Economics, Law, and Institutions in Asia Pacific

Tatsuyoshi Saijo *Editor*

Future Design

Incorporating Preferences of Future Generations for Sustainability

Springer

Economics, Law, and Institutions in Asia Pacific

Series Editor

Makoto Yano, Research Institute of Economy, Trade and Industry (RIETI), Tokyo, Japan

The Asia Pacific region is expected to steadily enhance its economic and political presence in the world during the twenty-first century. At the same time, many serious economic and political issues remain unresolved in the region. To further academic enquiry and enhance readers' understanding about this vibrant region, the present series, Economics, Law, and Institutions in Asia Pacific, aims to present cutting-edge research on the Asia Pacific region and its relationship with the rest of the world. For countries in this region to achieve robust economic growth, it is of foremost importance that they improve the quality of their markets, as history shows that healthy economic growth cannot be achieved without high-quality markets. High-quality markets can be established and maintained only under a well-designed set of rules and laws, without which competition will not flourish. Based on these principles, this series places a special focus on economic, business, legal, and institutional issues geared towards the healthy development of Asia Pacific markets. The series considers book proposals for scientific research, either theoretical or empirical, that is related to the theme of improving market quality and has policy implications for the Asia Pacific region. The types of books that will be considered for publication include research monographs as well as relevant proceedings. The series show-cases work by Asia-Pacific based researchers but also encourages the work of social scientists not limited to the Asia Pacific region. Each proposal and final manuscript is subject to evaluation by the editorial board and experts in the field.

All books and chapters in the Economics, Law and Institutions in Asia Pacific book series are indexed in Scopus.

More information about this series at http://www.springer.com/series/13451

Tatsuyoshi Saijo
Editor

Future Design

Incorporating Preferences of Future Generations for Sustainability

Springer

Editor
Tatsuyoshi Saijo
Research Institute for Humanity and Nature
Kyoto, Japan

ISSN 2199-8620 ISSN 2199-8639 (electronic)
Economics, Law, and Institutions in Asia Pacific
ISBN 978-981-15-5406-3 ISBN 978-981-15-5407-0 (eBook)
https://doi.org/10.1007/978-981-15-5407-0

This Springer imprint is published by the registered company Springer Nature Singapore Pte Ltd.
The registered company address is: 152 Beach Road, #21-01/04 Gateway East, Singapore 189721, Singapore

Preface

Have you seen the Academy Award-winning film *Green Book*? It tells the story of Don Shirley—a genius pianist, whose talents were hailed by Stravinsky as "worthy of gods"—as he sets out on a concert tour across the Southern U.S. with his white driver, Tony. On the journey, Don, an African American is repeatedly confronted with racial discrimination; he manages to change Tony's mind about racism, and the two of them struggle against it. The driver's words hit home: "Genius is not enough; it takes *courage* to change people's hearts." It may indeed take courage to overcome the racism that has become rooted in so many different people from various walks of life, but do the people of today also have the courage to give due consideration to future generations, who do not yet exist?

The Japanese movie *Wood Job!* follows a recent high school graduate Yuki (meaning "courage"), who fails his college entrance exams and takes a year-long forestry job in a village deep in the mountains of Mie Prefecture. At a lumber auction, he is told that "each of these trees is worth 800,000 yen" and muses: "If we all start logging this mountain, we could make a fortune!" Hearing this, the foresters admonish Yuki: "Our forefathers planted these trees. If we sold them all, what would happen to the next generation—and the generations after them? What we do in our work lingers after we die." As Yuki continues his forestry work, he begins to understand the perspective of the forestry workers and becomes conscious of his ancestors and descendants. The film is a story of gaining the courage to take future generations into account.

