V.R.F. Series

No.496
Feb 2016

The Market for Ideas and China's Market Transformation

Ning Wang

日本貿易振興機構 アジア経済研究所

INSTITUTE OF DEVELOPING ECONOMIES, JAPAN EXTERNAL TRADE ORGANIZATION

Acknowledgement

I would like to extend my sincere appreciation to all the staff members and researchers of the IDE for their support and assistance during my stay in Japan. This is my first visit to Japan. Through my interactions with colleagues at IDE, and through them, with the new contacts beyond IDE, I was able to learn quite a bit about Japan, its people and unique society. During my short visit, I have learned enough about Japan to be profoundly puzzled about its political system, law, and economic system. I have come to realize that while Japan is a democracy, democracy is only trivially true concerning the exercise of political power in Japan; that Japan has the lowest rate of crime in the world, while Japanese media is saturated with sex and violence; that Japan after WWII has been able to transform itself into an egalitarian society, which is a principal goal of socialism pursued in China, but with limited public ownership and virtually no state enterprises. I have no doubt that Japan, will join the United States of America, serve as another reference point in the back of my mind, in my future study of China's continuous transition to a market economy and open society.

Among the individuals who have made my stay in Japan fruitful, I'd like to single out Dr. Ke Ding, my counterpart at IDE, who deserves my special thanks. From the very first day and until the last day of my visit, Dr. Ding kindly extended to me his hospitality. In the middle of my stay, I went with Dr. Ding on a fieldtrip to Fukuoka and Miyazaki Prefectures. We also visited small enterprises at Ota Ward in Tokyo and at Kaihin Makuhari in Chiba. These fieldtrips allowed me to visit Japanese firms and interview Japanese businessmen, which greatly enriched my understanding of Japan's economic system, particularly innovation, craftsmanship and labor practice. I would also like to single out the following researchers at IDE, the conversations I had with them benefited me more than I can state: Naoko Eto, Taeko Hoshino, Mila Kashcheeva, Norio Kondo, Lei Lei, Bo Meng, Yasuo Onishi, Satoru Shimokawa, Abu Shonchoy, Nanae Yamada, as well as Mr. Daisuke Hiratsuka, who was Executive Vice President of IDE until the very end of my visit. I apologize to those whose names I cannot recall at the moment.

Mr. Takeo Masuda, Ms. Atsuko Hirakata and Ms. Kumi Manda at IDE's International Exchange and Training Program also deserve my wholehearted thanks. They have made my stay much easier and enjoyable. It is worth mentioning that they made several arrangements, including a fieldtrip on August 26 to Tokyo to visit Tepia, and a guest lecture on September 26 by Professor Hidehiro Nakajima from Nagoya University on Japan's higher education. Both events were highly informative and allowed me to see Japan outside IDE.

I also would like to thank other Visiting Research Fellows at IDE who overlapped with me, including Professor Chih-Hai Yang of National Central University of Taiwan, Professor Hao Xiao of Hunan University, Dr. Cheng Wang of Hubei University of Economics, Dr. Tang Weiqi of Fudan University, Dr. Pablo Lucas of University College Dublin, and Mr. Sonam Tobgyal, Senior Researcher and Head of Poverty and Evaluation Section of Bhutan's Gross National Happiness Commission. I greatly enjoy lunches and conversations with them.

Outside IDE, I would like to thank Professor Dapeng Cai of Nagoya University, Professor Shiro Hioki of Tohoku University, Professor Masaharu Hishida of Honsei University, Professor Tadashi Horiguchi of Migazaki Municipal University, Professors Tomoo Marukawa and Shozo Ota of Tokyo University, Professor Mariko Watanabe of Gakushuin University, and Professor Harry Wu of Hitotsubashi University. Their hospitality has not only made my visit much more enjoyable and productive, but opened up new windows for me to see Japan. Among them, I am particularly grateful to Professor Watanabe, who not only introduced me to the Research Institute of Economy, Trade and Industry (RIETI), but also organized a book seminar to discuss *How China Became Capitalist* (Coase and Wang 2012); both events allowed me to interact with Japanese scholars, officials, and businesspeople who are keenly interested in China's development.

Professor Chu Chih-Ning of Chung Yuan Christian University (Taiwan) and Professor Guang-zhen Sun of the University of Macau kindly visited me while I was at IDE. Their visits have certainly made my sojourn in Japan much more enjoyable. Among other activities, I went with Professor Chu to see Mountain Fuji, and with Professor Sun to stroll on the Philosopher's Walk near Kyoto University. Both memories are as fresh as yesterday! After they left, I discovered a natural beauty nearby, Hanami River (花見川), which is just five minutes away from the apartment I stayed in Makuhari. I greatly enjoyed jogging along the river to Tokyo Bay; a round trip took me more than an hour.

Last but not the least, I would like to thank my wife and children, Amy and Ally. Without their sacrifice and support, I would not be possible to spend three and half months in Japan, far away from them.

Contents

Abstract

This paper has a two-folded purpose. It first introduces the market for ideas, which is then applied to shed light on China's market transformation. As the market for ideas is a new concept, we will devote more space to the first task. We develop the market for ideas as an analytical concept to capture the role of knowledge in the working of modern economy. We argue that the economy is essentially an enterprise of knowledge, which is broadly defined to include both local and scientific knowledge. While modern economics is organized around incentives, a tradition that can be traced back to Adam Smith, we suggest that the *Wealth of Nations* also contains the germ to develop economics into a knowledge-centered discipline.

In the second part of this paper, we propose that the market for ideas provides a fruitful perspective to understand China's market transformation, complementing the prevailing approach, which emphasizes incentives. The current literature on China's market transformation comes from a political economy perspective, highlighting the dynamism created by political centralization and economic decentralization as a driving force behind the economic rise of China. According to this view, institutional change succeeded in China because new institutions helped to incentivize peasants, workers and government officials. We argue instead that institutions embody ideas, and institutional innovation implies competition among different ideas. We compare China under Mao and China under reform to illustrate the explanatory power of the market for ideas.

1. Introduction

Let me begin this essay with an explanation of the title itself. The second part of the title, "China's market transformation", is presumably familiar to most readers, even though it immediately conjures up images of a vast and involved subject matter. I do not mean to say that China's market transformation is so well understood that everything is crystal clear concerning China's transition to a market economy. On the contrary, despite the presence of a vast, and still rapidly growing, scholarly literature from many academic disciplines as well as various journalistic reports on the subject, the exact nature of China's market transformation remains controversial and its detailed processes fuzzy.[1] Moreover, as China's market transformation is still an ongoing process, its future remains wide open. A critical uncertainty in China's future trajectory is the changing identity of the Chinese Communist Party and its role in the evolving economy and society. While the Party has been incredibly flexible and adaptive during the past four decades of economic liberalization, the lingering grasp of an outdated ideology dies hard. It remains a litmus test for the Party whether it can reform its structure and ideology in such a manner that its monopoly of power not only remains legitimate, but also facilitates the 1.3 billion Chinese people's pursuit of their separate and individual dreams.[2] This is a daunting task for any party.

These concerns of China's future withstanding, China's transition from Marxism to markets is extraordinary. When it started after the death of Chairman Mao Tse-Tung in 1976, few predicted that China could go so far so fast.[3] Today, it has been widely recognized as a watershed event in the last quarter of 20th century. At the close of the 2008 Chicago Conference on China's Market Transformation on July 18th, 2008, Ronald Coase pronounced in his concluding speech "the struggle of China is the struggle for the world."[4] Later in the same year, *Time* magazine published a commentary on China's market transformation, which ended by stating "That is the great story of our time. It is our story, everyone's story – not just China's."[5] Hence, even those who command little intimate knowledge of China feel that they know in some general and broad sense what China's market transformation is about.

In contrast, the first part of the title, "the market for ideas", is almost the opposite. Upon first glance, the market for ideas seems so simple and straightforward that it hardly strikes anyone as problematic; both "market" and "ideas" are short and simple English words, commonly used in daily language. Yet, after a moment of reflection, the market for ideas prompts a sense of unease, if not outright confusion, even (or rather particularly)

---

[1] See, for example, Wang (2016).

[2] The Party has now realized it has to embrace the rule of law, if just for the sake of improving its governance capacity. However, how to reconcile the rule of law with its intention to monopolize political power seems an intractable problem. It remains to be seen how China's political system responds to mounting challenges as economic growth has significantly slowed down.

[3] To my knowledge, Steven Cheung (1982) was the only exception. Yet, even Cheung repeatedly underestimated the speed of China's market transformation.

[4] Coase and Wang (2012), p. 153.

[5] Michael Elliott, "Thirty Years after Deng: the Man Who Changed China", *Time Magazine* (December 10th, 2008). Available at http://content.time.com/time/world/article/0,8599,1865539,00.html

among experts. As ideas can be, and are indeed, readily shared without any loss to their original possessors – that is, ideas are non-rival goods – how is it possible to establish a market for such things as ideas? In textbook economics, the market is represented by a demand curve intersecting a supply curve; the point of intersection determines the market equilibrium, where the quantity demanded and supplied perfectly match each other. In this view, the market is essentially a pricing mechanism. Under a set of well-known assumptions, resources are efficiently allocated at the equilibrium point, with no agent or office in the economy possessing all the relevant information. However, for the market to work as a pricing mechanism, the good under consideration is assumed to be normal (that is, private). If, on the other hand, a good is non-rivalrous, it would cost nothing to add additional consumers. Under such a condition, economic efficiency requires its price be zero.[6] Because a free good does not require any pricing mechanism, the market for ideas makes no economic sense. If we follow this logic, this term seems nothing but a confusing misnomer.

It is thus not surprising that when the term appears in contemporary economics, more often than not the market for ideas is used metaphorically. For example, Aaron Director (1964), who was probably the first one among modern economists to use the term explicitly, "the market for ideas"(p. 3)[7], in contrast to "the market for economic goods and services",[8] referred the term mainly to freedom of speech. A decade later in an influential paper, Ronald Coase (1974) used the term in a similar fashion. More recently, the term is often used rather narrowly, primarily referring to the market for patentable or salable innovation and invention (e.g., Gans and Sterns 2003, 2010; Chatterjee and Rossi-Hansberg 2012).

Following Coase and Wang (2012), this essay proposes the market for ideas as an analytical concept. It makes a long overdue attempt to come to terms with a simple fact that knowledge has become the most critical driving force in the modern economy. Alfred Marshall was probably the first modern economist who presciently foresaw the growing import of knowledge when he, as early as 1890, highlighted knowledge as the "most powerful engine of production" (Marshall 1890 [1920], p. 115). While Marshall at the beginning of Book IV of his *Principles of Political Economy* singled out knowledge and organization as the most important part of capital, he fell back on the old tradition in the ensuing analysis, accepting the classical trichotomy of factors into land, labor, and

[6] The principle of marginal cost pricing stands at the core of modern microeconomics. Years ago, I took an undergraduate course in microeconomics at the University of Chicago. The instructor, who was then a junior faculty and is now a full professor, but whose name I decline to reveal, told the students that if they could take away only one thing from the course, it had better to be P=MC. Paul Samuelson, in his influential textbook and a classical paper on public goods (Samuelson 1954), is more responsible than anyone else in solidifying the sacred status of marginal cost pricing in modern economics.

[7] While it was not published until 1964, the article was first delivered in 1953 at a conference on freedom and the law at the University of Chicago Law School.

[8] It can thus be inferred that Director would exclude ideas from economic goods and services. A major purpose of this paper is exactly to urge economists to treat ideas as a special kind of economic good.

capital.[9] After Marshall, modern economics has gradually drifted away from production, and become preoccupied with resource allocation as the paradigmatic problem.[10] Under such an intellectual atmosphere, knowledge as a factor of production has rarely been considered.[11]

China's market transformation offers an inviting opportunity to look at economics of production, particularly the role of the market for ideas (e.g., Coase and Wang 2011). In the past four decades, the rise of the Chinese market economy has been accompanied with, or rather driven by, rapid industrial revolution. During Mao's era, China may have laid an industrial foundation throughout the country, particularly in heavy industry. Nonetheless, China remained an agrarian economy at the time of Mao's death. It is also true that Mao's China performed well in terms of investment in human capital (as measured by the rate of literacy and infant mortality as well as life expectancy). Yet, such potential had not been materialized until the start of China's market reform. China's transition from Marxism to markets is accompanied and driven by a shift in economic ideology – ideas about how the economy works and what can be done to improve economic performance. The far-reaching importance of the market for ideas has been clearly demonstrated in China's market transformation.

