, and \( C_0 \) is the consumption of traditional products by all consumers in the region. \( \alpha \) represents consumers' preference for differentiated industrial products and \( \delta \) reflects the substitutability of differentiated products. \( \beta > \delta \) is the condition for the quasi-linear preference quadratic sub-utility function to satisfy the convexity. \( \beta > \delta \) also denotes that when consumers face the physical constraints of differentiated industrial products, for a given \( \beta \) value, the larger the \( \delta \) value, the stronger the substitutability between products.

Assuming that savings, initial profit sharing and transfer payments are not considered, the consumer’s income is all used for purchasing expenses, that is, to meet economic constraints of \( \int_0^a p_i c_i di + C_0 = w \), where \( p_i \) denotes the price of the \( i \)th industry product, the price of the traditional sector product is set to 1. The first-order condition is obtained according to physical and economic constraints, and the demand function of the differentiated product can be obtained:

\[ c_i = a - (b + cn)p_i + cP, \]  

(2)

where \( a = \alpha/(\beta + (n-1)\delta) \), \( b = (a/\alpha) \), \( c = \delta ((\beta - \delta)/(\beta + (n-1)\delta)) \). The composite price index of the product is \( P = \int_0^a p_i di \). If the nominal price levels of the Regions A and B are, respectively, indicated by \( P_A \) and \( P_B \), then there is \( P_A = \int_0^a p_i di = n_A P_{AA} + n_{AB} P_{AB}, P_B = \int_0^a p_i di = n_B P_{BB} + n_{AB} P_{AB} \). Here, \( p_{rr} \) is the price \( (r, s = A, B) \) of the product made in Region \( r \) and sold in Region \( s \).

In the Walrasian equilibrium system, the consumer of the product is also the supplier of the production factor, so the quantity of the consumer \((L_L + L_S)\) can derive the supply of products in the corresponding area (A and B):

\[ M_A = \frac{1}{2} L_L + \theta L_S, \quad M_B = \frac{1}{2} L_L + (1-\theta)L_S. \]

First, solve the profit maximization conditions for manufacturers located in Regions A and B. Take Region A as an example, and B is similar:

\[ \text{Max } \pi_A = \pi_{AA} + \pi_{AB} - \theta w_A \quad (3) \]

where \( \pi_{AA} = (p_{AA} - a_m)(a - (b + cn)p_{AA} + cP_A)M_A, \pi_{AB} = (p_{AB} - a_m - \tau)(a - (b + cn)p_{AB} + cP_B)M_B \). \( \pi_{AA} \) and \( \pi_{AB} \) are, respectively, the operating profit when manufacturers in Region A are equalized in two markets.

Pursuant to the first-order condition of profit maximization, we solve the partial derivative of \( \pi_A \) and \( \pi_B \) relative to the corresponding price, and obtain:

\[ p_{AA} = \frac{2[a + a_m (b + cn)] + cnw_B}{2(b + cn)} p_{BA} = \frac{\pi_A}{2} + \frac{\tau}{2} \]

\[ p_{BB} = \frac{2[a + a_m (b + cn)] + cnw_A}{2(b + cn)} p_{AB} = \frac{\pi_B}{2} + \frac{\tau}{2} \quad (4) \]

It is not difficult to see from Equations (3) and (4) that in the linear model, the manufacturer implements pricing including transportation costs and related to spatial distribution. The condition of product trade is that the sales price of the manufacturer in any region suffices to cover its transportation costs to another counterpart region. Assuming the linear
transportation cost per unit of product is \( \tau \), the condition can be written as:

\[
\begin{align*}
\rho_{AA} - a_m - \tau > 0 & \Rightarrow \rho_{AA} > a_m + \frac{\tau}{2} \Rightarrow \tau < \frac{2(a-a_m)b}{2b+cn} \\
\rho_{BA} - a_m - \tau > 0 & \Rightarrow \rho_{AA} > a_m + \frac{\tau}{2} \Rightarrow \tau < \frac{2(a-a_m)b}{2b+cn} \\
\end{align*}
\]

(5)

Trade can only happen when \( \tau < \tau^{\text{trade}} \) is met. As for \( \tau^{\text{trade}} = \frac{2(a-a_m)b}{(2b+cn)} \), that is, the marginal cost of the enterprise needs to be within the following range: \( 0 < a_m < a/b \). This condition can be further relaxed to \( \tau < \min \left( \frac{2(a-a_m)b}{(2b+cn)}, \frac{(2(a-a_m)b)(2b+cn_A)}{2(a-a_m)b)(2b+cn_A)} \right) \). In fact, when the inter-regional product trade cost is positive, if there is no increasing returns to scale (i.e. \( f = 0 \)), or products show homogeneity (\( c = \infty \)), the inter-regional product trade will hardly occur, because Equation (5) does not hold at the moment. Otherwise, both regions either produce differentiated industrial products, or each is self-contained or self-satisfied.

The following is an analysis of the impact of market size and differentiation on product flow. Since \( c = \delta \beta/(\beta \delta + (n-1)\delta) \), there is \( dc/d\delta = \beta^2 + (n-1)\delta^2/(\beta \delta + (n-1)\delta) > 0 \). The larger the \( \delta \), the stronger the product substitutability, therefore the larger the \( c \), the stronger the product homogeneity is. The smaller the \( c \), the greater the degree of differentiation. By separately solving the first-order partial derivative of \( \tau^{\text{trade}} \) relative to \( f \) and \( c \), we obtain the expression \( d\tau^{\text{trade}}/df = 2(a-a_m)b/L_{\delta}f + cL_{\delta}^2 > 0 \), \( d\tau^{\text{trade}}/dc = -2(a-a_m)b/L_{\delta}f + cL_{\delta}^2 < 0 \).

According to the solution result, the following proposition can be obtained:

**P1.** In the inter-regional flow model of differentiated labor, there is a critical point where the symmetric spatial distribution is broken, which divides the agglomeration and diffusion of the industrial layout. At the same time, trade costs also have strict threshold limits on market size and product differentiation, with both the trade costs are negatively correlated within the critical value range.

Further, the profit of the manufacturer in Region A in the equilibrium state can be obtained, and the case of Region B is similar:

\[
\pi^*_A = \pi^*_A + \pi^*_A - f w_A = (b+cn)\left[(\rho_{AA}-a_m)^2M_A + (\rho_{AB}-a_m-\tau)^2M_B\right] - f w_A. \tag{6}
\]

### 3.2 Proportional constraints on factors

It is assumed that the profit of the manufacturer will eventually be converted into the nominal gross income of the consumer, and each manufacturer hires \( f \) units of skilled labor, then we get the nominal wage level \( W \) of Region A, and the situation of Region B is similar:

\[
w_A = \left(\pi^*_A + \pi^*_A\right)/f = (b+cn)\left[(\rho_{AA}-a_m)^2M_A + (\rho_{AB}-a_m-\tau)^2M_B\right]/f. \tag{7}
\]

Without the loss of generality, assume that the nominal wage level of the unskilled labor force is 1. Since the consumer surplus is the area between the demand curve and the market price curve in the long-term equilibrium, the consumer surplus of the Regions A and B can be calculated in Equation (4) for equilibrium price, to derive:

\[
C_A(\theta) = \frac{a^2L_{\delta}}{2b} \cdot \left[-a\theta\rho_{AA} + (1-\theta)\rho_{BA}\right] + \frac{b+cn}{2} \left[\rho^2_{AA} + (1-\theta)\rho^2_{BA}\right] \cdot n - c/2 \left[\rho^2_{AA} + (1-\theta)\rho^2_{AB}\right] u^2, \tag{8}
\]

\[
C_B(\theta) = \frac{a^2L_{\delta}}{2b} \cdot \left[-(1-\theta)\rho_{BB} + \theta\rho_{AB}\right] + \frac{b+cn}{2} \left[\rho^2_{BB} + \theta\rho^2_{AB}\right] \cdot n - c/2 \left[(1-\theta)\rho_{BB} + \theta\rho_{AB}\right] u^2. \tag{9}
\]

Substituting the equilibrium price Equation (4) and the wage Equation (7) into Equation (1), the indirect utility function of the labor force can be obtained. Of course, this
indirect utility function can also be obtained by adding the consumer surplus to the nominal wage level, i.e.:

$$\omega_A = C_A(\theta) + w_A,$$  \hspace{1cm} (10)

$$\omega_B = C_B(\theta) + w_B.$$  \hspace{1cm} (11)

The prices of industrial products in Equations (8) and (9) are the prices that consumers can purchase locally. The migration decision of skilled labor is largely due to the difference in real labor rates, and Equations (10) and (11) can represent the level of indirect utility. In order to achieve long-term equilibrium in each sub-regional market, it is necessary to satisfy the three basic conditions of maximizing consumer utility, maximizing profit of the manufacturer and clearing the market. Since each manufacturer only produces one modern industrial product, and uses $f$ units of skilled labor, the number of manufacturers in Region $A$ is thus $n_A = \theta L_S f$, the number of manufacturers in Region $B$ is $n_B = (1-\theta)L_S f$, and the total number of the manufacturers in the two areas is $n = L_S f$. Without loss of generality, it is possible to set the appropriate unit of measure for the skilled labor, namely, by simplifying the model via standardizing $n$. Let $L_S = f$, and therefore $n = 1$, $n_A = \theta$, and $n_B = 1-\theta$.