In truth, support for the "If we all start logging this mountain, we could make a fortune!" mentality is a hallmark of people dwelling in markets and democracies where nature is seen as hugely profitable. While the market may be a place where desired short-term gains can be achieved extremely efficiently, it is not meant for allocating resources with an eye towards the welfare of future generations. Even in a democracy designed to compensate for market failures, a method of realizing profits for people at present, by its very nature, does not take into account the welfare of the future generations. While there are honest politicians, the greatest concern of most democratically elected politicians is their own re-election, not the need to ensure that their actions consider future generations. Further, to increase their

chances of survival, the common people have also managed to forget negative events from the past, focus on pleasure in the moment, and establish an optimistic view of the future. Factors such as the market, democracy, and individual optimism lead to the "If we all start logging this mountain, we could make a fortune" perspective from the second half of the twentieth century to the present. In other words, the present generation is blithely stealing a cavalcade of resources from the next.[1]

If this is the case, then should we not emulate the forest workers and express gratitude to our ancestors while being mindful of our descendants? Almost no person in the present generation, however, is in a position to reflect on their place in the universe between their ancestors and their descendants. The Iroquois tribe of Native Americans has arrived at one method to overcome this problem. As we shall see in more detail in Chap. 1, when members of the Iroquois tribe make important decisions, they must place themselves in the shoes of people seven generations ahead of them. The term "seven generations ahead," then, represents not a world in which one's direct descendants live but a world that one cannot envision merely from the perspective of one's own bloodline. In other words, the Iroquois take proper consideration of hypothetical future generations, treating them as real in the present day, before they make their decisions.

The Iroquois have designed a social mechanism that does not direct the present generation towards the "If we all start logging this mountain" mentality. In other words, a sustainable mechanism for designing the future has been built into the Iroquois way of living itself. In neighborhoods, city councils, and national assemblies, which could be considered as similar mechanisms in our own societies, one never sees a scenario in which participants envision a generation, say, 100 years into the future, before they make decisions; in our society, the idea of present-day elected officials representing future generations is unthinkable. We have not designed a mechanism similar to that employed by the Iroquois.

Making decisions while considering a society that will exist seven generations from now is not simple. What may seem beneficial to a society seven generations in the future could appear detrimental to people in the present. If we take the present generation to be all of us, who are "logging the forest," then we see that it is not an easy choice for the present generation to stop this activity. From their perspective, stopping would mean a loss, giving something up. Thus, it is unlikely that both the present and future generations will profit through the skillful designing of a social mechanism. It may be possible to take decisions using a mechanism by which the present and future generations negotiate and agree upon the results; however, those future generations do not yet exist.

[1]Complicating the matter are the people whose thinking is opposite to that of the "If we all start logging this mountain, we could make a fortune!" side: those who have resisted such thinking. The former are 1% of the population, the leisure-loving population that controls the world's wealth; the latter are the impoverished 99% (see Joseph Stiglitz's *The Price of Inequality*, 2012). A further complication: while there are some among the impoverished 99% who work at jobs provided by the rich and are thereby granted access to the leftovers of the innovations produced by their labor (in the form of abundant lifestyles), there are also those for whom this is not true.

Future Design traces its origins to the summer of 2012. It was born when young researchers gathered at Osaka University's Center for Environmental Innovation Design for Sustainability to tackle the question of how to create hypothetical future generations based on ideas drawn from the ways of the Iroquois. This group of researchers called themselves the "Seven Generations Research Society," and encouraged themselves, in this debate experiment, not to cling to their individual backgrounds and be rooted in science or the liberal arts, but to consider how to introduce the concept of including hypothetical future generations to decision making on a variety of issues, such as energy (including nuclear power), water, forests, innovation, budget deficits, and so on, and ponder freely how the introduction of future generations changes matters.

The research participants considered the possibility of creating panels of experts on hypothetical future generations and entertained the ideas of a Ministry of the Future and a Department of the Future. Thus, in this step, the name of the workshop changed from the "Seven Generations Research Society" to the "Ministry of the Future Project." Their goal in doing so was not to create specific bureaucratic departments in society but to take future generations into account and become aware that it is such changes that could lead to the creation of resilient (self-stabilizing; resistant) and structurally stable systems. The project, ultimately, took the name of "Future Design."

Each chapter of this book illustrates how the future is designed. We are realizing that the potential for a new field of science, one that bridges the gap between traditional science and the humanities, is hidden in the designs of future social systems. Many members of the project even considered the possibility of creating an undergraduate or graduate department dedicated to the future, where future design would be studied from a scientific perspective. This might be optimistic, but we hope that graduates of these schools will find positions in a Ministry or Department of the Future and in companies' Future Sections, and will envision a future worthy of envy. However, this book is only a small first step towards future design, an initial volume. Parts of its arguments may still appear unskillful or incomplete.