This paper has a two-folded purpose. On the one hand, we use China's market transformation as an empirical context to develop the market for ideas as an analytical concept and to explore its explanatory power. On the other hand, we use the market for ideas as a window to shed light on China's market transformation. Given the limited space, the discussion of China's market transformation is highly selective; readers who are interested in more systematic coverage of the topic are welcome to start with *How China Became Capitalist* (Coase and Wang 2012), which also contains a well-rounded bibliography.[12] The analysis of the market for ideas presented in the following pages is inevitably preliminary, incomplete and speculative. The market for ideas as a factor market is at odds with our prevailing view of the market as a pricing mechanism. As the market stands as a core concept in modern economics, the proposed interpretation of the market for ideas inevitably challenges some deeply held views and assumptions among economists. I certainly would not have had nerve to embark on such an intimidating project if not for the two strong convictions. First, to stay or rather regain its relevance, economics has to come to terms with the profound and pervasive presence of knowledge

[9] For a revival of Marshallian economics, with a focus on knowledge, see, for example, Loasby (2002).
[10] Lionel Robbins (1932) made the first decisive move, taking economics toward a science of choice. This transition was finished in the able hands of Gary Becker (1976), whose ingenuity and persistence have managed to transform economics into an analytical approach, detached from the working of the economy and applicable to all choices, human or not. Economists now proudly see their discipline standing as the crown of social sciences, much like mathematics in natural sciences. It has become a common language among rational choice scholars. To what degree the content of their conversations is still focused on the study of man and wealth is secondary, if it is still worth considering at all.
[11] Economists have recently come to terms with the role of knowledge or ideas in economic growth, mainly for the reason that ideas are non-rivalrous (e.g., Romer, Lucas).
[12] More recent books on China's market transformation include Nee and Opper (2012), Lardy (2014), among others.

in the working of the economy. Second, Coasian economics, reminding us the root of economics as a study of man and wealth, offers a promising alternative research program for the development of economics.

2. Ideas and Knowledge

Since the market for ideas is meant to capture the profound and pervasive role of knowledge in the working of our modern economy, including its performance at one point of time and evolutionary path over time, let's be clear at the beginning what we mean by ideas and knowledge. Etiologically, knowledge consists of the parts. The first one comes from the verb, "to know"; the second part probably comes from Scandinavian and is cognate with "–lock", meaning "action or process". Since the early 15th century, it began to mean "an organized body of facts or teaching". Idea comes from Latin *idea*, originally used in Platonic philosophy, referring to "archetype, or ideal archetype", which literally means "the look of a thing (as opposed to the reality)". By the mid 17th century, it obtained the meaning of "result of thinking".[13] In their modern usage, both terms refer to the outcome of some mental process, knowing or thinking.

Let's introduce another concept, coined by Karl Popper (1978),[14] "World 3", which allows us to separate ideas from knowledge. According to Popper, we live in three separate but interacting universes. The first one consists of physical bodies, including stones and stars, plants and animals, which Popper calls "World 1". The second world consists of mental or psychological states or processes, including our feelings, perceptions, and thoughts. In addition to these two familiar universes, one objective, the other subjective, Popper emphasizes the presence of another quite difference universe, which he calls "World 3". As Popper explains, World 3 refers to the world of "the products of the human mind", including items such as "languages; tales and stories and religious myths; scientific conjectures or theories, and mathematical constructions; songs and symphonies; paintings and sculptures. But also aeroplanes and airports and other feats of engineering." Later in the same lecture, Popper gave more examples of "World 3" objects: "the American Constitution; or Shakespeare's The Tempest; or his Hamlet; or Beethoven's Fifth Symphony; or Newton's theory of gravitation."

What separates World 2 and World 3 is that the former consists of subjective experiences, that is, mental states and processes occurring in the brains (and other parts of the body) of individuals. Such stream of consciousness, for example, a recollection of a favorite poem, some deliberative decision-making, or fear of snakes, disappear immediately once the brain is shut down, as when people fall asleep or die. In contrast, World 3 exists independent of and beyond individual minds. For this reason, the satellite can broadcast Beethoven's Fifth Symphony to the outer space, in the hope that it be understood by alien species who live in galaxies light years away from us. For the same reason, we can

[13] All the above etymological knowledge is obtained from an online source, www.etymonline.com
[14] Karl Popper, "Three Words", The Tanner Lecture on Human Values, delivered at the University of Michigan on April 7, 1978. Available at http://tannerlectures.utah.edu/_documents/a-to-z/p/popper80.pdf

understand today how democracy worked in ancient Athens and what the society in Great Unity (Datong 大同) was like in ancient China. An object in World 3, like the law of comparative advantage or a mathematical proof, may be intangible, but it is as real as stones and stars.

It is important to note that an object may exist cross all three universes. This can be illustrated with an example from economics, the Coase Theorem, which is often stated as the following: when transaction cost is zero, private and social returns to any resources (or holders of their rights) are equal.[15] The original formulation of Coase Theorem appeared in two articles published in the *Journal of Law and Economics*. Both articles were printed on paper; they were physical objects, belonging to World 1. The original issues of the *Journal* where the two articles appeared as well as the reprints of the two articles are occasionally available for purchase at Amazon. On the other hand, the content of the Theorem stays independent of Coase – actually, Coase disapproved the Theorem as commonly presented in textbooks and classrooms. The Theorem is now taught in Chinese and many other languages, and will be discussed and debated by economists in the years to come. Apparently, the content of the Theorem (and its many rival interpretations) belong to World 3. For a beginning student of economics, who is struggling with the counter-intuitive logic of the Theorem, his thoughts and deliberations belong to World 2. Taking the Coase Theorem as a steppingstone, a later scholar may discover something new and contribute to the advancement of economics. His thoughts then become part of the legacy that will pass on to the future generations. In this way, a World 2 object is transformed into a World 3 object.

Now with the help of Popper's terms, World 2 and World 3, we can now pinpoint the key difference between ideas and knowledge as used in this essay. In a nutshell, knowledge resides in World 3, while ideas are its counterparts in World 2. Let's go back to the previous example of Coase Theorem. The Coase Theorem has served as a fountainhead for the development of law and economics as an independent field of inquiry; as far as its economic content is concerned, the theorem is an object in World 3. Each individual scholar has her own interpretation of the theorem, or her own *ideas* of what the theorem is about. At this stage, the ideas belong to World 2. Once the scholar dies, her version of the theorem will be lost forever.

However, if she is convinced that her interpretation has some distinct values, and takes the efforts to put her ideas on the table, entering a debate with the academic community on the merits of her views, her ideas may gain attention of her colleagues. If she is a well-respected scholar in the field, her colleagues are inclined to consider her thesis seriously, tracing step by step its internal logic, and comparing it with other existing alternative interpretations. In this process, her ideas gradually rise from World 2 to World 3. Once her interpretation is accepted as a legitimate extension of the original theorem, or a break-through to take the theorem to another level or another direction, it joins the original

[15] Coase (1959, 1960). The vast literature on the Coase Theorem is overwhelming. Interested readers may consult the two heavy volumes edited by Richard Posner and Francesco Parisi (2012), which exceed one thousand pages. Wang (2013) provides a short interpretation of Coase's basic arguments.

theorem in World 3 as a worthy contribution to the literature, to be studied and criticized by scholars in the future.

3. The Market for Ideas

In explaining the differences and connections between ideas and knowledge, I have already made implicit reference to the market for ideas. As shown in the above example, the process whereby a "World 2" object is turned into a "World 3" object takes place in what I call the market for ideas. In its origin, the market probably started as a physical place (a fair, a bazaar, or an emporium) where goods are exchanged. In daily language, we still frequently refer to the market as a place, as illustrated by terms such as the "marketplace" or "market town".[16] Nonetheless, economists use the term to refer to a mechanism to coordinate exchange and allocate resources that is not confined to, or even requires, any physical or geographic location (such as matching markets).[17]

If we take the market for ideas as a place, it can almost be everywhere. Any place where mind is free from both bigotry and coercion, eager to interrogate existing knowledge and curious to look for something that may not exist yet. Examples include Paris salons in the 18th century Paris, clubs Adam Smith attended in Edinburg, Chicago's grueling workshops, academic seminars, American Economics Association annual conferences, teahouses in China, and Starbucks all over the world. In addition, the market for ideas may dwell in "virtual" places, the printing world, radio, TV, and more recently, the internet, all belonging to "world 3".[18] Whether we talk about it as a physical place or a virtual world, the market for ideas boils down to an individual mentality, a curious mind looking for connecting principles behind a parade of fleeting phenomena.[19] Throughout this process, one forms her own identity, by freeing her mind from the grasp of ignorance and dogmatic fever, selectively absorbing existing knowledge passed from the past, and if lucky, making her own original contribution to the growth of knowledge. As such, this process primarily dwells in one's mind, even though one cannot think without engaging other minds, past and present.

---

[16] The Chinese word for the "market" (市場） contains two characters, and the second one means "place".

[17] Once we follow Coase (1959) and understand transaction not as exchange of goods per see, but their rights, it is easy to imagine the market as placeless. Wang (1997) provides a case study of fish markets, which contains competing conceptualizations of the market.

[18] The presence of books and newspapers in a society does not necessarily prove the presence of the market for ideas. George Owell's 1984 provides many illustrating examples.

[19] Unlike other markets, whose operation requires at least two parties, the market for ideas is not subject to such restriction. Indeed, a market for ideas can only be activated by many a single mind, even though no mind works or is able to work in complete isolation, because no collective actor is equipped with mental power. What is often called "group mind" (McDougall 1920), or more recently, "the wisdom of crowds" (Surowiecki 2005) and "collective intelligence" does not suggest the presence of collective decision-makers. On the contrary, these terms stress the distributed character of knowledge and emergent nature of collective intelligence, both underlining the argument for an open market for ideas.

The search for knowledge concerning truth, beauty and goodness of the universe and human society is also inevitably a collective and social undertaking in at least the following two senses. First, the searching is an open, continuous, and historical process. For any single actor, this process cannot and does not start from scratch, but builds on layers of foundations laid down in the past, even though most of preexisting knowledge might be outdated, misleading or plainly wrong, and hopefully, it in turn leaves a mark or even a steppingstone for later comers.[20] Attempts to make it ahistorical, often led by arrogant ambition to break up with the past and restart on tabula rasa, often end up as what Hayek (1991) called "fatal conceit". It is interesting to note that modern China witnessed many such attempts to denounce and jettison all legacies of the past, due to the strongly and widely held conviction that China had no chance to become a modern nation unless it totally broke up with its past and started anew. Such bigotry permeated China's intelligentsia community for most part of the 20th century and was not systematically challenged until China's transition to the market economy.

Second, the searching for truth, beauty and goodness inevitably involves constant dialogue and exchange with countless nameless and faceless contemporaries. This process is similar to the famed story of pencil told by Leonard Reed, numerous people are involved in the making of a pencil, who in most cases do not know each other, or even aware of their presence, let alone their participation in making pencils. Michael Polanyi (1958) had the following to say about the communal nature of the search for knowledge. "Nobody knows more than a tiny fragment of science well enough to judge its validity and value at first hand. For the rest he has to rely on views accepted at second hand on the authority of a community of people accredited as scientists. But this accrediting depends in its turn on a complex organization. For each member of the community can judge at first hand only a small number of his fellow members, and yet eventually each is accredited by all. What happens is that each recognizes as scientists a number of others by whom he is recognized as such in return, and these relations form chains which transmit these mutual recognitions at second hand through the whole community. This is how each member becomes directly or indirectly accredited by all. The system extends into the past. Its members recognize the same set of persons as their masters and derive from this allegiance a common tradition, of which each carries on a particular strand" (p. 163).

In a nutshell, the market for ideas channels mental power to the creation and utilization of knowledge. In the creation of knowledge, it transforms a mental process occurring in one's mind into a "World 3" object. A neurological process in someone's mind, which may be stimulated by an examination of "world 1" objects (the timing of moon eclipse), an pondering of "world 3" puzzles (the Coase Theorem), or simply a reflection of "world 2" phenomenon (one's own thinking). Once ideas activate a long process of consideration and survive an ensuring process of critical debate, they may become knowledge, entering World 3. In the utilization of knowledge, knowledge (in "World 3") directs what we think (happening in "World 2"), hence changes what we do and how we do it in "World 1".

[20] For a classical defense of the role of tradition in intellectual pursuit, see Edward Shils (1981).