In the standard linear model, it is generally assumed that the skilled labor force has strong mobility to pursue higher real wages (nominal wages are converted through the price index). The strength of mobility mainly depends primarily on the difference between the two regions, and the entire regional economic system will not reached a long-term equilibrium until they are the same. The flow equation for labor can be written as:

$$\dot{\theta} = (\omega_A - \omega_B)\theta(1-\theta).$$  \hspace{1cm} (12)

The long-term equilibrium conditions are: when $0 < \theta < 1$, $\omega_A = \omega_B$ when $\theta = 1$, $\omega_A > \omega_B$ and when $\theta = 0$, $\omega_A < \omega_B$.

Using the derived manufacturer’s profit and price formula, combined with Equations (10) and (11), we can get the long-term equilibrium equation that determines the difference between the actual labor rate of the skilled labor inter-regional flow and the flow barrier:

$$\omega_A - \omega_B = \Theta(\tau^* - \tau)\tau\left(\frac{1}{2}\right),$$  \hspace{1cm} (13)

where $\Theta = ((b+c)((6b(b+c)+c^2)L_S + c(2b+c)L_U)/(2L_S(2b+c)^2))) > 0$, and $\tau^* = (4L_S(3b+2c)(a-a_w b))/((6b(b+c)+c^2) L_S + c(2b+c)L_U)$.

Equation (13) shows that to maintain the long-term equilibrium of labor inter-regional flows, the inter-regional real labor rates must be equal. From this formula, it can be seen that no matter how big the obstacles of inter-regional factors flow, when $\theta = 1/2$, it is a point of equilibrium. According to the standardized initial setting $n_A = \theta = 1/2$, the regional spatial structure is a symmetric distribution structure[8].

Is this symmetrical structure composed of two regions stable and can the equilibrium point be maintained? The result depends mainly on the size of $\tau^*$ and $\tau$. It is not difficult to find from Equation (13), when $\tau < \tau^*$, $\omega_A - \omega_B$ and $n_A - (1/2)$ have the same symbol; on the contrary, when $\tau > \tau^*$, their symbols were different. Equation (13) reveals that when the degree of regional integration is high, there is a positive feedback mechanism in the economic system. The slight deviation of the symmetric distribution leads to the widening of the inter-regional real labor rate and the further deviation of the symmetric spatial distribution, forming a “black hole” phenomenon in which the skilled labor is fully concentrated in the core area. On the contrary, when the degree of regional integration is
low, the economic system has a negative feedback mechanism, and the symmetric distribution is relatively stable.

What is the relationship between $\tau^*$ and $\tau^{\text{trade}}$? The conclusion is that if $\tau^* > \tau^{\text{trade}} > \tau$, agglomeration always occurs and is persistent and stable. In fact, if $\tau^* < \tau^{\text{trade}}$, it is very similar to the “non-black hole condition” in the core-peripheral model, which is:

$$\begin{align*}
\tau^* &= \frac{4L_S(3b + 2c)(a-a_m)b}{6b(b + c) + c^2} \frac{L_S + c(2b + c)L_U}{L_S} < \tau^{\text{trade}} = \frac{2(a-a_m)b}{2b + cn} \\
\Rightarrow \frac{L_U}{L_S} > \frac{6b^2 + 3c^2 + 8bc}{c(2b + c)} > \frac{3c^2 + 6bc}{c(2b + c)} = 3.
\end{align*}$$

This inequation shows that the number of unskilled labor must be more than three times that of skilled labor regardless of agglomeration equilibrium or dispersion equilibrium. This shows that although the skilled labor force is very important for industrial agglomeration, it must be supported by the corresponding unskilled labor force. If Formula (14) is not satisfied, then $\tau^* > \tau^{\text{trade}}$. The symmetric distribution is unstable while the agglomeration state is stable. The following propositions can thus be obtained:

P2. In the inter-regional mobility model of differentiated labor, regardless of the industrial distribution pattern, the number of unskilled labor is at least three times that of the skilled labor. The upkeep of industrial agglomeration in the core area requires the continued supply of peripheral skilled labor. The smaller the trade cost, the more aggregated the industrial distribution will be.

4. The dilemma of industrial spatial layout from the two-dimensional perspective of labor and regions

This section expands the above basic model and performs numerical simulations to reveal whether the welfare conditions of the individual and regional dimensions are consistent with the optimal ratio requirements in the actual situation in China. This section will also introduce variables such as location conditions, market size, trade costs and marginal manufacturing costs to compare individual and regional welfare.

From the perspective of welfare, it is necessary to consider not only whether the industrial distribution can improve the welfare level of the entire economic system, but also whether the interpersonal and inter-regional distribution of welfare levels is appropriate. The former involves the efficiency of welfare and the latter involves the equity of welfare. The calculation results of the labor and regional two-dimensional welfare function matrix are shown in Table I, where $W_S$ represents the welfare of skilled labor, and $W_U$ represents that of unskilled labor.

To facilitate the simulation, we first assign values to related parameters. Considering that in Equation (5), $\tau^{\text{trade}} = 2(a-a_m)b/(2b + cn) > 0$, further let $a = b = c = 1$, $L_S = L_U = f = 1$, then $\tau^{\text{trade}} = 2/3(1-a_m) > 0$, $0 < a_m < 1$. This means that higher marginal costs will lead to the decrease of $\tau^{\text{trade}}$, trade costs are forced to compress, and terms of trade become more demanding.

| Table I. Two-dimensional welfare matrix by labor and region |
|---------------|---------------|
| Skilled labor (S) | Unskilled labor (U) |
| Region A | $W_S^A(0) = 0L_S[2C_A(0) + w_A(0)]$ | $W_U^A(0) = (1/2)L_U[2C_{Ah}(0)+1]$ |
| Region B | $W_S^B(0) = (1/2)L_S[2C_{Ah}(0) + w_A(0)]$ | $W_U^B(0) = (1/2)L_U[2C_{Ah}(0)+1]$ |
| Note: The welfare function matrix of this table is calculated according to the corresponding formula |
4.1 The welfare of differentiated labor

First, we examine the welfare of the unskilled labor force. Combining Equations (7) and (4), we get:

\[ C_A = \frac{2}{9} \frac{4}{9} (1-\theta) \tau + \frac{1}{4} (1-\theta) \tau^2 - \frac{1}{9} (1-\theta) \tau^2 - \frac{4}{9} \frac{a_m}{\theta} + \frac{2}{3} \tau + \frac{4}{9} a_m (1-\theta) \tau. \]

In the same way, we get:

\[ C_B = \frac{2}{9} \frac{4}{9} \theta \tau + \frac{1}{4} \theta \tau^2 - \frac{1}{9} \theta \tau^2 - \frac{4}{9} \frac{a_m}{\theta} + \frac{2}{3} \tau + \frac{4}{9} a_m \theta \tau, \text{ and } 0 < a_m < 1. \]

Solve the first-order partial derivative of \( C_A \) relative to \( \theta \), we get:

\( (\partial C_A/\partial \theta) = -(2\theta+7)/(36) \)

and

\( (\partial C_A/\partial \theta) > 0 \text{ or } < (16)/(12\theta+7)(1-a_m). \)

Consider again \( 1/2 \leq \theta \leq 1 \) (because the core area has an agglomeration effect), therefore \((16/9)(1-a_m) < (16)/(12\theta+7)(1-a_m) < (2/3)(1-a_m) \). According to Equation (5), \( 0 < \tau < \tau^{trade} = (2/3)(1-a_m) \), and there is \( (2/3)(1-a_m) < (16/9)(1-a_m) \), and therefore \( (16/(12\theta+7)(1-a_m) < (2/3)(1-a_m), \)

we get:

\[ (\partial W_B/\partial \theta) > 0, \text{ indicating that the unskilled labor force in the core area always prefers the structural model of agglomeration.} \]

4.2 Welfare economics analysis

The change in the welfare of skilled labor is more complicated than the relevant discussion of unskilled labor in that consideration has to be made on the changes in wage levels, and investigations and comparison of the industry spatial agglomeration (\( \theta \)), trade costs (\( \tau \)), and the marginal cost of the enterprise (\( a_m \)).

Now we look at the overall welfare status \( W_A \) and \( W_B \) of the skilled labor. Note that \( 0 < \tau < (2/3)(1-a_m) \) and \( 0 < a_m < 1 \), first we set different marginal costs to determine the upper boundary and lower boundary of trade costs; then select representative critical points, and within the allowable range of \( \tau \), take the critical points close to the upper and lower boundaries for simulation (Figure 1).

Observing Figure 1, it is not difficult to find: skilled labor will benefit from the agglomeration in a certain region; the reduction of trade costs and marginal cost will lead to the decline of the overall welfare of skilled labor in the region; the reduction in trade costs and marginal costs has a huge impact on the welfare level of skilled labor in different regions. Observing (a), (b), (c) and (d), (e), (f) in Figure 1, respectively, it can be found that given a marginal cost, a small change in trade costs has less impact on welfare; but an
observation of (a), (c), (e) and (b), (d), (f) in Figure 1 shows that the increase in marginal cost causes a significant decline to $W_A^S$ and $W_B^S$. It can be seen that the impact of trade costs on the welfare level of skilled labor is much less than that of the marginal costs.