For their support during the creation of this volume, I would like to thank Prof. Shinsuke Yamanaka (currently of the Japanese Atomic Energy Commission), Prof. Michihiko Ike and Prof. Yoshiyuki Shimoda, formerly of Osaka University's Center for Environmental Innovation Design for Sustainability; Prof. Yasushi Umeda of The University of Tokyo; Prof. Junyi Shen of Kobe University; Prof. Shunsuke Managi of Kyushu University; Prof. Satoshi Taguchi of Doshisha University; Prof. Koichi Kuriyama and Asst. Prof. Yohei Mitani of Kyoto University; Prof. Naoki Yoshihara of the University of Massachusetts; Prof. Reiko Gotoh of Hitotsubashi University; Prof. Keiichiro Kobayashi of Keio University; Pres. Masahiko Isobe and former Pres. Taketo Sakuma of the Kochi University of Technology; all the researchers at the Research Institute for Future Design at Kochi

University of Technology; Prof. Katerina Sherstyuk and Prof. Nori Tarui at the University of Hawaii; Dr. Daigee Shaw at the Academia Sinica; Mr. Matsuyoshi Nishimura at the Japan Institute of International Affairs; Ms. Maki Michinaka at Nippon Hyoronsha; Mr. Ritsuji Yoshioka in the town of Yahaba in Iwate Prefecture; and everyone in the Suita City Environmental Department, Department of Water and Sewer, and Highway & Parks Department. Further, this book is based on a 2015 anthology entitled *Future Design,* which was published by Keiso Shobo Publishing. New information and perspectives were added during the translation of the anthology from Japanese to English. I would like to express my gratitude to all authors who agreed to contribute and cooperated with the creation of the English edition, as well as to Keiso Shobo Publishing, who kindly saw the value in publishing an expanded English edition of the work.

Kyoto, Japan Tatsuyoshi Saijo

Contents

Editor and Contributors

About the Editor

Tatsuyoshi Saijo received a master's degree in economics from Hitotsubashi University in 1978 and a PhD from the University of Minnesota in 1985. He was an assistant professor in the Department of Economics, University of California at Santa Barbara (1986–1991), assistant professor, associate professor, and then professor at the Institute of Socio-Economic Planning, University of Tsukuba (1988–1996), a post-doctoral fellow at the Center in Political Economy, Washington University at St. Louis (1989), professor at the Institute of Social and Economic Research, Osaka University (1995–2013), visiting scholar at the Rational Choice Center, Department of Economics, Duke University (1999), faculty fellow at the Research Institute of Economy, Trade and Industry (2001–2004), research associate at the California Institute of Technology (2002–2003), professor at the Research Institute for Sustainability Science, Osaka University (2006–2010), research professor and then specially appointed professor at the Center for Environmental Innovation Design for Sustainability, Osaka University (2011–2015), and professor at the Institute of Economic Research, Hitotsubashi University (2015–2016) before assuming his present position at the Kochi University of Technology and the Research Institute for Humanity and Nature (RIHN). He has been a member of the Science Council of Japan since 2014, project leader for Experimental Social Science at the Ministry of Education, Japan (2007–2013), and vice–president of the Economic Science Association (2010–2014).

Contributors

Reiko Aoki Japan Fair Trade Commission, Tokyo, Japan

Matthias Fritsch Concordia University, Montreal, Canada

Yukari Fuchigami Osaka University, Osaka, Japan

Keishiro Hara Osaka University, Suita, Japan

Toshiaki Hiromitsu Visiting Scholar, Policy Research Institute, Ministry of Finance, Tokyo, Japan

Yusuke Kishita Department of Precision Engineering, The University of Tokyo, Tokyo, Japan

Koji Kotani School of Economics and Management, Kochi University of Technology, Kami, Japan

Masashi Kuroda Tokoha University, Shizuoka, Japan

Takashi Oshio Institute of Economic Research, Hitotsubashi University, Kunitachi, Japan

Masahiko Ozaki Yamato University, Suita, Japan

Tatsuyoshi Saijo Research Institute for Humanity and Nature, Kyoto, Japan;
Research Institute for Future Design, Kochi University of Technology, Eikokuji, Kochi, Japan;
Tokyo Foundation for Policy Research, Tokyo, Japan