The process can be illustrated with two examples. Marxism, a World 3 object, may exert powerful influence on how members of a society think, among other issues, about the relation between the state and economy. In a society where Marxism is accepted as final and permanent truth, economic theories contradicting Marxism are often banned and excluded from study or criticism. Without the constant input of new ideas to challenge it, Marxism becomes ossified and little new knowledge can be generated in the society. Moreover, a rigid doctrine, when imposed on society by force, further oppresses the minds of the people. In the ideal of Leninism, every member of the Soviet Union shall think the same, feel the same, and behave the same. In such a society of extreme uniformity, there will be neither room nor need for the market for ideas. When most members of a society cannot think freely, it is hard to imagine them to be creative or productive, in both the production of goods as well as ideas and knowledge. An economy manned by unproductive members is inevitably stagnant and stark, and its people poor, shortsighted, and unruly. Through this long this long chain of actions or inactions, knowledge, a "World 3" object, exerts its far-reaching influence on both "World 2" and "World 1" as well as "World 3" itself, connecting all the three universes together.

In comparison, the theory of classical liberalism or capitalism, another object in World 3, has the opposite liberating impact on the minds of the people, and through them, stimulating the growth of knowledge. A basic principle of classical liberalism is that no one is fit to govern a society, wielding the coercive power of Leviathan. As a result, a society where classical liberalism prevails is more likely to develop institutions to check and limit political power, to tolerate different voices, and to protect individual freedom. As no economic institution is more effective than private property to secure individual freedom and constrain political power, private property is more likely to prevail in a society whose members embrace classical liberalism. In such a society, competing ideas are more likely to emerge, calling for and fueling an open market for ideas, which facilitates the growth of new knowledge, which in turn opens up more horizons for members of the society, ultimately embarking the society onto what scientist David Deutsch (2011) calls "the beginning of infinity".

In the above discussion, we seem to make a clear distinction between the creation and utilization of knowledge. In reality, however, the creation and utilization of knowledge can never be clearly separated. In the first place, the creation of knowledge is often driven by its potential or expected utilization. This may be a conscious intention on the part of knowledge workers. The rise of patents and intellectual property rights, for example, must have pushed the growth of knowledge based on its intended economic value. More likely, knowledge is selected, in a rather blind fashion, by its pragmatic value, beyond the conscious design or expectation of those involved in its creation. Thomas Watson, for example, president of IBM, once believed that "there is a world market for maybe five computers." Clearly, the dramatic growth of computer and related industry since the second part of the 20th century was not anticipated by Watson.

Second, the utilization of knowledge is never a passive or mechanic process of applying a stock of preexisting knowledge to some problems at hand. Quite the contrary, it often provides a rich field for the generation of new knowledge. The literature on collective

invention – the idea that invention is often a lengthy social process, involving the active participation of end-users as well as original inventors – provides a good case in point.[21] More often than not, a major technological innovation or scientific breakthrough does not result from the strokes of a single genius, but reflect the accumulation of continuous minor improvements and radical extensions. Indeed, a new innovation or discovery can hardly become revolutionary if it is confined to its original domain.[22] A successful technological or scientific revolution must generate impacts far and wide beyond the imagination of its original author. This happens only when the original idea or invention is able to attract the hearts and stimulate the minds of many others, who discover its wide value and deep significance in other areas or applications. How effective such a process unfolds and what directions it takes are inevitably shaped by ideas and knowledge held by Michael Polanyi (1962) called the "societies of explorers".

This reciprocal relations between the creation and utilization of knowledge was actually noticed long time ago by a Chinese scholar in the Ming dynasty, Wang Yangming (王陽明 1472-1529), who has had a great impact on the diffusion and creative interpretation of Confucianism in Korea and Japan.[23] Wang developed his philosophy centered around the unity of knowledge and action. "People today distinguish between knowledge and action and pursue them separately, believing that one must know before he can act… . They say [they will wait] till they truly know before putting their knowledge into practice. Consequently to the end of their lives, they will never act and also will never know." Wang denied the possibility and desirability of separating action from knowledge, or vice versa. While it is widely known that action not informed by knowledge is aimless and fruitless, Wang stressed that mere knowledge without action is not genuine, because it has no impact on practice. In some sense, Wang's thesis is an early precursor of the famous distinction made by Gilbert Ryle (1949) between knowledge-that and knowledge-how.[24] Different from Ryle, however, Wang highlights the interdependence, reciprocal stimulation and mutual progress between action and knowledge.

In his original formulation, following the Chinese tradition of philosophy, knowledge was largely confined to ethics, that is, how and what to act morally. Nonetheless, his insight can be extended and apply to the broad spectrum of knowledge, including scientific knowledge. Interpreted in contemporary terminology, Wang's philosophy helps to open the market for ideas to practices or pragmatic knowledge, including individual habits, social customs, as well as organizations and institutions.[25] Once knowledge is

[21] For example, see Allen (1983) and von Himpel (2005).
[22] This is confirmed in Brian's (2009) discussion of technology.
[23] For a discussion of Wang's philosophy, see Henke (1916), Ching (1976), Tu (1976) and Chen (1991). The rise of *Yomeigaku* (Yangmingism or 陽明學⿴) in modern Japan has not only attributed to the success of Meiji Restoration, but also helped the postwar revival. Sakuma Shozan（佐久間象山,1811-1864） and Masahiro Yasuoka (安冈正笃，1889－1983） were leading scholars of *Yomeigaku* during the two respective periods.
[24] Ryle's early insight has generated a large and still alive literature. See, for example, Roland (1958), Car (1985), and Stanley (2011).
[25] In the next section, we will discuss in length the boundary of knowledge. What deserves special attention is that our knowledge concerning the nature and working of human society, including its organizations and institutions, directly affects how we organize the economy and run the economy.

expanded to include individual practices and their social outcomes, we can readily appreciate the role played by the market for ideas in the socialization of individuals, her entrepreneurial endeavor to create her own views of the world and her own reconstruction of social reality.[26]

For each individual, the process of socialization, to become a member of a society or an academic community, is to learn, absorb and practice its local knowledge, probably with some changes (minor or radical) on her part. With the intake of more knowledge, she gradually boosts her confidence and builds her capacity as well as taste in critical thinking, enabling her to exercise her own judgment in choosing different strands of knowledge and combining them in original manners, and thus making her own contribution to the advancement of knowledge. Over time, she matures from a consumer to a producer of knowledge, at least, in her own narrow specialty. This process is inherently and intimately personal, driven by her intuition and judgment. Any attempt to make it otherwise is inevitably counterproductive and self-defeating.

This internal aspect of the working of the market for ideas is highly idiosyncratic, fluid and transient, a mental process still largely opaque, unknown and even resistant to modern science.[27] At the same time, the market for ideas has another different aspect, making it a communal undertaking, held together by a collective process of evaluation, which Michael Polanyi referred to. When an individual operates her internal market for ideas, she also participates in a collective "enterprise of knowledge".[28] To borrow once again Popper's terminology, one end of the market for ideas operates in "World 2", the other in "World 3". While what's going on inside the brain remains dark and elusive, when each individual conducts her life in a society, her engagement with other members in collaboration and competition through both "world 1" and "world 3" is subject to empirical analysis.

4. Working Classification of Knowledge

Readers who have followed our previous reasoning may have noticed the emphasis placed on knowledge. Before we move forward to take on the role of knowledge in the working of our modern economy, let's take a closer look at knowledge itself.

Knowledge exists in various forms and kinds. A resident of Makuhari knows where to buy his favorite groceries, where to have delicious fresh sushi at one third of the price foreign tourists have to pay at Ginza. In a tribal society, an old lady knows what herbs

---

This character of reflectivity has recently been noticed by economists, see the 2013 special issue of the *Journal of the Economic Methodology* 20(4), which is devoted to "reflexivity and economics: George Soros's theory of reflexivity and the methodology of economic science."

[26] For a classical elaboration of knowledge in social construction of reality, see Berger and Luckmann (1966). For a more recent reformulation from a philosophical perspective, see Searle (1995).

[27] For recent progress on this matter, see Crick (1995), Edelman (2004) and Seung (2012). Nonetheless, we are still far away from understanding the neural and other mental processes undergirding the creation of ideas and knowledge.

[28] The term, "enterprise of knowledge", is borrowed from a book title (Levi 1980).

can reduce fever. People living in a desert know where to find water. Such local or folk knowledge is critical in daily life. In the past, such knowledge probably determined life or death.

Our modern time has witnessed the explosion of knowledge of another kind – science and technology – whose validity travels across time and geographical boundaries.[29] A Japanese college student looks around in her apartment, she will see a cellphone, a TV set, a microwave, a watching machine, a stove, a laptop computer, and the list goes on. All such equipment and gears are embodiments of modern science and technology. Science consists of empirical knowledge and theoretical explanations about the fabric of reality, be it a physical system (the universe), a biological system (life), or a social system (society); it is driven by questions like, what is the nature of reality? How does it work? Why does it work the way it does? Technology is applications of scientific knowledge for human purposes. It includes MRI, medicine, as well as public policies and laws that are created to improve human welfare.[30]

Scientific knowledge is commonly divided according to its subject matters into physical, biological, social sciences. Not all scientific knowledge travels across time and distance with the same degree of ease; it depends on the reach of theoretical explanations (Deutsch 2012). Currently, knowledge in physical sciences appears as universal as knowledge can be (keep in mind the warning of Karl Popper that all knowledge is unavoidably conjectural and never final), knowledge in social sciences is parochial and context-dependent, and knowledge in biological sciences lies in between.

Among all human knowledge, knowledge in social sciences about how our society and the economy work stands out for a critical ontological reason. While knowledge in physical and biological sciences (such as Einstein's theory of relativity or Crick and Watson's discover of the double helix) is created by human mind, the subject matter is

[29] As perceptively stressed by Hayek (1937) decades ago, the growth of technical knowledge in the modern era does not reduce the importance of local knowledge. My visit in Japan allows me to appreciate Hayek's argument from a wholly different angle. In the United States, the automation of manufacturing, made possible by continuous advancement in technical innovation, gives rise to the management philosophy that supremacy in technology can reduce the need for, if not totally substitute, human expertise, which has to be local knowledge. According to this philosophy, the best machine is the one that can be safely operated by an idiot. In Japan, however, the management philosophy is almost the opposite. A more advanced technology calls for more refined hands (and minds) to realize its perfection. The same philosophy seems also prevalent in Germany, another power house of manufacturing. This observation readily creates a puzzle. If the United States ignores Hayek's wisdom, why it is able to lead the world in technological innovation? It could be the case that Hayek's observation is of limited relevance. More likely, the leading edge the United States enjoys in technology comes from other sources, such as its world-class universities and capacity to attract best minds from all over the world. Such factors are able to outweigh the damages caused by the wrong-headed managerial philosophy. It is also interesting to point out that this philosophy, by discouraging human capital investment among blue-workers, may be responsible for the impoverishment of blue-color jobs in the United States since the 1980s.

[30] It is certainly true mistakes of various kinds can be made, and are indeed made on a daily basis, so that some knowledge and technology may make us worse off, even before we consider the issue of distribution. The potential danger of knowledge does not reduce its importance, but warns us against the arrogance of "fatal conceit" (Hayek 1991).

not human creation. Both timespace and DNA are objects in "World 1"; their existence is independent of human conduct or human will. In contrast, the subject matter in social sciences – human society and economy – are mostly what Hayek called "social facts"[31]. They mainly result from human actions. Both social sciences knowledge (such as Adam Smith's theory of invisible hand or the concept of the market for ideas) and the subject matter (such as the market) are man-made. This distinct ontological feature of social scientific knowledge has two critical implications.

First, since beliefs and values held in people's minds cast a long shadow over their decisions and actions, out of which emerge institutions and organizations – the building blocks of human society and economy, they have to be included in our investigation of social sciences knowledge. This task is particularly pressing for beliefs, values and thoughts people held on how the economy and society work (or should work), which directly, immediately and profoundly affect the actual functioning of the economy and society, the subject matter for social sciences. In other words, the boundary in social sciences between ideas and knowledge is rather blurred. Ideas, just like knowledge, are also able to exert a causal influence on action.

Second, most knowledge in social sciences is institutional knowledge – knowledge about institutions and organizations that made up the economy and society.[32] Institutional knowledge can inform and guide our endeavors in designing and building institutions and organizations; such practice and its feedback can in turn help us revise and improve institutional knowledge. The same reciprocal relations can also be found, but to a much less degree, between science and technology in physical and life sciences. As the primary subject matter for physical and biological scientists is the secret of the universe and life, which belongs to "World 1"; their study of technology, a "World 3" object, is inevitably secondary. Social scientists, on the other hand, have no choice. Their subject matter, such as institutions and organizations, belong to "World 3", not "World 1".