The partial derivatives of $W_A^S$ and $W_B^S$ with respect to the marginal cost $a_m$ are solved, respectively, taking $\tau = 0.1$, we obtain $\left(\frac{\partial W_A^S}{\partial a_m}\right)_0$, and $\left(\frac{\partial^2 W_A^S}{\partial a_m^2}\right) = \frac{4}{3}$, indicating that the second order derivative of $W_A^S$ relative to $a_m$ has a uniform increase-decrease characteristic with $\theta$, while the second order derivative of $W_B^S$ relative to $a_m$ is opposite to the increase-decrease characteristic of $\theta$. It can be seen that under different industrial distribution patterns, the welfare of skilled labor has higher sensitivity with respect to marginal cost and changes with the variation of agglomeration degree $\theta$. This leads to the following proposition:

$P3$. In the differentiated labor inter-regional mobility model, skilled labor can always benefit from the two models. When trade costs rise, welfare levels rise; when marginal costs rise, welfare levels fall. Relative to the cost of trade, marginal cost has a higher sensitivity to the impact of skilled labor welfare, and is enhanced with the increase of industrial concentration in the core areas. On the contrary, unskilled labor has the opposite situation in the two regional models. When it is in the core area, the welfare is improved, and when it is in the peripheral area, the welfare suffers.

4.2 Comparison of welfare in interpersonal dimension

The overall welfare of the skilled labor and unskilled labor are expressed, respectively, as follows:

$$W_S = \theta L_S[C_A + w_A] + (1-\theta)L_S[C_B + w_B], \quad (15)$$

$$W_U = \frac{1}{2}L_U[C_A + 1] + \frac{1}{2}L_U[C_B + 1]. \quad (16)$$

First, we examine the impact of industrial distribution on the welfare of differentiated labor. The partial derivatives of $W_S$ and $W_U$ relative to $\theta$ are solved, combining the constraints we
obtain \( (\partial W_S/\partial \theta) = (2\theta - 1)(16/9)(1 - a_m) - (53/16)\tau^2 \). When \( \theta > 1/2 \), \( (\partial W_S/\partial \theta) > 0 \); when \( \theta < 1/2 \), then \( (\partial W_S/\partial \theta) < 0 \). In the same way, we get \( (\partial W_U/\partial \theta) = (1/18)(1/2 - \theta)\tau^2 \). When \( \theta > 1/2 \), \( (\partial W_U/\partial \theta) < 0 \); when \( \theta < 1/2 \), then \( (\partial W_U/\partial \theta) > 0 \). Therefore, agglomeration increases the overall welfare of the skilled labor, but may reduce the overall welfare of the unskilled labor.

Second, we examine the impact of marginal cost on differentiated labor welfare. The partial derivatives of \( W_S \) and \( W_U \) relative to \( a_m \) are solved, combining the constraints we obtain \( (\partial W_S/\partial a_m) < 0 \), \( (\partial W_U^2/\partial a_m^2) > 0 \), and \( (\partial W_U/\partial a_m) < 0 \). \( (\partial W_U^2/\partial a_m^2) > 0 \). Therefore, the reduction in marginal cost will increase the overall welfare of the two types of labor, and this effect will gradually increase.

Finally, we examine the impact of trade costs on differentiated labor welfare. The partial derivatives of \( W_S \) and \( W_U \) relative to trade costs \( \tau \) are solved, combining the constraints we obtain \( (\partial W_S/\partial \tau) < 0 \), \( (\partial W_U/\partial \tau) < 0 \). It shows that when trade costs rise, all labor welfares decline.

4.3 Comparison of welfare in the inter-regional dimension

Divided by the inter-regional dimension, the welfare levels of the two regions can be expressed as follows:

\[
W^A(\theta) = W^A_S(\theta) + W^A_U(\theta) = \theta L_S[C_A(\theta) + w_A(\theta)] + \frac{1}{2}L_U[C_A(\theta) + 1],
\]

(17)

\[
W^B(\theta) = W^B_S(\theta) + W^B_U(\theta) = (1 - \theta)L_S[C_B(\theta) + w_B(\theta)] + \frac{1}{2}L_U[C_B(\theta) + 1].
\]

(18)

Give different marginal costs first, and then we simulate within the value range of trade costs (Figure 2).

![Figure 2. Comparison of inter-regional welfare levels under different freight rates and marginal costs](image-url)
The following proposition can be drawn from Figure 2:

*P4.* In the differentiated labor inter-regional flow model, when the location conditions are improved, the industrial agglomeration is enhanced, the welfare of the core area will be increased, but the welfare of the peripheral areas will be uncertain or even decreased. When trade costs rise, welfare in core areas rises; when marginal costs rise, welfare in core areas falls.

Figure 2 and *P4* show that although industrial agglomeration and location improvement can enhance the welfare of the core area, the core area has insufficient drive for regional integration. The reason is that rising degree of integration means that the cost of trade has fallen, the threshold for entry has decreased, the monopoly position of the core area has declined, and the welfare has, on the contrary, declined.

5. **Transition from unitary transfer payment to industrial intervention and industrial balance**

The results of the previous analysis show that, in the long run, the welfare of the core area tends to rise in the core-peripheral structure, whereas the welfare of the peripheral area tends to decline. So, how should the core area compensate the periphery for welfare? There are currently no established criteria and answers to this issue. Even with interpersonal compensation standards, welfare economists have different theoretical perspectives and policy claims. For example, Kaldor (1939) compensation principle is concerned with the compensation after the change, and believes that if the beneficiaries still get benefits after fully compensating the maleficiaries, then the social welfare is improved. Hicks (1940) made some amendments on the basis of the Kaldor standards, and believed that the criteria for judging social welfare should be observed in the long run. If the maleficiaries cannot benefit from the social beneficiaries from the changes contrary to social conditions, such compensation is an improvement in social welfare. Scitovsky (1941) combines the above two viewpoints and believes that the forward test or the reverse test alone cannot be used as a basis for judging whether social welfare is improved. Only by making two-way tests at the same time can we correctly analyze changes in social welfare, that is, only when the Kaldor and Hicks standards are met simultaneously, can we confirm that social welfare is improved or not.

5.1 **Transfer payment from an equity perspective**

First of all, in theory, the above transfer payment from the perspective of welfare economics is a potential one based on certain value judgments. The special meaning of “potential” here is that the premise of this transfer payment lies in the confirmation that agglomeration is superior to dispersion in terms of efficiency, which determines that when the economic entity changes from dispersion to agglomeration, it can obtain potential Pareto improvements in the sense of Kaldor-Hicks compensation. Therefore, this potential transfer payment is a kind of welfare compensation that balances equity and efficiency.

Assuming that the transfer payment plan is \((c, t)\), \(c\) denotes the per capita payment required in the peripheral area, and \(t\) denotes the core area per capita payment. The welfare results of various groups in the two states of agglomeration and dispersion are shown in Table II.

First, according to the Pareto standard of equity perspective, when the industrial distribution shifts from dispersion to agglomeration, there is \(\hat{W}_B^U > \hat{W}_U^A\) and \(\hat{W}_S^A > \hat{W}_S^A\), but \(\hat{W}_U^B < \hat{W}_U^U\). Therefore, both types of labor in Region A must provide transfer payment to the unskilled labor of Region B, so that the unskilled labor’s welfare \((\hat{W}_U^B)\) after
compensation is not less than that in the dispersed state \((\overline{W}_U)\), namely, after compensation, at least \(\overline{W}_U(c) = \overline{W}_U\) is met. Thus there is:

\[
\frac{1}{2} \left( \overline{C}_B + 1 \right) \leq \frac{1}{2} \left( \overline{C}_B + 1 + c \right),
\]

with solution \(c \geq \frac{2}{9} (1 - a_m) \tau - \frac{5}{48} \tau^2 \). (19)

Second, according to the principle of welfare compensation, after paying compensation in the agglomeration state, the personal utility level of all residents in Region A should be at least not lower than that in the dispersed state. That is:

\[
\overline{V}_A^S \geq \overline{V}_S, \quad \text{as simplified as} \quad \overline{V}_U^A \geq \overline{V}_U^A, \quad \text{simplified as} \quad t \leq \frac{4}{9} (1 - a_m) \tau - \frac{33}{144} \tau^2.
\]

Again, the transfer payment shall ensure that the total income and expenditure of the two regions are equal, thus:

\[
c \left( \frac{1}{2} L_U \right) = t \left( L_S + \frac{1}{2} L_U \right), \quad \text{simplified as} \quad c = 3t.
\]

Finally, the transfer payment scheme \((c, t)\) must meet the clearing conditions after agglomeration, which is reflected in Equation (3). Consistent with the foregoing, the marginal cost is set to three values, respectively, \(a_m = 0.2\), \(a_m = 0.5\) and \(a_m = 0.8\). Combined with Equations (19)–(21), the Turing analysis corresponding to the transfer payment scheme \((c, t)\) can be given as shown in Figure 3.

Figure 3 reflects the core-to-peripheral transfer payment scheme at dispersion to agglomeration transition. The shaded parts in (a), (c) and (e) of the figure indicate the per capita payment to be obtained in the periphery, and the shaded parts in (b), (d) and (f) indicate the per capita payment to be paid by the core area. Given the marginal cost \(a_m\), the trade cost range is \(\tau \text{trade} = (2/3)(1 - a_m)\). The vertical red line in Figure 3 represents the upper bound of the trade cost range, i.e., \(\tau \text{trade}^u\). An observation of Figure 3 leads to the following proposition:

\(\text{P5.}\) In the inter-regional mobility model of differentiated labor, the industrial distribution shifts from dispersion to agglomeration, objectively requiring the core area to support the periphery with corresponding welfare compensation, the intensity of which rises with the increase of inter-regional trade costs, and falls with the decline of the marginal manufacturing costs.

The proposition reveals that the size of inter-regional transfer payments depends mainly on the welfare losses and mobility willingness of the peripheral unskilled labor force when the regional economic system shifts from dispersion to agglomeration. On the one hand, rising dispersion equilibrium

<table>
<thead>
<tr>
<th>Region A</th>
<th>Skilled labor ((S))</th>
<th>Unskilled labor ((U))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Region B</td>
<td>(\overline{W}_S = (1/2)L_A)</td>
<td>(\overline{W}_U = (1/2)L_A[C_A + 1] )</td>
</tr>
<tr>
<td>Agglomeration equilibrium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Region A</td>
<td>(\overline{W}_S^D = L_A[C_A + w_A] )</td>
<td>(\overline{W}_U^D = (1/2)L_A[C_A + 1] )</td>
</tr>
<tr>
<td>Region B</td>
<td>(\overline{W}_S^D = 0 )</td>
<td>(\overline{W}_U^D = (1/2)L_A[C_B + 1] )</td>
</tr>
</tbody>
</table>

\textbf{Note:} The welfare function matrix of this table is calculated on the basis of Table I.
trade costs have forced firms in the peripheral areas to bear higher import prices of industrial products, resulting in greater welfare losses, and forcing the core areas to provide more welfare compensation. On the other hand, the increase in marginal cost has led to the compression of the space for transfer payments. The peripheral skilled labor force, attracted by the “conviviality effect” in the core area, will choose to flock to there at the expense of large-scale immigration, resulting in excessive agglomeration and crowding.

5.2 Industrial balancing from the perspective of efficiency

Different from the transfer payment compensation method from the equity perspective, the inter-regional welfare compensation can also be realized by balancing the industrial locations across regions, that is, through industrial transfer and industrial intervention. The fundamental reason for its implementation lies in the deviation of the market's optimal agglomeration relative to that of the society. There are two potential inefficiencies in the regional economic system when the market is free to operate[10]. If the social welfare levels of the two regions are aggregated, the overall welfare can be “optimal.” At the same time, as an economic planner, if the central government can force the manufacturers in the region to price according to the marginal costs, the economic system can thus achieve the “sub-optimal” situation. Under such circumstances, the central government has sufficient information and adjusts the regional industrial layout according to the overall optimal agglomeration level of the whole society. Not only can the market efficiency be greatly improved, but also the regional gap can be narrowed. Compared with the potential transfer payment, the method of balancing the regional industrial location via global welfare analysis with utilitarian standards may also achieve the purpose of balancing equity and efficiency and realizing inter-regional welfare compensation through completely different compensation methods.

In order to give a utilitarian social welfare function, the two regional social welfare functions are summed up to:

\[
W(\theta) = \frac{1}{2}L_A[C_A(\theta) + 1] + \theta L_S[C_A(\theta) + w_A(\theta)] + \frac{1}{2}L_B[C_B(\theta) + 1] + (1-\theta)L_S[C_B(\theta) + w_B(\theta)].
\]  

(22)
Since the manufacturer is pricing according to the marginal cost, there is \( P_A^0 = P_{BB}^0 = a_m \), \( P_{AB}^0 = P_{BA}^0 = a_m + \tau \), that is, the difference between the profits of the manufacturers in the region is zero, and the difference in the nominal wage of the labor is also zero, \( w_A(\theta) - w_B(\theta) = 0 \) and it holds for all \( \theta \). The modified Equation (22) formula can solve the regional industrial distribution state at the social optimal agglomeration:

\[
W = (1-a_m)^2 + \left( 2\theta^2 - 2\theta - \frac{1}{2} \right)(1-a_m)\tau + \left( -2\theta^2 + 2\theta + \frac{1}{4} \right)\tau^2 + 1
\]

\[
= 2\tau [\tau^0 - \tau] \theta (\theta - 1) + \text{constant}, \quad \tau^0 = 1 - a_m.
\]

Combined with the actual labor rate difference of Equation (13), the industrial distribution under the optimal market condition can be obtained:

\[
\omega_A - \omega_B = \frac{16}{9} (\tau^* - \tau) \theta \left( \frac{\theta - 1}{2} \right), \quad \tau^* = \frac{5}{4} (1 - a_m).
\]

First, we examine the impact of trade costs on social optimal and market optimal industry distribution. Since the trade costs in Equations (22) and (12) have two critical values: \( \tau_0 = 1 - a_m \) and \( \tau^* = 5/4(1-a_m) \), for each given marginal cost \( a_m \), the trade cost parameters can be selected in three representative intervals for numerical simulation. We might as well set \( a_m = 0.2 \), then \( \tau_0 = 0.8 \), \( \tau^* = 1 \). Taking three representative trade cost parameters, the Turing analysis of numerical simulation is as shown in Figure 4.

Observing Figure 4 and combining the characteristics of long-term equilibrium, it is not difficult to find out: when the degree of regional integration is low, social optimality and market optimality are consistent when the industry is highly dispersed (corresponding to \( \theta = 0.5 \)); when the degree of regional integration is at a higher level, social optimality still favors dispersion in industries, while market optimization requires a spatial distribution of agglomeration; when the regional integration is very high, social optimality and market optimality invariably tend to form in core areas an industrial distribution of complete agglomeration, where the market optimality and social optimality are inherently consistent.

At present, China is in the second stage of the above three situations, that is, the stage of low trade cost and high degree of regional integration, corresponding to the market optimal agglomeration is higher than the social optimal agglomeration. This means that the "laisser-faire" of spontaneous role of market forces would incur excessive agglomeration of industries. The reason is that although the degree of regional integration in China is gradually increasing, the current market is not yet fully mature. As reflected in Figures 3 and 4, the payment for compensation in the peripheral areas is much higher than that the core area is willing to pay.

The impact of marginal cost \( a_m \) on overall social welfare is also in line with expectations. For example, the partial derivative of Equation (22) on the marginal cost \( a_m \) and the

![Figure 4. Inter-regional welfare compensation path under balanced industrial location models](image-url)
combination of constraints derive \(\partial W / \partial a_m = -2[(1-a_m) + (\theta^2 - \theta - (1/4))\tau] < -2(\theta^2 - \theta - (5/4))\tau < 0\), denoting that through the means of economies of scale or technological progress, and reducing the marginal cost, the overall welfare of the whole society can be escalated.

It is worth noting that the two thresholds (critical values) \(\tau^0 = 1 - a_m\) and \(\tau^* = 5/4(1 - a_m)\) of trade costs have subtle links with marginal costs. The increase of marginal cost \(a_m\) makes both thresholds decrease, and the market optimal and social optimal ideal state in the fully agglomerated state will be more difficult to achieve, because the range of values accompanying trade costs \(\tau\) is compressed, and the requirements for \(\tau\) are more demanding. Conversely, lower marginal costs will relax the range of trade costs. Under ideal conditions, there is a trade-off interaction between these two costs.

### 5.3 Extended discussion of industrial layout

In the model framework of this paper, the initial assumption is that the ratio of the number of skilled labor to unskilled labor is 1:1. However, according to the ratio requirement of Equation (14), in the composition of the two types of labor, the proportion of skilled labor to the total labor force cannot exceed 0.25. This means that in a regional economic structure with a core-peripheral structure, the number of skilled labor is much less than that of unskilled labor. Now suppose that the ratio of the skilled labor to the unskilled labor is \(\lambda:1\) \((0 < \lambda < 1)\), then the increase of \(\lambda\) means that the proportion of skilled labor in the economic system rises. Of course, for China in a transition period, among the many factors that measure the overall economic development driven by industrialization and urbanization, the proportion of skilled labor as a representative of high-tech and high-level labor is undoubtedly an important factor with a crucial impact on the overall welfare of the whole society.

Assume that the overall welfare of society can be written in the form of \(W = \lambda \cdot W_S + W_U\). According to the conclusions of Equations (15) and (16), \(W_S\) is a parabola with an opening upward relative to \(\theta\), and \(W_U\) is a parabola with an opening downward relative to \(\theta\). However, the final opening direction of \(W\) mainly depends on the size of \(\lambda\). When \(\lambda\) is larger, it represents a developed regional economic structure, which is dominated by \(W_S\) with an open side up parabola of \(W\); when \(\lambda\) is smaller, it represents an underdeveloped regional economic structure dominated by \(W_U\) and with an open-side-down parabola of \(W\). The Turing analysis results of \(W\) are shown in Figure 5.

A closer look at Figure 5 reveals that when the proportion of skilled labor in the economic system is high, the industrial distribution in the agglomerated state can optimize the overall welfare of the society; and when the proportion of skilled labor in the economic system is low, the scattered industrial distribution is more conducive to the improvement of the overall welfare level of the society.

### 6. Conclusions and revelations

Based on the perspective of differentiated labor inter-regional mobility, this paper constructs a model framework consisting of quasi-linear preference functions of quadratic sub-utility, and theoretically analyzes the rebalance of China’s industrial spatial layout.
The main conclusions are as follows: first, in the long-term state, the industrial spatial layout has a certain threshold limit on the portfolio proportion of the differentiated labor force. The dilemma of China’s industrial spatial layout stems from the deviation of market’s optimal agglomeration from social optimal agglomeration, and from the disfunction of Eastern China’s role as an intermediary between the global and the domestic value chain. Second, at this stage, because the market’s optimal agglomeration is always higher than the social optimal agglomeration, it is objectively determined that the imbalance of industrial spatial distribution in China will persist in the long run. Third, the sustainability of high-end industrial agglomeration in the core region needs to be up-kept by the continuous supply of skilled labor in the peripheral regions. At the same time, it is necessary to have as guarantee a welfare compensation mechanism matching social optimum with market optimum.