A corollary is particularly worth noticing that ideas people held concerning society and the economy have the same capacity to influence decisions and actions as social sciences knowledge. The common presence of self-fulfilling hypothesis in social phenomena provides a strong piece of evidence. It is widely observed that a rumor of "bank runs" can actually cause a bank to collapse. The famous Hawthorne effect is another example that beliefs matter for productivity.[33] In explaining physical or biological phenomena, we seek causes from factors structural to the physical or biological system and external to the actors.[34] In explaining social phenomena, however, we have to come to terms with causes

---

[31] Hayek (1943), "The Facts of The Social Sciences", *Ethics* 54(1): 1-13.
[32] Berger and Luckmann (1966), Searle (1995).
[33] For a recent revisit of the famed experiment, see Levitt and List (2011).
[34] According to Popper, "To given a causal explanation of an event means to deduce a statement which describes it, using as premises of the deduction one or more universal laws, together with certain singular statements, the initial conditions" (1968, p. 59). This has become known as the cover-law model of explanation. Social scientists have long suspected the limitation of such causal explanations and proposed an alternative mechanism-based explanation, in which beliefs and ideas held by actors loom large. See, for example, Elster (1989), Hedstrom and Swedberg (1998). For a recent review, see Hedstrom (2010).

internal to the participating actors, including beliefs, values, expectations, and ideas held by them, in addition to structural constraints they face.[35] One way or another, causal explanations in social sciences have to recognize the critical role of intentionality, an-age old challenge long noticed since the time of Max Weber (1949).

All knowledge, including social sciences knowledge, is objective in Popper's (1972) sense. Knowledge, once created, discovered, and expressed, can exist independently of their authors and has a life of its own. The market for ideas would be impossible if not for the objective reality of knowledge. Created by individual minds, knowledge avails itself to the public for debate and criticism. The market for ideas turns an otherwise purely mental or neurological process occurring in our individual brain into a social dynamism, whereby personal knowledge is subject to open test and becomes sequentially revised and improved over time, an never-ending process susceptible to empirical investigation.

5. Economy as an Enterprise of Knowledge

So far, our discussion of the market for ideas has been limited to the connections between ideas and knowledge. In this context, the market for ideas turns flashes of ideas into knowledge, which in turn affects the generation of new ideas and new knowledge. It is time to see the working of the market for ideas and the economic role of knowledge.

Once we focus our attention on the part played by knowledge in the working of the economy, we can hardly avoid coming to the conclusion that the economy is essentially an enterprise of knowledge. In a hunting and gathering society, economic prosperity is mainly determined by a biological process, which dictates what fruits and plants available to pick, and what animals to hunt. In an agricultural society, the biological process is increasingly harnessed by human knowledge, which plays the upper hand in setting the limit to food production. A modern economy, powered by industry and commerce, finds its primary source of growth in the continuous division of labor and cutback of transaction costs; both are to a large extent determined by the growth of knowledge.[36] If

[35] Among such internal factors, expectation stands out as the only factor that has long been recognized by economists as important in explaining economic behavior and conducting economic policy, as shown from the early cobweb model of price movement to the more recent rational expectation revolution in macroeconomics. New institutional economists have recently highlighted the role of beliefs in understanding economic change (e.g., Douglass North, Avner Greif, and Deidre McCloskey). During the last few decades, economists' recent preoccupation with causality in empirical studies and policy evaluation, and the use of instrument variables as well as lab and field experiments to replicate the ideal comparison between control and treatment groups in experimental sciences, have brought much rigor and several Nobel prizes to economics. This growing interest in causality is largely driven by the rise of policy intervention in welfare states, which calls for program evaluation (e.g., Heckman 2010). For a critique of economists' ignorance of intentionality, see Lawson (1997). For a recent attempt to bring intentionality into economic analysis, see Hoover (2015).

[36] Adam Smith was the first to highlight the division of labor as the ultimate source of economic growth. While Smith alluded to technological innovation as an advantage of the division of labor, it was Charles Babbage who revealed knowledge as the secret of the division of labor. Ronald Coase

we zero in on manufacturing, what has been transformed is various physical materials (energy, minerals, water, and so on), which is subject to the law of preservation; the transforming force comes from knowledge, which is open to infinite growth. The whole process is directed by what we want to produce, and is constrained by what we know about the nature the materials, the technology of production, and the art of organization. Hence, it is proper to characterize the economy as an enterprise of knowledge.

Historically, knowledge has always been a crucial factor in economic production. Even in the primitive hunting-gathering economy, local or folk knowledge is vital for the success of livelihood. Where to find water and food, how to build shelters and avoid predators, how to raise a family, and many other daily challenges of life all require local knowledge, which is often passed from one generation to another through oral tradition and observation. When knowledge is accumulated in this manner, its rate of growth is inevitably limited. In such a society, when environmental change is gradual, relative to the rate of knowledge accumulation, members of the society can manage to live a slow-paced life. In cases when environmental change is abrupt and rapid, leaving little time for the society to adapt, it may wipe out the whole community. In this sense, competition among human groups is fundamentally decided by their possession of knowledge, and more important, their abilities to create, discover, and learn new knowledge.

A conspicuous feature of the modern world, particularly after WWII, has been the explosive growth of knowledge.[37] In various forms and types, knowledge has become the most powerful engine driving the rapid accumulation of material wealth and unprecedented improvement in the quality of life. Unlike industrial revolution in the previous centuries, which was largely confined to European countries and their colonies, the post-war development was a global phenomenon, if still unevenly distributed across the globe. Developed countries in the West quickly embarked on postwar reconstruction; Japan, the United States, and Germany witnessed record economic growth. Under the banner of modernization, newly independent nations wholeheartedly implemented mass education and healthcare as well as big-push industrialization as the means to pursue wealth and improve wellbeing. As a result, the benefits conferred by the growth of modern knowledge have become widely distributed among people at every corner of the globe.

Since the last quarter of the 20th century, after the fall of communism and the closure of central planning, first in China and a decade later in the former Soviet bloc, the emergence of market economies all over the world has greatly speeded up the spread of modern knowledge. With economic globalization and technological revolutions in communication and information, the whole global community has become increasingly connected economically, technologically, and knowledge-wise. The increasing

---

opened our eyes to the ubiquity of transaction costs in the modern economy, and pointed to organizations and institutions as tools to adjust transaction costs.

[37] The relevant literature on this subject is huge and keeps growing. See, for example, Boulding (1956), Drucker (1969, 1993), Bell (1973), Romer (1986, 1990), Mowery and Rosenberg (1989), Nonaka and Takeuchi (1995), Powell and Snellman (2004), Kay (2005), Warsh (2006), and Black (2013).

availability of vaccines and essential medicines as well as access to computers, internet and cell phones for the rural population in developing countries have changed the lives of billions of people. Free online education programs, such as Khan Academy and open courses provided by many universities in the West, has for the first time made high quality education available to every motivated students, regardless of their family ground. Despite persisting economic inequalities, knowledge has rarely been so widely accessible throughout human history. In most countries, compulsory schooling, universal literacy and immunization, the rise of various professional trainings and increasing enrollment in higher education have led to unparalleled growth of human capital. This rapid and broad increase of human capital opens up the production of knowledge to a wide population, which in the past was often sacredly guarded as a privilege; it also facilitates the dissemination and utilization of knowledge both in the workplace and at home, creates further incentives for the growth of knowledge. This co-growth of human capital and knowledge has of late been rightly recognized as the most powerful and sustainable force in maintaining economic development in the new millennium.[38]

To recognize the importance of knowledge is one thing, to demonstrate it in a convincing and rigorous manner is another. As early as in the 16th century, Francis Bacon pronounced that knowledge is power. Yet, we have to wait until 1962 when Fritz Machlup published the first empirical investigation to document the power of knowledge in a modern economy. In his estimates, as early as 1958, the size of the knowledge economy was measured as 29 percent of GDP in the United States.[39] Machlup coined the term "knowledge economy" and other related terms, including "knowledge industry" and "information economy". Today, "knowledge economy" has become a cliché; it can be found in newspaper headlines, titles of research articles and books, and even in the journal title[40], handbooks[41], and the name of a government ministry.[42]

We can also approach the economy as an enterprise of knowledge from another operational perspective. In an economy, organizations, including firms and countries, frequently appear as main actors. For example, GDP is calculated at the national level. Economic performance is often evaluated among countries. Firms, including sole proprietorships, are the taken-for-granted actors in economic production. From investment to employment, decisions are made in firms almost every second. Yet, only individuals make decisions, who may act as a natural or legal person, or an agent of corporation. Decisions made by separate individuals may be aggregated at the group level, such as presidential elections and committee meetings. This does not change the fact that

---

[38] See, for example, Romer (2000), Mokyr (2002), Jones (2005), Warsh (2006), and Lucas (2009).

[39] At the time of his death in 1983, Machlup just launched a "monumental" 10-volume Knowledge Project. See Langlois (1985) for an account of Machlup's efforts to come to terms with the economics of knowledge.

[40] *Journal of the Knowledge Economy* was launched in 2000.

[41] *Handbook on the Knowledge Economy* (Edward Elgar). The first volume was published in 2005, followed by a second volume in 2012.

[42] In 2008, the South Korean government founded a Ministry of Knowledge Economy, with a conviction that "knowledge will be the primary engine of productivity and growth for the Korean economy". In 2013, it was changed to a more conventional name, the Ministry of Trade, Industry and Energy.

the decision-makers are individuals. We may commonly refer to firms or countries as actors in our daily conversation and even writings, we shall not deceive us into thinking that there are decision-makers other than individuals.[43]

In the economy, the most important decisions firms make is their identity, that is, what to produce. What products or services they provide, as well as their price and quality, define and differentiate who they are to consumers vis-à-vis their competitors. Such decisions tend to cast such a long and heavy shadow that it is often not possible to calculate its impact in advance. To borrow the pair of terms made famous by Knight (1921), this is a matter of uncertainty, rather than business risk. Exactly due to its pervasive uncertainty, such decision is more like a judgment call than a cost-benefit analysis. While we cannot discuss the process of such decision-making process in great detail, it is clear that such decision is profoundly shaped by what knowledge and ideas the decision-maker possesses or is exposed to. Diversity in the stock of knowledge and ideas may well matter more than their accuracy. The Chinese axiom, "listen to all sides of the story, you will be enlightened; heed only one side, you will be benighted", speaks to the same insight. At the same time, the diversity of information makes it a taxing task for the decision-maker to weigh different and even conflicting information. More often than not, decision-makers are forced to compare apples and oranges, with consequences running far into the distant future.

While they may be shrouded in uncertainties, decisions of this nature are not like a math test question, with a single right answer. Instead, the best criterion to evaluate the soundness of a decision is how close it matches the ultimate reality. Since decision-making does not rest on a single bet, it is not an act of gambling. Rather, as decisions are made continually over time, how consistent and coherent they are in light of the anticipated business future, which remains changing all the time, decides their final outcome. Hence, business decision-making is a test of patience, persistence, courage, as well as prudence. How the outcome turns out, whether the decision-maker is disappointed, and whether and what kind of Plan B is available when the original plan goes awry are all determined by the unfolding of the imperfectly anticipated economic future, including the general economic conditions as well as industrial and parochial circumstances specific to the firm, which is by no means fixed at the time when the firm makes its decision. Indeed, the economic future, to a large degree, is shaped by all the aggregated impact of decisions made by firms and consumers, as well as other actors, particularly government agents. In other words, decisions made by each actor contribute to the constantly changing environment, which all actors try to factor into their decision-making. The whole

[43] This is often referred to as methodological individualism in the social sciences literature (e.g., Watkins 1952, Elster 1982, Udehn 2001). However, the position taken here does not deny the presence of collective actors, such as firms, political parties and nation-states. That such organizations do exist and exert powerful influence is beyond a reasonable doubt. The point I want to make is rather that these organizations, as powerful and resourceful as they might be, are impotent as a decision-maker. They have to rely on certain individuals (their officers or legal agents) as the decision-maker. This irremediable disparity, particularly when the organization is significant in terms of the resources it controls, can pose a serious risk for both the organizations and the society at large.

economy becomes a self-driven system, powered by the continuous growth of knowledge and constant flow of ideas.

With the constant emergence of novel knowledge and influx of new ideas in the economy, the economic system becomes an open non-ergodic system. Ergodicity is a feature of the stochastic dynamics in the physical universe.[44] For a deterministic system, all the future states are fully specifiable by the initial conditions and universal laws, leaving no room for uncertainty. In contrast, a stochastic system is one where the future states are uncertain. Nonetheless, they may subject themselves to a probabilistic structure. Such a stochastic system is ergodic if the time distribution of all its states converges to its ensemble distribution, which is the product space of the possible states of all the state variables. For an ergodic system, while its future is not specifiable in advance, it can be approximated by what we know about its space distribution. In such a system, if we take the time average of any variable, it matches its space average. As long as we know its distribution in space, its future contains no genuine surprise.