The enlightenment significance of this paper is that, first, in order to fundamentally alleviate the imbalanced dilemma of China’s industrial spatial layout and the phenomenon of regional left-behind due to long-term migration of the central and western labor force, it is necessary to realize a transition from a unitary regional transfer payment strategy to industry relocation and industry rebalancing strategy. Second, under open conditions, the connotation and standards of regional equity are dynamically changing, and the corresponding welfare compensation measures should also be adapted to local conditions. For example, interest groups in the core areas often have the stronger floor and vote decisions, now that they do not expect to obtain more inter-regional transfer payments; they are naturally reluctant to assume more compensation obligations. Therefore, copying the theory of Western economics does not help solve the practical problems in China. An obvious example is that the Western standard welfare economics theory generally believes that the most effective way to compensate for inter-regional welfare under market conditions is transfer payments, but for the actual situation in China, the conditions for doing so are not met. On the contrary, compared with the compensation devices of potential transfer payment, those devices balancing the regional industrial location via global welfare analysis with utilitarian principle may be an effective means to achieve the optimal welfare compensation of the whole society in China. To this end, the central government as an economic planner needs to scientifically balance the industrial location, and consciously plan new industries and projects in the peripheral areas through industrial transfer, industrial intervention and industrial support. In the regional counterpart support and assistance action plan, in view of the long-term siphoning of the skilled labor force in the peripheral areas by the core areas, it is necessary to escalate the system constraints to block the “allee couverte” of abnormal backflow of industry, capital and labor to the core areas. Third, the breakthrough in the predicament of regional industrial spatial layout must not only have an open vision, but also strive to achieve a reasonable balance and trade-off between equity and efficiency. First, based on the openness of the economic system, it is necessary to fundamentally change the traditional practice of maintaining the participation of foundry OEM enterprises in the international division of labor system by means of cheap energy and factor subsidies; second, it is necessary to fundamentally reverse the welfare inequity as a consequence of the deviation of market optimality from society optimality in industrial spatial layout. The spatial matching prowess of talents and industry shall be improved by beefing up the strategic investment on labor talents in general.

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Notes

1. As early as 1935, Chinese geographer Hu Huanyong proposed the famous “Hu’s line (Heihe-Tengchong Line),” which reveals that on the land map of China, the 45-degree diagonal line north from Heilongjiang Heihe River (Henan) and south to Yunnan Tengchong divides the proportion of land area in China into 64 percent in the northwest and 36 percent in the southeast, with a corresponding population ration of 4 and 96 percent, respectively. This pattern of asymmetric distribution of population has not changed even when Hu studied the topic again in 1987. See Hu (1935).

2. The so-called “birth effect” denotes that the more people there are, the greater the potential of social interaction. However, the 2009 World Development Report repeatedly mentioned in terms of the research on China’s immigration, growth and welfare that the southeast coast of China is not only a gathering place for large population migration, but also an agglomeration area with high poverty rate in China. For example, in the early days of reform and opening up in 1980, the population of Shenzhen was only about 30,000. In 1988, it soared up to 800,000, and in 2000, to 7m. See The World Bank (2009).

3. According to the utilitarian principle of social welfare function theory, the ideal state is the maximization of total social welfare, and the core categories are Pareto’s “optimality” and Marshall’s “consumer surplus.” The premise of fair global optimality is to rationally distribute welfare among regions, the necessary condition is economic efficiency, and the sufficient condition is reasonable distribution.

4. The first theorem of welfare economics states that competitive equilibrium has Pareto efficiency. The second theorem emphasizes that to satisfy the competitive equilibrium, appropriate welfare compensation must be applied to specific groups. The third theorem, namely, the Arrow’s theorem, purports that there is no Arrow social welfare function that satisfies simultaneously the universality, Pareto compatibility, independence, and Non-Dictorship. However, Mori’s theorem states that the “Arrow’s impossibility theorem” only applies to the collective selection rule such as in voting, its essence is the defect of the new welfare economics derived from the ordinal utility. The use of the cardinal utility can derive the relevant information for comparison of interpersonal utility. This article uses this as a starting point.

5. At the theoretical level, the current research on such issues is mainly represented by Charlot et al. (2006).

6. This is a transfer payment in the sense of obtaining potential Pareto improvements.

7. The first constitutes the Pareto improvement standard and considers that there is no situation in which certain group welfare is better without making any group welfare worse. The second constitutes the utilitarian welfare function standard, which considers the ideal state is to maximize the total social welfare; the third constitutes the Rawlsian welfare function standard, which believes that the level of social welfare depends mainly on the welfare level of the group with the lowest utility in society. Two devices are transfer payments and industrial transfers.

8. Of course, if we consider the influence of restrictions on population mobility such as household registration, we may maintain a symmetric structure of scattered distribution.

9. The so-called “Marshall Pecuniary externality” is essentially Marshall’s principle of external economy, which mainly includes the localization and urbanization effects brought by the knowledge spillover, labor union and factor sharing to the cluster of SMEs.

10. First, whilst the price index in the core region declined, and the price index in the peripheral region rose, which brought negative externalities to the peripheral residents. Second, if the monopolistic pricing of the manufacturers was higher than the marginal cost, unnecessary loss of consumer surplus would ensue.
References


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Research on the performance of industrial innovation of small and medium-sized enterprises in China

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Abstract
Purpose – The purpose of this paper is to test the relationship between innovation performance and innovation spillover effects, innovation inputs, innovation outputs and industrial effects.
Design/methodology/approach – The analysis framework including variables such as innovation spillover effect, innovation input, innovation output and industrial effect was constructed. Through the investigation and analysis of the innovation activities of China’s GEM listed companies in 2014–2016, the innovation performance and the above factors were tested.
Findings – The research shows that enterprise performance has a significant positive correlation with innovation input and innovation output, but there is no significant correlation or even negative correlation with innovation environment and industry background such as government support and innovation opportunities, and the spillover effect is significant. The negative correlation is also negatively correlated with innovative human capital investment, company age and company Q.
Originality/value – Innovation is the real source of economic growth, and industrial innovation is the system integration of technological innovation, product innovation, market innovation, etc., which is the basic determinant of national competitiveness.
Keywords Innovation performance, Innovation spillover effect, Industrial innovation, GEM listed company

1. Introduction
Since Schumpeter’s innovation theory was put forward, the impact of innovation on economic growth has gained more and more attention from economists. The general view is that innovation is an important endogenous variable to economic growth (Baumol, 2002, 2007; Malerba and Brusoni, 2007; Peters, 2008). Baumol (2002) emphasized that innovation was the real source of unprecedented growth of capitalist economy, while small enterprises with proprietary innovation and large high-tech enterprises were the two wheels driving innovation forward.

Since the 18th National Congress of CPC, the Chinese Government has taken changing the mode of economic growth and structural adjustment as its strategic task to an unprecedented height, and in particular since the USA ban on ZTE sales after Sino-US trade war broke out in 2018, the proprietary innovation of key technologies and core industries has been highlighted as “pillars of a power.” The 13th Five-Year Plan put forward the important proposition of shaping the leading development by relying more on innovation and giving more play to the first-mover advantages. Either to replace old growth drivers with new ones or to achieve high-quality development, the essence is industrial upgrading and the fundamental path to industrial upgrading lies in industrial innovation. Freeman and Soete (1997), the author of the theory of national innovation, believes that the efficiency of industrial transformation depends on a country’s industrial innovation
capability, and the core of national innovation is industrial innovation. He compared the former Soviet Union and Japan to illustrate the importance of industrial innovation in economic development. Japan lagged far behind the USA and other countries in technological innovation, especially major scientific and technological innovation. However, due to its strong industrial innovation capability, Japan’s competitiveness in many industrial fields far exceeded that of the USA. Although the USA was the first innovator in these industries, Japan became the market leader. While the former Soviet Union could compete with the USA in technological innovation or invention, even surpassing the USA in some cutting-edge scientific and technological fields, however, due to its lack of innovative capability to transform advanced technologies into products and industries, most of its new and high-tech technologies only existed in laboratories or were used for military purposes and could not enter the major industrial sectors of the national economy. The lack of industrial innovation capability brought the economy of the former Soviet Union to the brink of collapse. Baumol (2007) also cited the four great inventions of ancient China. Although the talented Chinese people created these world-leading technologies, they lacked the capability to utilize them, or in today’s term, the capability of industrial innovation. Whether it is the implementation of the major strategy of building an innovative country or the transformation of China’s economic growth engines from old to new, it cannot be separated from the innovation practice of a large number of small- and medium-sized enterprises (SMEs) with industrial innovation capability. Looking at the history of the world capital market, the reason why GEM exists is simply to support the entrepreneurial innovation of SME. Innovation is the foundation of GEM’s existence and also the source of GEM’s development. China’s GEM has existed for nearly ten years since its establishment in 2009, and about 700 SMEs have been successfully listed on the GEM, which highlights its remarkable achievement in terms of development speed. However, its development quality is not high, and has been criticized for the prevalence of market fraud, the large fluctuation of the index, the fact that the index has remained unchanged for ten years and the failure to cultivate a truly subversive and innovative company such as BATJ. At present, there is a lack of in-depth research on GEM innovation in theoretical circles and this paper attempts to make an empirical study on the innovation performance of listed companies on GEM, the pioneer of China’s industrial innovation and its determinants.

2. Literature review

2.1 The meaning of industrial innovation
Schumpeter (1934) believed that the essence of innovation was “industrial mutation” or “creative destruction,” while “creative destruction” was the fundamental driving force of economic growth. Since Schumpeter’s theory of innovation, the theory and practice of innovation have made great achievements in the world, especially, the national innovation system, regional innovation system and innovation system of departments, industries and enterprises have attracted more and more attention. Schumpeter’s innovation is actually the popular concept of “industrialization” in China’s public opinion. In essence, industrialization is a “new combination” of factors of production, that is, the process of transforming results of technological innovation into commodities, which is the process of industrial innovation. Therefore, we can say that Schumpeter’s concept of innovation is consistent with the connotation of industrial innovation. Freeman and Soete (1987, 1997) pointed out that industrial innovation was a systematic concept, and systematic factors were decisive factors to the success of industrial innovation. Lundvall (1992), Nelson (1993) and Malerba et al. (2004, 2007) also believed that innovation had systematic characteristics. Malerba et al. (2004, 2007) put forward the concept of sectoral systems of innovation based on the evolution theory. Malerba believes that sector is more accurate than industry in terms of innovation, as innovation system includes non-industrial organizations such as governments and
universities, and the sector innovation system includes three components: first, knowledge and technology; second, actors and networks; and third, the system (Malerba, 2004). From the content perspective, Malerba’s concept of sector innovation is basically consistent with Freeman’s industrial innovation theory. Scherer (1982) also suggested that sectors could reflect the characteristics and boundaries of R&D activities and technological activities more accurately than industries. However, up till now, both government statistics and stock exchange data have been based on industrial standards, and academic research in this field basically has been based on the definition of industry. Therefore, this paper believes that the concept of industrial innovation is more reasonable and easier for study. It can be said that industrial innovation is the systematic integration of technological innovation, product innovation, market innovation, etc. It is also the process that enterprises breaking the restrictions posed by structured industry and utilizing technological innovation, product innovation, market innovation or combination innovation to change the existing industrial structure or to create new industries, which is exactly what Schumpeter called the process of industrial mutation or creative destruction (Lu Guoqing, 2002).

2.2 Research progress at home and abroad

A great deal of empirical research shows that innovation is positively correlated with enterprise performance and its competitiveness (Peters, 2008), but there is also a research conclusion that R&D investment is weakly correlated with the performance of the enterprise, and innovation cannot explain all productivity growth of enterprises (Griliches, 1994). Peters (2008) made systematic investigation on the innovation performance of German enterprises, and his basic conclusion was that the labor productivity and the labor productivity growth were clearly positively correlated with the product innovation, but there is no conclusion between the process innovation and enterprise performance. The elasticity coefficient of knowledge capital output of German manufacturing enterprises is about 0.04, which is slightly lower than the output elasticity coefficient of existing R&D capital.

With the growth of new economy, there are three new dynamics in the field of innovation economics, which are the impact of spreading effect on productivity, the different forms of research and development cooperation and the role of patents in promoting innovation when innovation grows (Sena, 2004). The spreading effect has become the hot spot in foreign innovation research. In the endogenous growth model, the technology spillover or R&D spillover as important factor has gained wide attention (Grossman and Helpman, 1991). Since endogenous growth theory was born, knowledge innovation and spillover have been considered to have a significant impact on economic growth. Indeed, in the endogenous growth model, the focus is that individual companies’ innovative behavior can contribute to sustained long-term economic growth through intra-industrial spreading effect (Romer, 1986; Grossman and Helpman, 1991). Bernstein and Nadiri (1988, 1991) found that the spreading effect was statistically significant for all US industries in that if companies in different fields were technically similar or share the same technological base, R&D’s spreading effect in the industry would be produced; they found that in all industries, spreading effect could reduce variable costs and increase output, thus cutting product price. Jaffe (1986, 1989) concluded that an enterprise productivity growth was positively related to its own R&D and R&D of its similar enterprises in the same technical field. Aiello and Cardamone (2009) studied the panel data of 1,203 Italian manufacturing enterprises from 1998 to 2003 and concluded that the spillover effect of R&D had a positive correlation with enterprise performance. In short, a large number of empirical studies show that the spillover effect of R&D has a positive impact on enterprise production (Griliches, 1991; Wieser, 2005; Aiello and Cardamone, 2009).

Entering the twenty-first century, China’s innovation-driven development strategy and development of innovation economy have provided a lot of new topics for innovation
economics research. However, despite the voluminous and diverse foreign innovation research literature, it cannot answer the innovation-related questions in China’s rapid economic growth. Chinese scholars have begun to transfer their research on innovation from macro-economic level to micro-enterprise level. The two key areas are: first, the micro-level of enterprise innovation such as R&D strategy and patents. An Tongliang and others analyzed the behavior characteristics of Chinese enterprises like R&D strategies and R&D subsidies (An Tongliang, 2006, 2009), and conducted a micro-level survey through questionnaires on the R&D behavior of Jiangsu manufacturing enterprises. Alcorta et al. (2008) studied several behavioral characteristics in Chinese companies’ innovation. Second, industrial policies and innovation subsidy performance of China’s innovation support. Quite a few scholars have studied this and have generally concluded that government innovation support and innovation subsidies play a certain role in promoting the growth of emerging industries (Lu Guoqing et al., 2014; Zhang Jie et al., 2015), but have not significantly improved the quality of innovation, that is, they have not notably promoted substantive innovation or disruptive innovation (Li Wenjing and Zheng Manni, 2016; Zhou Yahong et al., 2012). Regardless of the theoretical studies’ conclusion, the reality is that the quantity and variety of innovation in China are unprecedented in the world, so there is no reason to doubt the innovation capability of Chinese enterprises and the fact that the wave of industrial innovation has already emerged in China. As Bloom’s research suggested, China had rapidly developed into the world’s largest trading country since joining the WTO, greatly pushing forward not only the technological progress of its own enterprises but also the technological innovation of developed countries in Europe and North America (Bloom et al., 2016).

On the whole, the current domestic research on enterprise innovation is mainly questionnaire survey and macro-level industrial research, while the research on industrial innovation, especially on micro-enterprise-level innovation performance, is basically blank. This paper attempts to make an empirical analysis on the innovation performance of GEM listed companies, the most active, successful and influential group in China’s industrial innovation, referring to domestic and foreign innovation research, and adopting the micro-subject method commonly used internationally in innovation research. The main reason for selecting GEM listed companies as research samples is that SMEs, especially listed small- and medium-sized companies, are the activists and winners of industrial innovation, the leaders of their industries, and the pioneers of industrial innovation. As Baumol (2007) put it, small enterprises (defined as “fewer than 500 employees in size”) basically monopolized innovative activities with revolutionary breakthrough.

3. The performance of industrial innovation and its measurement methods

3.1 Model design

Innovation as a hot topic for theoretic research as it is, far too little research has been conducted on industrial innovation performance. For long, people have been accustomed to R&D investment and patent statistics as indicators to innovation performance, which has limitations. Not only the research on R&D activities’ output has seriously underestimated the return of them, the metrics of innovative output measurement themselves also exist major defects (Peters, 2008). Griliches (1994) believed that R&D – based input–output indicators could only partially reflect innovation performance. First of all, R&D investment is not the only way for enterprises to develop new products or processes, and R&D indicators will especially underestimated innovation performance of SMEs and service industries (Peters, 2008). Second, patents do not fully reflect the innovative output (Griliches, 1990). The innovation process itself is of the black box nature, which always puzzles research on innovation performance. The general conclusion is that R&D has a positive correlation with productivity, and process-related R&D is more conducive to productivity improvement than product-related R&D (Griliches and lichten Berg, 1984). However, the CDM model coined
by Crépon et al. (1998) has effectively overcome the black box confusion in the innovation process. The CDM model incorporates innovation input, innovation output and productivity indices in the same model for the first time, and applies Community Innovation Survey data in the efficiency research of product and process innovation via knowledge production function. Löf and Heshmati (2002) revised the CDM model by replacing R&D investment with innovation investment (Peters, 2008). Third, innovation, especially industrial innovation, shares the characteristics of public goods. Recent research shows that traditional methods generally underestimate the return of R&D activities, mainly because they neglect the spillover effect of these activities (Mairesse and Mohnen, 2005; Aiello and Cardamone, 2009). Aiello and Cardamone (2009) perfected the CDM model based on the above research and established a new model that contains the innovation spillover effect.

3.2 The measurement of the spillover effect

According to the CDM model, an enterprise decision on whether to invest on innovation or not depends on the cost comparison between acquiring technology from outside and developing technology itself. The measurement of spillover effect is a difficult point in the measurement of industrial innovation performance, and no recognized methods are available yet. Aiello and Cardamone (2009) measured the spillover effect of enterprise innovation with the company’s technical similarity and its geographical consistency, solving the problem of measuring spillover effect that has long confused the enterprise innovation performance research. The author believes that Aiello’s and Cardamone’s measurement has two defects. First, the company’s technical similarity index is in fact Jaffe’s (1989) consistency index, which essentially reflects the vector’s uncentered correlation and does not truly reflect innovation spillover effect. Based on industrial economic analysis, the spillover effect of industrial innovation mainly depends on the similarity of the industry that the enterprise is in and its influence on other industries. Therefore, it is more reasonable to replace the company’s technical similarity index with the industrial similarity and industrial influence coefficient in the modern industrial organization theory. Second, it is also problematic for Aiello and Cardamone to measure the company’s geographical consistency with mere spatial distances. The results of regional innovation theory indicate that the spillover effect of an industry’s innovation activities not only has something to do with the influence of the industry itself, and the most important external environmental factor is the influence coefficient of the region where the innovation activities take place. For example, the spillover effect of innovation in an industrial cluster should be much larger than that in a single company. Thus, pure spatial distances cannot fully indicate the innovation spillover effect. Borrowing from the research results of regional innovation economics and industrial geographical concentration theory, further revising the gravity model improved by Aiello and Cardamone (2009) based on China’s reality and the data availability by replacing the company’s geographical consistency index in spillover effect calculation with the regional innovation radiating capability index in China’s regional innovation capability evaluation system (Zhao Yanyun et al., 2009), measuring the company’s technical similarity by the industrial influence coefficient, combining the National Input–Output Table 2015 and applying Formula 3.37 (Liu Zhibiao and An, 2009) of “An Analysis of Modern Industrial Economy,” we can calculate the spillover effect of enterprise industrial innovation through the following formula:

\[ S = i \text{ enterprise's industrial influence coefficient} \times i \text{ enterprise's regional innovation radiation coefficient} \times R, \]

where \( S \) represents the spillover effect of innovation; \( R \) represents R&D investment; and \( i \) represents the company.
3.3 Selection of indicators

This paper selects the indicators in Table I by referring to the definition of relevant indicators in the OECD Innovation Survey Manual (OECD and Eurostat, 2005) and taking into consideration of the accessibility of data.