As life is full of novelty, the biological world is certainly non-ergodic.[45] There is no law in biology that comes close to Newton's laws that can predict what new species will emerge or how the biosphere will change over time. As powerful as it is, the theory of evolution has little predictive power. This is not to belittle the extraordinary progress biological sciences have made in decoding the secret of life, but to underline the fact that life is distinct from the non-organic physical universe in a fundamental manner.

If the biological world is non-ergodic, human society, particularly its economic system, has more reasons to be non-ergodic.[46] As a subset of the biological world, human society is at least as non-ergodic as the whole biosphere. Given the unique structure and function of human brain and the rise of mind, what Hayek (1952) called the "sensory order" has already demonstrated a level of complexity far beyond the non-human life world. On top of that, the exchange economy consists of firms, markets, and institutions working together through a decentralized system, which is kept alive by the constant flow of information and information-triggered actions, which in turn generate and send new information to the system.

As a non-ergodic system, a market economy has an open future, which cannot be predicted or even predictable in advance, and which indeed simply does not take its shape until its time comes.[47] From the perspective of decision-makers, the market economy is

[44] The ergodic hypothesis was introduced by Boltzmann and Maxwell during the second part of the 19th century as the foundation of statistical mechanics.
[45] This point is made most forcefully by theoretical biologist, Stuart Kauffmann (2000).
[46] Among economists, Douglass North (1999) and Paul Davidson (2012) have repeatedly emphasized the non-ergodic feature of the modern economy.
[47] This feature of the economy (and life) differs it from the computer program. As pointed out by Alan Turing, there is no theory or algorism that allows us to know the result of computer programs before we run them. Yet, the end result of such a program is already implied in and determined by the details of the program. In the case of the economy (or life), the end result is far from determined, and keeps evolving until the second when it is materialized. This crucial difference points to the limitation of using computers and artificial intelligence to model the economy (and life).

full of irremovable uncertainties. The market for ideas helps economic actors to capitalize on, not do away with, uncertainty. Without uncertainty, all decision-making would be reduced to the logic of choice, with little room for entrepreneurship. As rightly pointed out by Knight (1921), it is uncertainty that gives birth to profit, without which the economy would come to a standstill. The market for ideas facilitates the flow of information and pools together information diffused in the economy. In so doing, the market for ideas enables economic actors to adjust their actions and revise plans in response to changing economic circumstances. As all economic actors join an open system of information sharing, the system keeps updating its information in a timely and accurate manner, which in turn helps the actors to forge consistent expectations about the future.

The following example helps to illustrate how the market for ideas works in a concrete context as well as its economic implications. In the United States, it is common for an engineer to quit his job for a better offer at a competing firm, or start his own company to compete with his former employer. Indeed, at the Sillican Valley, this is how most start-ups are founded. While job-hopping – changing jobs frequently for short-term financial gains or career advancement – is not necessarily an asset on one's CV, it is certainly not a taboo in the business world. Such high and frequent labor mobility is a major channel for the transfer of knowledge, ideas and human capital across firms.[48] This Sillican Valley culture, where labor mobility is high and frequent, stands in sharp contrast to Japan, where companies rarely hire engineers, technicians, and high-skill specialized workers from their competitors. A Japanese employee can leave a company, but he is not expected to set up one of his own to compete with his former employer. When an engineer quits his job and starts a business of his own, the new company often becomes a supplier or subcontractor to the old one.

As the market for ideas is localized in Japan, it forces each and every firm to develop its own internal labor market and stock of expertise. Small manufacturing companies in Japan are still able to offer highly paid blue-collar jobs, because workers at the production lines are often masters of special skills. As a result, the spirit of craftsmanship is widely spread and deeply rooted in Japan, which helps to sustain a technology savvy labor force in Japan, despite its rapidly aging population. In recent years, Japan may have lost some ground in its global leadership in consumer electronics, but it remains a first rate powerhouse in high-precision manufacturing, where refined industrial automation often calls for, rather than substitutes, dedicated and specialized craftsmanship.

At the same time, because knowledge and skill accumulation is inevitably a long and patient process, Japanese firms lack the kind of adroitness and flexibility that characterize American companies. With limited labor mobility, companies are ill positioned for rapid structural changes in the economy. For example, contract labors have been on the rise in

[48] Saxenian (1994) remains a classical reading in the field. For the discussion of small firms in Japan, see Whittaker (2009).

Japan, accounting for 28 percent of the labor force.[49] Moreover, with limited exchange of information across firm boundaries, Japan is not known for cutting edge innovation.

6. Adam Smith's Two Competing Legacies

Given the importance of knowledge in the working of the economy, it is interesting to see how modern economics has treated the subject. It appears that since the very beginning, modern economics is split into two competing visions, one centered around interest, the other knowledge, each taking a quite different approach to economics of knowledge.

In one of his most memorable quotes, Adam Smith, the founding father of modern economics, put interest at the center of the working of the market economy. "It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their own interest." George Stigler (1975), a leading historian of economic thought, thus commented that "*The Wealth of Nations* is a stupendous palace erected upon the granite of self-interest". Ever since Smith, economists have treated the pursuit of self-interests as the legitimate driving force in a free market economy, making economics the science of self-interests.[50] This view of economics has also reached the general public. A recent NPR (National Public Radio) commentary, in its review of *Freakonomics*, a bestseller in economics by Steven Levitt, a winner of Clark medal at the University of Chicago, told the audience plainly that economics is a study of incentives.[51]

Self-interests or incentives stand as the core of modern economics, from mechanism design to game theory, from industrial organization to contract theory. In this standard view, economics is a study of individual choice, which is driven by self-interests. In the market, consumers maximize their utilities, firms their profits. Through the market system, not only are their goals met, but a social optimal as defined by Pareto is reached. Individual freedom and social efficiency go hand in hand. This is the ideal world portrayed by modern economics.

However, if we read Adam Smith carefully and sympathetically, this is not the only view of economics he had. Indeed, Smith started the *Wealth of Nations* with an emphasis on the division of labor. "The greatest improvement in the productive powers of labor, and the greater part of the skill, dexterity, and judgment with which it is anywhere directed, or applied, seem to have been the effects of the division of labor."[52] A critical advantage of

---

[49] This figure is from a recent report by Professor Kotaro Tsuru (2014) of Keio University, "Farewell to Japanese Employment Practices". Tsuru is Chairman of the Council on Regulatory Reform's working group on employment. The full report is available at http://www.japanpolicyforum.jp/pdf/2014/vol18/DJweb_18_eco_02.pdf.

[50] See Hirschman (1977) for an insightful discussion of the intellectual history of interest during the rise of capitalism in the 17th and 18th century.

[51] April 9, 2015. Available at http://www.npr.org/templates/story/story.php?storyId=4583937

[52] Joseph Schumpeter (1954, p.187), in a disparaging comment, proclaimed "nobody before or after A. Smith, ever put such a burden on division of labor. With A. Smith, it is practically the only factor in economic progress". Good for his standing but unfortunate for economics, Schumpeter was right. But

the division of labor, alluded to by Smith but much elaborated later by Charles Babbage, is its close bearing on the production and utilization of knowledge.[53] In other words, in addition to interest-centered economics, the *Wealth of Nations* contains seeds for an alternative knowledge-based view of economics.

After Smith, while economics has gradually become interest-centered, some economists, including those who have contributed to the establishment of this canonical view, have serious doubts. Keynes (1936, pp. 383-84) at the end of his *General Theory*, made the following observation. "The ideas of economists and political philosophers, both when they are right and when they are wrong, are more powerful than is commonly understood. Indeed, the world is ruled by little else. …, it is ideas, not vested interests, which are dangerous for good or evil." If Keynes is right, that it is ideas rather interests that rule the world, we have to ask ourselves whether modern economics has taken the wrong path.

Keynes was not alone. Almost at the same time, Hayek (1937), who disagreed with Keynes on many policy issues, came to the same side.[54] In Hayek's view, the most serious problem with equilibrium analysis, which would later prevail modern economics after the formulation of the Arrow-Debreu model in the 1950s, is its assumptions concerning knowledge held by economic actors. Through the manipulation of these assumptions, equilibrium can simply be reached by definition. Such analysis, however, is almost empty unless the assumptions concerning knowledge conform to reality. Hayek thus urged economists to take up the task and investigate to what degree these assumptions hold. "The empirical element in economic theory-the only part which is concerned, not merely with implications but with causes and effects, and which leads therefore to conclusions which, at any rate in principle, are capable of verification - consists of propositions about the acquisition of knowledge"[55]

In a later work, Hayek (1982) urges economists to come to terms with ignorance as an "irremediable" feature of our modern life. "A designer or engineer needs all the data and full power to control or manipulate them if he is to organize the material objects to produce the intended result. But the success of action in society depends on more particular facts than anyone can possible know. And our whole civilization in consequence rests, and must rest, on our *believing* in that we cannot *know* to be true in the Cartesian sense (Hayek 1982, p. 12, emphasis original). As he continues, "The fact of our irremediable ignorance of most of the particular facts which determine the process of society is, however, the reason why most social institutions have taken the form they actually have. To talk about a society about which either the observer or any of its members knows all the particular facts is to talk about something wholly different from anything which has ever existed – a society in which most of what we find in our society

---

the trend may have started to turn. See Yang (2003) for the most ambitious attempt to restore division of labor to the core of economics.

[53] For a comprehensive coverage of the intellectual history of the division of labor, see Sun (2012).

[54] Hayek was brought by Lionel Robbins to London School of Economics in 1931 to counterbalance the Keynesian influence from Cambridge. For the clash between Hayek and Keynes, see Wapshott (2011).

[55] Hayek (1937, pp. 33).

would not and could not exist and which, if it ever occurred, would possess properties we cannot even imagine" (p. 13).

Other predecessors of a knowledge-centered economics include Kenneth Boulding (1956, 1966), who encouraged economists to see their subject matter as what he called "econosphere", a term he coined to refer to the subset of "the sphere of all human activity, relationships, and institutions, which is particularly characterized by the phenomenon of exchange" (1966, p. 2). Boulding encouraged us to think "capital as essentially knowledge (a "world 3" object) imposed on the material world ("world 1"), in the first place by an organizing process which creates a producing organization and in the second case by a process akin to three-dimensional printing" (p. 5).

Ronald Coase (1937) took on the challenge of knowledge from another angle, the ubiquity of transaction costs in the economy. Coase is recognized as the founding father of several branches of modern economics, including law and economics (Richard Posner), transaction cost economics (Oliver Williamson), and new institutional economics (Steven Cheung, Douglass North, and more recently, Daron Acemoglu and James Robinson). At the same time, Coase is a staunch critique of "blackboard economics" (Wang 2008, Coase and Wang 2012); he has repeatedly urged economists to take on the economic system as their subject of investigation, and study the structure of production (Coase 1991, Coase and Wang 2012). Much like black holes in the universe, transaction costs point us to what we don't see, or what interest-based economics does not allow us to see, in the economy.

Among these scholars, Hayek was probably most explicit in proposing an alternative research program for economics, in which knowledge would replace interest as the organizing theme. At the moment, it would be too speculative to imagine what a knowledge-centered economics looks like. Instead, let's start with an observation, attributed to the famed American actor and commentator, Will Rogers. "The trouble isn't what people don't know; it's what they do know that isn't so."

Many economists, including Frank Knight, James Buchannan, and Kenneth Boulding, have referred to this quote in their writings. Reflecting on our personal experiences, the history of our favorite company or one's country, we can readily relate to the insight of this observation. Ignorance makes us hesitant, if not trepid. More often than not, ignorance, particularly when we are fully aware of it, induces us to seek advices and opens us to dissenting voices. Convictions, on the other hand, make us rush into decisions, and embolden a coward to take extreme measures. Terrible errors are committed, and disastrous decisions made when what we believe deeply turns out otherwise. Such errors in knowledge, with ruinous consequences, are frequently made by individuals and organizations, including countries (or rather their political leaders). But they hardly exist in conventional economic analysis, which assumes actors are rational enough not to be fooled.[56] As Stephen Littlechild pointed out long time ago, "Nothing will ever occur for

[56] The "Lucas critique" can be understood as an indirect attack waged on mainstream economists on this problem. George Stigler's (1961) classical paper on searching cost offers a justification of ignorance. The recent literature on information asymmetry can also be seen as another endeavor by

which they are not prepared, nor can they ever initiate anything which is not preordained" (1977, p. 7).

If not for this problem of knowledge, that is, people often hold wrong ideas and/or accept flawed knowledge without knowing it, the market for ideas would have a limited and rather mechanical role to play. Ideas are wrong, knowledge is flawed when ideas and knowledge are simply not true, that is, they don't correspond to reality.[57] Wrong ideas and flawed knowledge cannot last for long if an open and competitive market for ideas is at work.[58] As Edwin Cannan (1893) put it, "However lucky Error may be for a time, Truth keeps the book, and wins in the long run." When propaganda is imposed as truth, or when truth is perceived as propaganda, falsehood is inclined to last and prevail. At the time of rapid change, be it environmental, technological, economic, or social, ideas and knowledge may quickly become outdated and obsolete, making it a demanding challenge to people to keep their stock of knowledge up to date. In the context of high regional heterogeneity, when knowledge cannot readily travel across distance without losing its validity, it is also a tricky challenge to avoid falling into the traps of wrong ideas and flawed knowledge. Under these and other circumstances, when the working of the market for ideas is undermined or weakened, we have to take seriously the problem of knowledge.

It is certainly not true that mainstream economics has totally ignored the issue of knowledge. The following four lines of work have attracted considerable attention. The first is the study of patents (Plant 1934, Nordhause 1969) and more recently, intellectual property rights (e.g., Boldrin and Levine 2008). Economists have long realized the necessary evil behind patents, which are artificial monopoly created by the state to give the inventor sufficient incentives to engage in the risky action of invention. In general, economists are keenly aware of the obvious economic inefficiency created by monopoly. Patents inevitably create a deep sense of uneasiness.[59] Unlike conventional economic resources (movable and immovable properties), patents or what they are supposed to protect is some kind of knowledge or its embodiment, primarily "World 3" objects. A distinct feature of "world 3" objects is that they are non-rivalry goods. In contrast, most traditional moveable and immovable properties (cattle and land) are rivalry goods.

---

mainstream economics to come to terms with the problems of knowledge. For a critique of mainstream economics, see Sen's (1977), "Rational fools: a Critique of the Behavioral Foundations of Economic Theory". The title says all.

[57] This is what is called the correspondence theory of truth, which was originally proposed by Alfred Tarski in a paper published in 1931, "The concept of truth in formalized languages", and later elaborated by Karl Popper. See Miller (1999), "Popper and Tarski".

[58] Under the assumption of perfect knowledge, neoclassical economics assumes away the problem of knowledge as identified here. To my knowledge, Hirschman (1982) is one of the few works that entertains the possibility of false knowledge.

[59] Old generation economists, including Plant, are in general critical of patents. Recent scholars, in contrast, emphasize patents as necessary evil in order to encourage innovation. More recently, however, scholars (e.g., Boldrin and Levine (2008)) start to question the assumption that patents are necessary for innovation. For example, the fashion industry is never short of innovation, but it does not recognize any patents.

The second area of research is economics of knowledge (Foray 2004, Andersson and Beckmann 2009, for a useful review of the literature, see Leppälä (2012)), that is, economic analysis of the creation of knowledge, including R&D and invention (e.g., Arrow 1962). Since knowledge, particularly basic scientific knowledge, is public goods, private investment tends to be under-supplied. As a result, public funding is necessary to support research in basic science. It has now become a common practice in developed economies that the state channels tax-payers money into basic and applied scientific research, including medicine, health, as well as traditional physical, biological and social sciences.

The third area of research is education and human capital. The rise of human capital as a field of study in economics is largely due to the leadership of Gary Becker (1994), whose efforts had been preceded by T. W. Shultz and Jacob Mincer. More recently, James Heckman (2014) has extended the line of research into economics of human development, focusing on the economics of investment in early childcare.

The fourth one is information economics (e.g., Stiglitz 1985, 2001), which has become one of the most-lively subjects in economics.[60] Moral hazard and adverse selection have been widely known in the insurance industry; Kenneth Arrow (1963) was probably the first one to bring them to economic analysis. George Akerlof's (1970) study of the used car market introduced information asymmetry into economic analysis. Game theory

While these studies have brought our attention to the issue of information or knowledge in economics, they all approach the subject from an interest-centered economics perspective. In general, they are driven by the problem of incentives in the creation of knowledge (patents, economics of knowledge), the development of human capital, or in the case of information asymmetry. In contrast, the information-centered economics advocated here focuses on the growth of knowledge, at both individual and societal level, and its economic consequences. In this process, incentive certainly matters, but it is far from the driving concern.

Given the limited space and my own limited knowledge, we have to end our discussion of the market for ideas for now, and turn into the second subject, China's market transformation.

7. China under Mao

From the perspective of the market for ideas, the most damaging aspect of Mao blind pursuit of socialism, which became increasingly radical since the mid 1950s, is its suppression and obliteration of diversity in ideas, institutions, and practice, and the ensuing depletion and poverty in the stock of knowledge. Mao's anti-intellectualism had

[60] In a series of articles published in the 1960s and 1970s, Steven Cheung built on and extended Coase's (1937, 1959) analysis of transaction costs and property rights to develop a distinct contractual approach to analyze the problem of information. They are available in a collected volume under the name of Economic Explanation (Cheung 2005)

not only destroyed the external market for ideas in society, but also severely undermined the internal market for ideas in the mind of each individual. At the end of Mao's era, China was not only lagging far behind the West in modern technology and managerial knowhow, but also incredibly ignorant about its own cultural traditions.[61] Without a free market for ideas, while China enjoyed a rapid recovery in the early 1950s, it turned out to be a mere flash in the pan. Mao's economy quickly wound down and fell trapped in stagnation. What is far more worse, Mao's closing of the Chinese mind cornered China to what Hayek (1991) called "the fatal conceit". Between the mid 1950s and Mao's death in 1976, China suffered one stupendous disaster after another, from the "Anti-Rightist" campaign in 1957, to the "Great Leap Forward" in 1958-1961, and finally, the Cultural Revolution in 1966-1976. Worse still, without an open market for ideas, few lessons were learnt from such senseless stupidity.

When the People's Republic started in 1949, it heralded a promising future. China was reunited for the first time after a century of humiliation, first under the Western colonialism and later under Japanese conquest. After decades of guerrilla war and a bloody three-year civil war, Mao led the Chinese Communist Party to victory, forcing the defeated Nationalist Party to retreat to Taiwan. Mao commanded popular support and the Party won the mandate to lead the country. In the first few years, to the surprise of Mao and his colleagues, China enjoyed a robust economic recovery. What Mao failed to understand, however, was that the economic recovery was powered by a booming mixed economy. As the economy was still recovering, Mao started the scheme of nationalization. Mao's rush to socialism not only nipped economic recovery in the bud, but also set China down the road to perdition.

In 1952, China launched a campaign to remodel its educational system after the Soviet Union. The restructuring of higher education abolished all private universities, including many that enjoyed international recognition. All college professors lost their economic independence and had to depend exclusively on the state for their livelihood. Around the same time, all newspapers and publishers were nationalized. As a result, all knowledge workers in China became state employees. In 1953, the first Five Year Plan was launched, introducing a powerful administrative structure tasked for state planning. Around the same time, agriculture began to become collectivized, depriving Chinese peasants of their land and freedom. Ever since then, eighty percent of the Chinese people would be chained to their birthplace, no freedom to migrate, even at the time of starvation. The very next year, China passed a new Constitution, which Mao drafted himself.[62] Right

[61] The following example shows how close-minded the Chinese were at the end of Mao's era. Enriching the people had always been accepted as a top priority for Chinese rulers ever since the time of Confucius. Yet, Mao's perverted ideology had gulled the Chinese to believe that the pursuit of wealth was not only wrong, but also evil. People who dared to engage in any profit-seeking misbehavior would suffer public humiliation and even imprisonment. It was against such an abhorring atmosphere that Deng's policy, "let some people get rich first", which otherwise would be plain and commonsensical, became at first a controversial, and later, revolutionary, mantra in the early 1980s.

[62] The drafting committee of the 1954 Constitution consisted of four members, Mao and his three secretaries. As Mao explained in June 1954, the first draft was finished at the end of 1953 after seven

before the founding of the People's Republic, the Chinese People's Political Consultative Conference was held in Beijing, adopting "the Common Program" on September 29, 1949 as China's temporary constitution. Unlike the 1954 Constitution, the "Common Program" sanctioned private property, including private land ownership and private business. However, with the passing of the 1954 Constitution, China committed itself to socialism. All competing ideologies were ostracized from the Constitution; their believers automatically became the "enemy of the people"; they were deprived of any political or legal rights.

At the time, the Constitution was praised for ending the mixed economy and embarking China onto socialism. In retrospect, the passing of the new Constitution became a turning point in the history of the People's Republic in many ways. First, while the launch of the first Five Year Plan and agricultural collectivization signaled the beginning of the end of China's private sectors, the new Constitution pronounced their death penalty for good. The first two economic policies would quickly eliminate private business from practice, the 1954 Constitution sealed the vanishing of private business even as ideas.

Second, with the passing of the 1954 Constitution, communism transformed itself from an instrument, intended to bring peace and prosperity to China, into an ultimate non-negotiable goal. At the same time, the Party turned itself from a messenger to a pawn of a foreign ideology. With this dual self-alienation, China became a sacrifice to the cause of communism.

Third, in the early 1950s, Mao must have thought highly of the importance of the Constitution, otherwise he would not devote so much time and efforts on it. Ironically, after the passing of the 1954 Constitution, Mao lost his interest in law.[63] It must be the case that as he could, and probably did, write China's first Constitution according to his own will, he could no longer hold sacrosanct the Constitution and law in general. Mao's distaste toward law became infectious. With the only exception of Dong Biwu, who served as President of the Supreme Court from 1954 to 1959, few Chinese leaders of Mao's generation showed little appreciation or understanding of law. They did not recognize that ruling a country as big as China, without the help of law, is an impossible task, a painful lesson for post-Mao Chinese leaders to ponder.

---

months of hard work. The team then spent more than two months in Hangzhou, from December 27 to March 9, 1954 working on the second draft, which went through eight or nine revisions. The third draft was prepared in June 1954. The third draft was made public to collect comments from the wide population. While each draft was circulated for comments, Mao stayed on throughout the whole process as the main drafter. See http://www.people.com.cn/GB/14576/15117/3043462.html

[63] While the details are not revealed, Mao indeed became disillusioned with law, if he ever had any serious interest in law. See, for example, Leng (1977) for Mao's impact on the role of law in the People's Republic. During Mao's rule, China adopted a new constitution in 1975, which was meant to sanction the Cultural Revolution and hence was even more radical and ideological. In the post-Mao era, China rushed to adopt a new Constitution in 1978, and another one in 1982. The 1982 Constitution has since been revised four times, in 1988, 1993, 1999, and 2004.

Fourth, if we read through the 1954 Constitution, it is reasonably clear as a frame of government, whether we agree with or endorse the frame is another matter. But it does an abysmal job as the protector of rights. Indeed, it is not a constitution to sanction and preserve existing rights, but a rousing blueprint for revolution. In this regard, the Constitution worked well. Mao's China went through waves of revolution, to keep socialism alive. However, Mao was too preoccupied with socialist revolution to consider what socialism was for.

To carry out his political ideal, Mao also engineered organizational and institutional revolutions. His most influential and damaging organizational invention was the people's commune (人民公社) – a new organizational form Mao created to be the basic unit of his ideal society, which is exclusive in function, able to perform basic social, political, and economic functions on its own, with little horizontal interactions. While the people's commune existed in both rural and urban China, it transformed rural China from a communal society centered on family and kinship into an artificial administrative structure consisting of communes, brigades, and production teams. This organizational transformation was facilitated and preceded by a violent attack on the landlord and gentry class during Land Reform (1949-1952). As a state instrument, the people's commune enabled the state to implement state planning in rural areas, the unification of purchase and distribution of agricultural products. But this function was achieved by undermining the very foundation of rural China, private land ownership, free rural-urban migration, and the gentry elites.

The unit (单位) was created and assigned a similar role in Chinese cities. It was first and foremost an economic organization under state planning, carrying out production order designated by the central or local government. It was also a social and political organization. The unit provided all necessary services to its employees, including life-time employment, housing, daycare, basic medical serves, among others. It was rare for employees to go outside the walls of the unit too meet their daily needs. It was equally rare for people to change jobs or move from one unit to another, unless ordered by the state.

The most severe defect of the communes and units is the fragmentation of the Chinese economy. A national economy barely existed, except on the state production plans. Exchange among economic organizations was limited to the very minimal. Later, the model of Daqing, a state oil company in Shandong province, was imposed as a national model for industry, and Dazai, a village of Shanxi province, as a model for agriculture. Imposed uniformity undermined the vitality of the economy.