The innovation input in this paper selects two indicators including R&D investment and human resources investment (the share of employees with bachelor’s degree or higher).

The direct output of innovation is measured by the number of patents. For a long time, people feel that high-growth industries and high-tech industries embrace innovation with investment of higher frequency and stronger intensity. Therefore, three important industry variables are added to this model to verify the conventional views. These industry variables include industry effects, opportunity windows for industrial innovation and learning by export, which are employed to reflect the industry environment and innovation opportunities when enterprises engage in innovative activities. These three industry variables are of particular importance to listed companies, due to the distinct industry differences (in industry effects) in China’s securities market. Even if hype is not considered, the P/E ratio and P/B ratio vary considerably in different industries and thus the listed companies in different industries enjoy different innovation opportunities and accessible resources. Industry effects can be measured by Tobin’s \( Q \) (Mcgahan, 1999), which is calculated by reference to the calculation method of Chung and Pruitt (1994). The opportunity windows for industrial innovation are measured by the proportion of sales revenue of new product in total sales revenue. The Learning by Export is measured by the proportion of export revenue of new products in total sales revenue:

\[
\ln y = x_0 + x_q \ln q + x_h h + x_r \ln r + x_l \ln l + x_s \ln s + x_g \ln g + x_i \ln i
\]

\[
+ x_p \ln p + \mu.
\]

4. Data sources and data processing

The GEM board is designed to provide financing and space of growth for small- and medium-sized growth companies and high-tech companies outside the main board. Since its establishment in 2009, it has maintained a high level of innovation investment and innovation output and showed sound momentum of rapid development and increasing

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profit from main operations ( y )</td>
<td>An enterprise’s annual profit from main operations, serving as a comprehensive indicator reflecting the enterprise’s business performance and innovation performance</td>
</tr>
<tr>
<td>Tobin’s ( Q ) ( q )</td>
<td>( Q = (\text{total market value} + \text{gross liability})/\text{total assets}; \text{total market value} = \text{market value of circulating shares} + \text{preference shares} )</td>
</tr>
<tr>
<td>High-tech enterprises ( h )</td>
<td>1 represents high-tech enterprises; 0 represents non-high-tech enterprises</td>
</tr>
<tr>
<td>R&amp;D investment ( r )</td>
<td>An enterprise’s annual total investment in R&amp;D</td>
</tr>
<tr>
<td>Human resources investment ( l )</td>
<td>Share of employees with bachelor’s degree or higher in an enterprise on December</td>
</tr>
<tr>
<td>Spillover ( s )</td>
<td>Regional innovation radiation capacity coefficient ( \times ) industry influence coefficient ( \times ) R&amp;D investment</td>
</tr>
<tr>
<td>Age of enterprise ( a )</td>
<td>Number of years between the founding of the enterprise to the end of this year</td>
</tr>
<tr>
<td>Government support ( g )</td>
<td>Government subsidy/total amount of R&amp;D</td>
</tr>
<tr>
<td>Opportunity windows ( i )</td>
<td>New product sales revenue/total sales revenue, reflecting the innovation opportunities in the industry</td>
</tr>
<tr>
<td>Learning by export ( e )</td>
<td>New product export revenue/total sales revenue, reflecting the learning by export effects</td>
</tr>
<tr>
<td>Number of patents ( p )</td>
<td>Patents the company obtains within the year</td>
</tr>
</tbody>
</table>

Table I. Meanings of indicators
vitality of innovation. It collects more complete information on innovation input and output than the main board. Therefore, this paper selects GEM listed companies as research samples.

The data spans three consecutive years including 2014, 2015 and 2016. It is in line with the conventions of international innovation survey (OECD and Eurostat) to select the data of three years for innovation studies. As of December 31, 2014, there were 412 companies listed on the GEM board. After excluding sample companies with incomplete data and no innovation output (with zero patent), this paper obtains 256 valid samples in the manufacturing sector. The specific distribution is shown in Table II.

The data of the sample enterprises are directly obtained from CSMAR database and iFind database, which are derived from such published documents as the prospectus and annual report of listed companies. The original data of government subsidies, which is utilized to measure government support, are derived from the “non-operating income” account of the financial statements. When the information of patent number is not complete, further manual efforts are made to search in the company’s daily disclosure information and website. Information on new product sales revenue, new product export volume and total sales revenue is from Gtafe database. When the data are incomplete, we further refer to the China Statistical Yearbook on Science and Technology for additional information. Industry data are obtained from the China Statistical Yearbook on Science and Technology, China Statistical Yearbook on High-tech Industry, Innovation Survey of Industrial Enterprise Nationwide and Statistics on Scientific and Technological Activities of Industrial Enterprises among others. Due to the endogenous feature of innovation, a 3SLS regression calculation of the above model is performed by the Stata software.

5. Empirical analysis

5.1 Relevance and endogeneity test

Table III shows the Pearson correlation coefficient between the explained variable and the explanatory variable. The test results show that innovation performance, which is measured by \( \ln y \) (profit from main operation), has a remarkable correlation of above 10 percent between the majority of explanatory variables including \( \ln q \) (Tobin’s \( Q \) value), \( \ln r \) and \( \ln s \). There is also certain correlation among explanatory variables, but the correlation coefficients stay at a relatively low level. To further test the multicollinearity among the

<table>
<thead>
<tr>
<th>Industry</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture, forestry, animal husbandry and fishery products and services</td>
<td>1</td>
<td>0.39</td>
</tr>
<tr>
<td>Food and cigarettes</td>
<td>4</td>
<td>1.56</td>
</tr>
<tr>
<td>Textile, garment, shoes, hats, leather, feather and relevant products</td>
<td>1</td>
<td>0.39</td>
</tr>
<tr>
<td>Papermaking, printing and cultural and educational products</td>
<td>1</td>
<td>0.39</td>
</tr>
<tr>
<td>Chemical products</td>
<td>36</td>
<td>14.06</td>
</tr>
<tr>
<td>Non-metallic minerals</td>
<td>11</td>
<td>4.30</td>
</tr>
<tr>
<td>Metal smelting and calendaring processing</td>
<td>2</td>
<td>0.78</td>
</tr>
<tr>
<td>Metal ware</td>
<td>2</td>
<td>0.78</td>
</tr>
<tr>
<td>General-purpose equipment</td>
<td>19</td>
<td>7.42</td>
</tr>
<tr>
<td>Special-purpose equipment</td>
<td>42</td>
<td>16.41</td>
</tr>
<tr>
<td>Transport and communication equipment</td>
<td>7</td>
<td>2.73</td>
</tr>
<tr>
<td>Electric machinery and equipment</td>
<td>33</td>
<td>12.89</td>
</tr>
<tr>
<td>Communication devise, computers and other electronic equipment</td>
<td>57</td>
<td>22.27</td>
</tr>
<tr>
<td>Instruments and apparatus</td>
<td>16</td>
<td>6.25</td>
</tr>
<tr>
<td>Other manufacturing products</td>
<td>23</td>
<td>8.98</td>
</tr>
<tr>
<td>Electricity and heat generation and supply</td>
<td>1</td>
<td>0.39</td>
</tr>
<tr>
<td>Total</td>
<td>256</td>
<td>100</td>
</tr>
</tbody>
</table>

Table II. Industrial distribution of sample companies
explanatory variables, the variance inflation factor (VIF) is employed and the results are shown in Table IV. The results show that the VIF of each explanatory variable is less than 10 and with no multicollinearity.

Missing variables and other situations may lead to correlation between the explanatory variables and the disturbance terms and therefore cause endogenous problems. A Hausman’s endogeneity test is applied to the variables in the model. If the result is at a significance level lower than 5 percent, this paper rejects the null hypothesis that “all explanatory variables are exogenous” and tests all the explanatory variables one by one. The results show that both lnq and lnr are endogenous. Therefore, the first-lagged variables of lnr and lnq are used as instrumental variables (not related to the disturbance terms, but related to the explanatory variables) and the model is subjected to a two-stage least squares regression calculation.

5.2 Estimated results and analysis

This paper uses the first-lagged variable as instrumental variables, employs the Stata 14 to estimate the cross-section data in 2014, 2015 and 2016 and gets the estimated results for three consecutive years (see Table V).