To make the country fit into the socialist ideal, Mao reformulated the whole educational system. Except reading and basic algebra, propaganda rather than education was offered at school. The goal of schooling was to turn every individual into a standard "screw", which could be applied anywhere and anytime. Schooling became a process of de-

individualization and shoehorning all minds into a single mode. As far as the market for ideas is concerned, Mao's pursuit of socialism was a history of self-destruction.

When Mao died in 1976, China's radical experiment with socialism had severely impoverished the Chinese people materially and intellectually. In Mao's time, China banned all markets, castigated all kinds of entrepreneurship as the "tails of capitalism", and sent many of its educated elites into prison or labor camps as "rightists". "Socialist weeds are preferred to capitalist wheat" was a popular slogan during the Cultural Revolution. Holding socialism as the final truth, any criticism against the ideology or government policy was deemed as treason. Those who dared to voice their dissent were chastised as "class enemy" and lost their freedom, if not their lives, in repeated campaigns of class struggle. Marxism, originally accepted as a "scientific theory", had become ossified and turned into political and moral absolutism. After almost thirty years of socialism, China had not only cut itself off from the progress of modern science and technology in the West, but also cast away its own cultural traditions as antithesis to socialism. Mao's China had fallen so deep into darkness and insanity that post-Mao leaders, including some of his most loyal comrades, felt the need to change gear.

8. China's Return to Capitalism

Given the failure of his radical policy, Mao's death created an opportunity for change.[64] And radical change was on the way. Under the leadership of Hua Guofeng, whom Mao designated as his heir right before his death, China's post-Mao reform began by closing class struggle and embarking on socialist modernization. This shift in policy brought some degree of closure to Mao's radical ideology and opened the Chinese economy to the West. Under his leadership, Hua sought to modernize the economy by pursuing what economists called "big push industrialization".

While Hua was preoccupied with a state-led economic program, other changes were taking place on the sideline, mainly due to the entrepreneurial efforts of Hu Yaobang, whom Hua brought back in 1977 to lead the Central Party School and the powerful Organization Department of the Central Committee of the Party. As head of the Organization Department, Hu helped to rehabilitate many senior government and Party officials, because of their disagreement with Mao's radical policy, had been purged during Mao's time; many of them became staunch supporters of economic reform. Hu's most influential effort was to lead a national campaign to free the minds of the Chinese

[64] How to evaluate Mao's economic record remains a controversy, partly due to the lack of reliable data, partly due to the complexity and internal contradictions of China's command economy (see, for example, Wang 2016). If we look at life expectancy, adult literacy, and the enfant mortality rate in Mao's era, China made quite impressive progress. Mao's record in industrialization was also impressive. However, any of Mao's economic achievement had to be overshadowed by the brutality of the Anti-Rightist campaign, the disaster of the Great Leal Forward and the insanity of the Cultural Revolution.

people. Under Mao's rule, Marxism and Maoism were regarded as the final truth. Any idea or practice inconsistent with or contradictory to Marxist and Maoist doctrines was deemed automatically wrong. Raising the banner of "seeking truth from facts", which Mao himself had advocated, Hu sought to weaken the grip of ideological indoctrination and reopen the minds of the Chinese people. While political loyal to Mao, Hua welcomed Hu's efforts in both fronts.

At the Third Plenum of the Eleventh Central Committee of the Party, which was held in Beijing in December 1978, Hua lost his power to Deng Xiaoping and Chen Yun. Chen quickly ended Hua's economic program of modernization and started another round of state-led economic reform, focusing on the state enterprises. Chen, a critic of Mao's radical economic policy and big brain behind China's first Five Year Plan, sought to bring the Chinese economy back to the socialist path: central planning and state ownership supplemented by the market and private businesses. What Chen and his comrades did not expect was that market forces and private sectors would soon overwhelm central planning and state enterprises.

At the start of reform, China was one of the poorest countries in the world. Yet, what held Mao's economy back was not the lack of capital or entrepreneurship, but the poverty of knowledge, which had resulted from decades of isolation from the outside world and waves of political campaigns against intellectuals. China's lack of knowledge was appalling, including institutional knowledge, such as how the pricing mechanism works, as well as technological knowledge, such as how to manufacture a quartz watch or a tape recorder.

Partly because of its lack of knowledge about the market economy, at the beginning of reform, China remained loyal to socialism. Consequently, state enterprises were preserved and privatization was ruled out at the beginning of reform. Reforms of the state sector were meant to strengthen collective ownership and revive socialism. As the Chinese government was assured that the dominant economic sectors were under its control, it first tolerated and later welcomed grass roots initiatives, particularly after state-led reforms failed to galvanize the economy. A race was accidently set between reforms designed by Beijing and what Coase and Wang (2012) called "marginal revolutions" – reforms first pushed by starving peasants and jobless city residents, who were later joined by local governments.

The competition between the state-led reform and marginal revolutions was most revealing in agriculture. Beijing-led agricultural reform included a 50% one-time increase of the purchasing prices for all agricultural products as well as subsidies for the use of fertilizers, tractors, and other farming inputs and equipment. Private farming, which would become the transforming force in rural China, was not designed by Beijing, but resulted from peasants' endeavor to produce enough food to feed their families, even when it was prohibited by the government. Competition between

Competition in the Chinese economy also proceeded along the geographical dimension. Private farming, when it first emerged, took different formats in different locations. Anything deviating from collective farming was put under a single inclusive nametag, "individual farming" (单干). In reality, a wide variety of different organizational and institutional arrangements emerged throughout rural China. Such regional variations and regional competition played an important role in developing and spreading "individual farming" and undermining collective farming.

It is important to point out that this competition would not work its magic if not for the fact that the post-Mao Chinese leadership had freed itself from radical ideology and re-embraced pragmatism. "Seeking truth from facts" enlightened post-Mao Chinese leaders to see through the dense veil of socialism. Deng Xiaoping admitted saying that few people really understood socialism. Instead of debating socialism over capitalism, Deng reasoned, let's instead focus on economic development.[65] Once convinced that private farming was way more productive than collective farming, Deng and other Chinese leaders were open-minded enough to allow the ending of collective farming. When they later saw the defeat of state enterprises by township and village enterprises, they accepted it and refrained from attacking non-state sectors on ideological grounds, even though they continued to subsidize the state sectors. Their endeavor to save socialism created inefficiency and distorted economic order; nonetheless, the non-state sectors were made stronger. Step by step, the Chinese leaders gracefully let go socialism except its name.

9. Conclusion

In a 1742 essay, "The rise and progress of arts and sciences", David Hume made the following observation. "In China, there seems to be a considerable stock of politeness and science, which, in the course of so many centuries, might naturally be expected to ripen into something more perfect and finished, than what has arisen from them. But China is one vast empire, speaking one language, governed by one law, and sympathizing in the same manners. The authority of any teacher, such as Confucius, was propagated easily from one corner of the empire to the other. None had courage to resist the torrent of popular opinion. And posterity was not bold enough to dispute what had been universally received by their ancestors. This seems to be one natural reason why the sciences have made so slow a progress in that mighty empire."

Hume have certainly erred on some details and underestimated China's internal heterogeneity. For example, China speaks more than one language. As it is true today, we have good reasons to believe that more languages must be spoken in Hume's time. Revered teachers of great authority over the course of many centuries did not speak one single voice. Even among Confucians, serious disagreements have often erupted, let

[65] Many years later during his famous southern tour in early 1992, Deng revealed that he invented the policy of "no debate" (不争论). That is, China should stay away from ideological debates and search for practical solutions. Deng's approach echoed Hu Shi's early recommendation of pragmatism, "let's talk less about isms, and talk more about problems".

alone the constant competition among Confucianism and other schools of thought. Nonetheless, time has not make Hume's observation obsolete. Indeed, the progress of arts and sciences in China has further slowed since Hume's time. During Mao's era, not only the pursuit of arts and sciences was completely abolished, but the very presence of pure arts and sciences was also denied. As any modern economy is powered by the growth of knowledge, such hostility toward science augurs disaster.

The free pursuit of arts and sciences is important not just for its social function of spurring technological innovation and sustaining economic growth. It is also an integral part of each individual becoming a responsible citizen of a free society. Both processes can only take place in an open market for ideas. The goal of turning every individual into a standard "socialist man" is not only self-defeating, but inevitably dehumanizing. While claiming to be a scientific theory of social evolution, socialism ironically closes the minds of its believers. The failure of socialism is not merely an economic one; it is first and foremost an intellectual failure.

China's market transformation began as a shift of mind and mentality. After his death, Mao's economic failure led the Chinese people to question his radical ideology. Even his most loyal comrades questioned his ideology of continuous revolution. China's post-Mao reform started by discarding Mao's little red book and re-embracing "seeking truth from facts". While the Chinese government held onto the state enterprises, market forces and entrepreneurship were brought back to the Chinese economy.

Without challenging the socialist doctrines head on, "seeking truth from facts" worked well over the first three decades to allow "marginal revolutions" to strike China like wild fire. The old economic system worked so poorly that even the strong believers of socialism changed their mind once they had a chance to see the new changes in the economy. In the late 1970s, it took Deng Xiaoping and other Chinese leaders a couple of years to recognize the advantages of private farming, even though Mao had repeatedly singled out private farming as the number one enemy of rural socialism. Chen Yun, after years of doubt and apprehension, came to recognize the Special Economic Zones as a valuable vehicle to reform China's socialist economy. Eventually, it took the Party two decades to accept and sanction private property rights, which the 1954 Constitution had quickly abolished. Competition between collective and private farming, township and village enterprises and state enterprises, central planning and local autonomy, have served well as a proxy between the debate between capitalism and socialism. Indeed, the competition between institutions during the course of reform spoke more forcefully and unambiguously than any debate possibly could.

However, competition among institutions is not a perfect substitute for direct competition among ideas. Competition among institutions or practices may be more direct, but competition among ideas is most productive in revealing the strengths and weaknesses of existing ideas and in generating new ideas. Today, the Chinese Communist Party is searching for ways to introduce the rule of law without undermining its political legitimacy. Apparently, this is an unprecedented challenge, calling for a free market for ideas to bring out and test novel proposals. Moreover, the working of a free market for

ideas helps its participants to practice and appreciate tolerance and the spirit of compromise; both are essential to prepare responsible citizens. Without engaging a free market for ideas at both the individual and social level, any individual would be poorly prepared for civic life, particularly inclusive politics.

I'd like to conclude this paper with a quote from Coase and Wang (2012, p. 84). "Institutional change is as much driven by interests as it is shaped by ideas. It often gets stymied due to the mishandling of conflicts of interest and clashes of ideas. The conflict of interests and its resolution through property rights and market competition has long been, and continues to be, a staple of economic analysis. Clashes of ideas, however, have not received their due attention. When ideas and ideologies are recognized in institutional analysis, they are often treated as part and parcel of informal institutions, which includes norms, customs, and values that support the working of formal institutions. Less formal, and with little coercive power, informal institutions are often deemed less forceful or direct than formal institutions in their effect on human behavior. This, however, may have more to do with the way institutions have been conceptualized than with actual reality."

References

Aklerlof, George. “The Market for ‘Lemons’: Quality Uncertainty and the Market Mechanism.” Quarterly Journal of Economics 84(3): 488-500.

Allen, Robert C. 1983. “Collective Invention.” Journal of Economic Behavior and Organization 4: 1-24.

Arrow, K.J. (1963), «Uncertainty and the Welfare Economics of Medical Care». *American Economic Review*, 53, December, p. 941-973.

Becker, Gary. 1974. The Economic Approach to Human Behavior. Chicago: University of Chicago Press.

Becker, Gary. 1993. Human Capital. Chicago: University of Chicago Press.

Bell D. 1973. The Coming of Post-Industrial Society. New York: Basic Books
Berger, Peter and Thomas Luckmann. 1966. The Social Construction of Reality. Garden City, NY: Anchor Books.

Black, Jeremy. 2013. The Power of Knowledge: How Information and Technology Made the Modern World. New Haven: Yale University Press.

Boldrin, Michele and David Levine. 2008. Against Intellectual Monopoly. Cambridge University Press.

Boulding, Kenneth. 1956. *The Image: Knowledge in Life and Society*. Ann Arbor: University of Michigan Press.

Brian, Arthur. 2009. The Nature of Technology. New York: Free Press.

Cannan, Edwin. 1893. A History of the Theories of Production and Distribution in English Political Economy from 1776 to 1848. London: Staples Press.

Carr, David, 1981, “Knowledge in Practice,” *American Philosophical Quarterly*, 18(1): 53–61.

Chatterjee, Satyajit and Esteban Rossi-Hansberg. 2012. “Spinoffs and the Market for Ideas”, International Economic Review 53(1): 53-93.

Chen Lai, 1991. *Youwuzhijing*: *Wang Yangming zhuxue de jingshen* (*The Realm of Being and Non-being: The Spirit of Wang Yangming’s Philosophy*). Beijing: Renmin Publisher.

Cheung, Steven N.S. 1982. *Will China Go Capitalist*? London: Institute of Economic Affairs.

Cheung, Steven N.S. 2005. Economic Explanation: Selected Papers of Steven N.S. Cheung. Hong Kong: Arcadia Press.

Ching, Julia, ed. *To Acquire Wisdom: The Way of Wang Yang-ming.* New York: Columbia University Press, 1976.

Coase, Ronald. 1937. “The Nature of the Firm.” Economica 4(16): 368-405.

Coase, Ronald. 1959. “The Federal Communications Commission”. *Journal of Law and Economics* 2:1-40.

Coase, Ronald. 1960. “The Problem of Social Cost”. *Journal of Law and Economics* 3:1-44.

Coase, Ronald. 1974. “The Market for Goods and the Market for Ideas.” *American*

Economic Review 64(2): 384-91.

Coase, Ronald and Ning Wang (2012), *How China Became Capitalist*, London: Palgrave Macmillan.

Coase, Ronald and Wang, Ning. 2011. "The Industrial Structure of Production: A Research Agenda for Innovation in an Entrepreneurial Economy," *Entrepreneur Research Journal* 1(2): 1-13.

Davidson, Paul. 2012. "Is Economics a Science**?** Should Economics Be Rigorous?" *Real-World Economics Review*, 59: 58-66,

Deutsch, David, 2011. The Beginning of Infinity. London: Viking.

Director, Aaron. 1964. "The Parity of the Economic Market Place". *Journal of Law and Economics* 7: 1-10.

Drucker, Peter. 1969. *The Age of Discontinuity: Guidelines to Our Changing Society*. New York, NY: Harper & Row.

Drucker Peter. 1993. *Post-Capitalist Society*. New York: Harper Bus.

Elster, Jon, 1982. "The Case for Methodological Individualism," *Theory and Society*, 11: 453–482.

Elster, Jon. 1989. *Nuts and Bolts for the Social Sciences*. Cambridge University Press.

Gans, Joshua and Scott Stern. 2003. "The Product Market and the Market for 'Ideas': Commercialization Strategies for Technology Entrepreneurs," *Research Policy* 32, 333–350.

Gans, Joshua and Scott Stern. 2010. "Is There a Market for Ideas?" Industrial and Corporate Change 19(3): 805-37.

Hayek, F.A. 1937. "Economics and Knowledge." *Economica*, new series 4: 33-54.

Hayek, F.A. 1943. "The Facts of The Social Sciences." *Ethics* 54(1): 1-13.

Hayek, F.A. 1991. *The Fatal Conceit: The Errors of Socialism*. University of Chicago Press.

Heckman, James. 2010. "Building Bridges between Structural and Program Evaluation Approaches to Evaluating Policy." *Journal of Economic Literature* 48(2): 356-98.

Heckman, James and Stefano Mosso. 2014. "The Economics of Human Development and Social Mobility." IZA DP #8000.

Hedstrom, Peter. 2010. "Causal Mechanisms in the Social Sciences", *Annual Review of Sociology* 36: 49-67.

Hedstrom, Peter and Richard Swedberg. 1998. *Social Mechanisms: An Analytical Approach to Social Theory*. Cambridge University Press.

Henke, Frederick Goodrich. *The Philosophy of Wang Yang-Ming*. Chicago: Open Court, 1916.

Hirshmann, Albert. 1977. The Passions and the Interests: Political Arguments for Capitalism before its Triumph. Princeton University Press.

Hirshmann, Albert. 1982. Shifting Involvements: Private Interests and Public Action. Princeton University Press.

Hoover, Kevin. 2015. "Reductionism in Economics: Intentionality and Eschatological Justification in the Microfoundations of Macroeconomics." Philosophy of Science 82(4): 689-711.

Jones, Charles I. 2005. “Growth and Ideas” in P. Aghion and. S. Durlauf (eds.) Handbook of Economic Growth (Elsevier). Volume 1B, pp. 1063-1111.
Kay, John (2005). Culture and Prosperity: Why Some Nations are Rich but Most Remain Poor. New York: Harper Business.
Kauffmann, Stuart. 2000. Investigations. Oxford University Press.
Langlois, Richard. 1985. “From the Economics of Knowledge to the Knowledge of Economics: Fritz Machlup on Methodology and on the ‘Knowledge Society’.” History of Economic Thought and Methodology 3: 225-35.
Lardy, Nicolas. 2014. Markets over Mao: The Rise of Private Business in China. Institute for International Economics.
Lawson, Tony. 1997. Economics and Reality. London: Routledge.
Leng, Shao-Chuan. 1977. “The role of law in the People’s Republic of China as Reflecting Mao Tse-Tung’s Influence.” The Journal of Criminal Law & Criminology 68(3): 356-73.
Levi, Isaac. 1980. The Enterprise of Knowledge. MIT Press.
Levitt, Steven and John List. 2011. “Was There Really a Hawthorne Effect at the Hawthorne Plant? An Analysis of the Original Illumination Experiments.” American Economic Journal: Applied Economics 3: 224-38.
Littlechild, Stephen. 1977. **“**Change Rules, OK?**”** Inaugural Lecture delivered in the University of Birmingham on May 28th, 1977.
Loasby, Brian. 2002. Knowledge, Institution and Evolution in Economics. London: Taylor & Francis.
Lucas, Robert. 2009. “Ideas and Growth”, *Economica* 76(301):1-19.
Marshall, Alfred. 1890. The Principles of Economics. London: Macmillan.
McDougall, William. 1920. The Group Mind. University of Michigan Press.
Miller, David. 1999. “Popper and Tarski”, in Ian Jarvie and Sandra Pralong (eds.) *Popper’s Open Society after Fifty Years*, pp. 56-70. London: Routldge.
Mokyr, Joel. 2002. The Gifts of Athena: Historical Origins of the Knowledge Economy. Princeton University Press.
Mowery, D. C and Nathan Rosenberg. 1989. Technology and the Pursuit of Economic Growth. Cambridge University Press.
Nee, Victor and Sonja Opper. 2012. Capitalism from Below: Markets and Institutional Change in China. New York: Cambridge University Press.
Nordhause, William. 1967. “The Optimal Life of a Patent.” Cowles Foundation Discussion Paper #241.
North, Douglass C. 1999. “Dealing with a Non-Ergodic World: Institutional Economics, Property Rights, and the Global Environment.” *Duke Environmental Law & Policy Forum* 10: 1-12
Plant, Arnold. 1934. “The Economic Theory concerning Patents for Inventions.” 1(2): 167-95.
Polanyi, Michael. 1958. Personal Knowledge. London: Routledge.
Popper, Karl. 1968. The Logic of Scientific Discovery. London: Routledge.
Popper, Karl. 1972. Objective Knowledge: An Evolutionary Approach. Oxford University Press.
Popper, Karl. 1978. “Three Words”, The Tanner Lecture on Human Values, delivered at the University of Michigan on April 7, 1978.

Posner, Richard and Francesco Parisi. (eds.). 2012. The Coase Theorem, 2 volumes. Cheltenham: Edward Elgar.
Pollak, Robert. 2003. “Gary Becker’s Contributions to Family and Household Economics,” *Review of Economics of the Household* 1(1): 111-41.
Powell, Walter W. and Kaisa Snellman, 2014. “The Knowledge Economy.” *Annual Review of Sociology* 30: 199-220
Robbins, Lionel. 1932. An Essay on the Nature and Significance of Economic Science. London: Macmillan.
Roland, Jane, 1958, “On "Knowing How" and "Knowing That",” *The Philosophical Review*, 67(3): 379–88.
Romer, Paul. 1986. “Increasing Returns and Long-Run Growth”, Journal of Political Economy 94(5): 1002-1037.
Romer, Paul. 1990. “Endogenous Technological Change,” Journal of Political Economy 98(5): S71-S102.
Rubin, Jared. 2014. “Printing and Protestants: an empirical test of the role of printing in Reformation”, *Review of Economics & Statistics* 96(2): 270-86.
Nonaka, I., Takeuchi, H. (1995), The Knowledge-Creating Company. Oxford: Oxford University Press.
Samuelson, Paul. 1954. “A Pure Theory of Public Expenditure”, *Review of Economics and Statistics* 36(4): 387-89.
Saxenian, Anna Lee. 1994. Regional Advantage: Culture and Competition in Silicon Valley and Route 128. Harvard University Press.
Searle, John. 1995. Construction of Social Reality. New York: Free Press.
Sen, Amartya. 1977. “Rational fools: a Critique of the Behavioral Foundations of Economic Theory.” Philosophy & Public Affairs 6(4): 317-44.
Spence, Michael. “Job Market Signaling.” Quarterly Journal of Economics 87(3): 355-74.
Shils, Edward. 1981. Tradition. University of Chicago Press.
Stanley, Jason. 2011. *Know How*. Oxford: Oxford University Press.
Stigler, George. 1975. “Smith’s Travels on the Ship of State.” In Essays on Adam Smith, edited by Andrew S. Skinner and Thomas Wilson. Oxford: Clarendon Press.
Stigler, George. 1961. “The Economics of Information.” Journal of Political Economy 69(3): 213-225.
Stiglitz, Joseph. 1985. Information and Economic Analysis: A Perspective.” Economic Journal 95: 21-41.
Stiglitz, Joseph. 2001. “Information and the Change in the Paradigm in Economics.” Nobel Lecture.
Surowiecki, James. 2005. *The Wisdom of Crowds*. New York: Anchor Books.
Udehn, Lars, 2001. *Methodological Individualism*, London: Routledge.
Von Hippel, Eric. 2005. Democratizing Innovation. MIT Press.
Wang, Ning. 1999. “Transaction Costs and the Structure of the Market: A Case Study.” *American Journal of Economics and Sociology* 58 (4), pp. 783-805.
Wang, Ning. 2013. “The Successes and Failures of Professor Coase,” *Journal of Natural Resources Policy Research*, 5(4), pp. 267-71.
Wang, Ning (ed.). 2016. *China’s Market Transformation: Origins, Protagonists and Processes.* Singapore: World Scientific Publishing.
Warsh, David. 2006. Knowledge and the Wealth of Nations. New York: Norton.

Watkins, JWN. 1952. “The Principle of Methodological Individualism,” *The British Journal for the Philosophy of Science*, 3: 186–189.
Werker, Claudia and Suma Athreye. 2004. “Marshall’s disciplines: knowledge and innovation driving regional economic development and growth”. Journal of Evolutionary Economics 14: 505-23.
Whittaker, D. H. 2009. Small Firms in the Japanese Economy. Cambridge University Press.
Wible, James. 1998. The Economics of Science: Methodology and Epistemology as if Economics Really Mattered. New York: Routledge.
Yang, Xiaokai. 2003. Economic Development and the Division of Labor. Wiley-Blackwell.

About the Author

Dr. Ning Wang was educated at Beijing University and the University of Chicago. He is currently Senior Fellow at the Ronald Coase Institute (USA) and International Director of the Ronald Coase Center for the Study of the Economy at Zhejiang University (China). He is also editor-in-chief of Man and the Economy: the Journal of the Coase Society. Before his current position, Dr. Wang has taught at the University of Chicago and Arizona State University.

Dr. Wang is interested in economic development, with a geographic focus on China, and the development of Coasian economics.

This paper is the result of his three and half months stay at the Institute of Developing Economies, Chiba, Japan, from June 15 to October 5, 2015.

List of Major Works

Coase, Ronald and Ning Wang. 2012. How China Became Capitalist. Palgrave Macmillan. (Also available in Chinese, Japanese, German, Russian, Italian and Turkish, paperback available since 2013).

Wang, Ning. *Making a Market Economy: The Institutional Transformation of a Freshwater Fishery in a Chinese Community*. New York: Routledge, 2005. (Paperback available since 2012).

Coase, Ronald and Wang, Ning. 2012. “Saving Economics from the Economists,” Harvard Business Review (December), p. 36.

Coase, Ronald and Wang, Ning. 2011. “The Industrial Structure of Production: A Research Agenda for Innovation in an Entrepreneurial Economy,” *Entrepreneur Research Journal* 1(2): 1-13.