<table>
<thead>
<tr>
<th>Variable</th>
<th>VIF</th>
<th>1/VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>lnr</td>
<td>4.800</td>
<td>0.206</td>
</tr>
<tr>
<td>lnq</td>
<td>4.820</td>
<td>0.207</td>
</tr>
<tr>
<td>hl</td>
<td>2.900</td>
<td>0.345</td>
</tr>
<tr>
<td>lnv</td>
<td>2.440</td>
<td>0.411</td>
</tr>
<tr>
<td>lnr</td>
<td>1.320</td>
<td>0.758</td>
</tr>
<tr>
<td>lnq</td>
<td>1.130</td>
<td>0.884</td>
</tr>
<tr>
<td>lnv</td>
<td>1.100</td>
<td>0.910</td>
</tr>
<tr>
<td>lnr</td>
<td>1.090</td>
<td>0.920</td>
</tr>
<tr>
<td>lnq</td>
<td>1.080</td>
<td>0.930</td>
</tr>
<tr>
<td>lnv</td>
<td>1.040</td>
<td>0.957</td>
</tr>
<tr>
<td>Mean</td>
<td>VIF</td>
<td>2.180</td>
</tr>
</tbody>
</table>

Table IV. Test of multicollinearity
6. Conclusion

Following conclusions are drawn based on the model evaluation and tests illustrated above.

First, there is significant positive correlation between innovation performance and R&D inputs of companies listed on the GEM Board. The significance test at 0.1 percent level is passed and the correlation coefficient is 0.8, the highest among all factors. This suggests that the increase of R&D investments remains to be the most important way to improve performance of companies listed on the GEM Board and it is also the internal driving force for the sustainable growth of the company, which is in line with the view of traditional innovation economics. However, negative correlation is observed between innovation performance and inputs in human resources among all other innovation inputs. Human resources inputs, represented by the proportion of staff with higher education or above in the entire staff population, are negatively correlated to the profits of the company’s main business, suggesting that companies with higher investments in human resources have lower performance. In other word, the value of human capital, instead of boosting the performance of the listed companies, becomes burdens of the companies. This is probably because in SMEs costs of highly educated staff usually account for a large share in the overall costs of human resources. Moreover, the economic utility of inputs in human capital cannot be released in the short-term, but evaluation of innovation performance happens within three years upon the inputs are made, and as a result there is a negative correlation between the two factors. In addition, investing in human capital means something deeper for China’s listed SMEs. For example, if an enterprise intends to apply for the state’s funding for technologically innovative programs, a critical indicator is the research team or personnel and it is usually the key factor to determine whether an enterprise gets the funding. In this sense, direct economic reward from human capital inputs does not look as important as it really is.

Second, companies listed on the GEM Board are all emerging enterprises at the growing stage of booming development. It is logically justifiable that the age of a company is positively correlated to the company’s performance. The negative correlation emerging in 2017 is in line with the enterprise life cycle theory. There is positive correlation between government support and innovation performance of the enterprises, but the coefficient is rather small, suggesting that government subsidies provide some but not significant incentives to enterprise innovation. It can be seen from the raw data that government subsidies to the sampled companies/enterprises are far smaller than the R&D investments made by the companies/enterprises themselves and therefore have relatively small impact.

<table>
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<tr>
<th></th>
<th>2014 Coefficient</th>
<th>Z-test</th>
<th>2015 Coefficient</th>
<th>Z-test</th>
<th>2016 Coefficient</th>
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<td>lnq</td>
<td>0.0986 (0.74)</td>
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<td>0.102 (0.86)</td>
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<td>h</td>
<td>-0.0419 (-0.58)</td>
<td>-0.0398 (-0.55)</td>
<td>-0.0932 (-1.44)</td>
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<td>lnr</td>
<td>0.883*** (9.25)</td>
<td>0.869*** (8.50)</td>
<td>0.849*** (9.53)</td>
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<tr>
<td>lnf</td>
<td>-0.0964* (-2.31)</td>
<td>-0.112* (-2.73)</td>
<td>-0.130*** (-3.54)</td>
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<tr>
<td>lnv</td>
<td>-0.0152 (-0.28)</td>
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<td>0.0826 (1.73)</td>
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<tr>
<td>lnz</td>
<td>0.0669 (0.52)</td>
<td>0.0333 (0.23)</td>
<td>-0.0119 (-0.09)</td>
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<tr>
<td>lnh</td>
<td>0.0797* (2.18)</td>
<td>0.0599* (2.41)</td>
<td>0.0931* (2.42)</td>
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<tr>
<td>lnw</td>
<td>0.267* (2.18)</td>
<td>0.345* (2.28)</td>
<td>0.262* (2.01)</td>
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<td>lnv</td>
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<td>-0.242*** (-3.67)</td>
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<tr>
<td>lnK</td>
<td>0.0133 (0.39)</td>
<td>0.0197 (0.53)</td>
<td>0.00820 (0.25)</td>
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<tr>
<td>ln_cons</td>
<td>3.672*** (5.58)</td>
<td>2.693* (3.76)</td>
<td>2.092 (1.80)</td>
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Notes: *p < 0.05; **p < 0.01; ***p < 0.001

Table V. Model calculation results
on the companies’/enterprises’ performance. In addition, the current paper takes into account only the direct subsidies from the government rather than the entire basket of government supporting policies such as tax reduction, which is another important reason why government support does not have great impact on enterprise performance. It is indeed that there is no significant correlation between high-and-new-tech enterprises listed on the GEM Board and innovation performance, and a negative correlation is even observed between the two. It is traditionally believed that high-and-new-tech enterprises, usually with strong innovative inputs and sound operational performance, should be positively correlated to innovation performance in one way or another and a negative correlation is never possible. However, the conclusion drawn by this paper is completely different from the traditional view. This can be understood from two perspectives: even though innovative inputs of high-and-new-tech enterprises are usually higher than those of ordinary innovative enterprises, high-and-new-tech companies do not have business performance significantly higher than the average level of innovative enterprises in general. Preferential treatment for those enterprises, such as tax reduction, government subsidies or R&D subsidies, do not tend to increase the profits of major business of those enterprises on a large margin. This is because China has a system to certify high-and-new-tech companies, which has clear specifications on how much innovation inputs an enterprise should make for it to be qualified as a high-and-new-tech company. But the system does not set any requirement on business performance; and if certified as a high-and-new-tech company, the company can enjoy a lot of direct and indirect benefits such as tax reduction, government subsidy and financing facility. Therefore, it is rather tempting for an enterprise to get certified as high-and-new-tech company. Since high innovative input is regarded by the government as a must-have condition for a company to be certified as high-and-new-tech company, statistics related to innovative inputs are inevitably over-decorated or even faked in the application process. In this sense, it is understandable why there is the negative correlation between high-and-new-tech companies and innovation performance.

Third, innovation performance and spillover effect are not significantly correlated, and there even emerged negative correlation. Based on the definition of spillover effect as given in this paper, the negative correlation is justifiable. As is known to all, the process of innovation comes with certain degree of externality or spillover effect (Romer, 1986), which usually happens when a company uses the research findings of another company without sharing the research costs or when the production or innovation are quite universal. Spillover effect usually emerges because a company cannot possess all the benefits brought by the innovation made by itself. Since innovation is public good that spreads, it is not possible for the innovator to take all the benefits as a result of the innovation, which will reduce the performance of innovation. Even though the innovator is granted the right to possess the innovative achievements all by himself/herself, for example, in the case of a patent, he/she is able to use the innovation exclusively just for a certain period of time. This is rather unfavorable and inefficient for an enterprise. As a result, a commonly accepted view in literature of industrial organization is that the existence of spillover effect is regarded as the primary reason for the optimal R&D investment in the equilibrium condition, and that the spillover effect is one of the sources hindering R&D investments. This is why the benefits of innovation cannot be exclusively enjoyed by the innovator and the spillover effect ensures that the innovative achievements spread to the entire society, which will enrich the overall knowledge reserve of the society.

Fourth, innovation performance is positively correlated to the innovation opportunity windows, is negatively correlated to the Learning by Export effect and is not significantly correlated to the Tobin’s Q ratio of the company. The positive correlation between innovation performance and the window of innovation opportunity means that the enterprise seizes the opportunity of innovation and finds the right direction in the
transformation and upgrading of industrial structure. The negative correlation between innovation performance and the Learning by Export effect is quite contrary to traditional views. Generally speaking, export companies can draw upon advanced management experience and production technologies from abroad, which should be conducive to the company’s performance. But the Learning by Export effect is closely related to economic condition and market environment. Although trade in export facilitates the production efficiency of Chinese enterprises by certain extent, the impact has significantly diminished since China joined the WTO. As China became the world’s second largest exporter of goods, enterprises have been increasingly reliant on trade in export and more sensitive to policies on external trade. At the same time, the fact that enterprises listed on the GEM Board are mostly SMEs with weak Learning by Export capability, the existence of technological spillover in the export process and the uncertainties of trade policies have also helped to explain the negative correlation between the Learning by Export effect and company performance. Tobin’s Q ratio is a market-based indicator of the operational performance, innovation performance and productive effect of an enterprise. Just like the P/B ratio of a public company, a higher Tobin’s Q ratio suggests higher premium on assets. China’s stock market is speculative where high P/E ratios are quite prevalent for companies listed on the SME Board and the GEM Board, and it is common when the stock price of a company is deviated from its performance. As a result, a company’s Tobin’s q ratio is not necessarily related to the current performance of that company.

References


Freeman, C. and Soete, L. (1987), Technical Change and Full Employment, Pinter, London.

Freeman, C. and Soete, L. (1997), The Economic of Industrial Innovation, 3rd ed., Pinter, London.


**Further reading**


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