Shibly Shahrier Research Institute for Humanity and Nature, Motoyama, Kyoto, Japan

Tatsuhiro Shichijo Osaka Prefecture University, Sakai, Japan

Hikari Shimadera Osaka University, Osaka, Japan

Hiroyuki Takeda Osaka University, Suita, Japan

Raja Rajendra Timilsina Research Institute for Future Design, Kochi University of Technology, Kami, Japan

Michinori Uwasu Osaka University, Toyonaka, Japan

Ritsuji Yoshioka Yahaba, Iwate, Japan

Chapter 1
Future Design: An Introduction

Tatsuyoshi Saijo

1 Seven Generation Sustainability

In March 2nd 2012, I held a seminar at University of Massachusetts about social dilemmas. During the dinner, I started talking about the problem of how future generations can be greatly affected by current actions, but have no means of negotiating with the current generation. I suggested that there ought to be a group, a sort of "Ministry of the Future", which exists within the current generation that engages solely in the welfare of future generations. Then, Laura, the wife of John Stranland, one of my former students from University of California at Santa Barbara, said that the Iroquois Indians had been implementing such ideas for hundreds of years.[1]

The Iroquois Confederacy's "Great Binding Law", which is their constitution, there is a passage that says "in every deliberation, we must consider the impact on the seventh generation… even if it requires having skin as thick as the bark of a pine".[2] In the seventeenth century, the five nations living around the Great Lakes formed an alliance, creating the "Confederation". By the early eighteenth century, a new tribe joined and this became the Six Nations. The "Great Binding Law" acts as the constitution of this confederacy. In fact, the Iroquois Confederacy had a considerable effect on the design of American political institutions.[3] The thirteen colonies learned the idea of "Confederation" from the Iroquois to gain independence from the United Kingdom and construct a new kind of polity not found in Europe at the time. To

[1] http://en.wikipedia.org/wiki/Seven_generation_sustainability.

[2] http://en.wikipedia.org/wiki/Great_Law_of_Peace.

[3] See Grinde Jr. and Johansen (1991).

T. Saijo (✉)
Research Institute for Humanity and Nature, Kyoto, Japan
e-mail: tatsuyoshisaijo@gmail.com

Research Institute for Future Design, Kochi University of Technology, Eikokuji, Kochi, Japan

Tokyo Foundation for Policy Research, Tokyo, Japan

T. Saijo (ed.), *Future Design*, Economics, Law, and Institutions in Asia Pacific,
https://doi.org/10.1007/978-981-15-5407-0_1

demonstrate this, I have quoted a rather long passage from Late Senator Daniel Inoue's concurrent resolution from the 200th anniversary of the founding of the United States.[4]

Wednesday, September 16, 1987 100th Cong.

SENATE CONCURRENT RESOLUTION 76 TO ACKNOWLEDGE THE CONTRIBUTION OF THE IROQUOIS CONFEDERACY OF NATIONS TO THE DEVELOPMENT OF THE U.S. CONSTITUTION AND TO REAFFIRM THE CONTINUING GOVERNMENT—TO—GOVERNMENT RELATIONSHIP BETWEEN INDIAN TRIBES AND THE UNITED STATES ESTABLISHED IN THE CONSTITUTION.

Whereas, the original framers of the Constitution, including most notably, George Washington and Benjamin Franklin, are known to have greatly admired the concepts, principles and governmental practices of the Six Nations of the Iroquois Confederacy; and,

Whereas, the Confederation of the original thirteen colonies into one Republic was explicitly modeled upon the Iroquois Confederacy as were many of the democratic principles which were incorporated into the Constitution itself; and,

Now, therefore be it.

RESOLVED BY THE SENATE (THE HOUSE OF REPRESENTATIVES CONCURRING), That:

The Congress, on the occasion of the 200th Anniversary of the signing of the United States Constitution, acknowledges the historical debt which this Republic of the United States of America owes to the Iroquois Confederacy and other Indian Nations for their demonstration of enlightened, democratic principles of government and their example of a free association of independent Indian nations….

That is to say, it may be more appropriate to think of Iroquois ideas as part of a bigger flow of ideas in human history instead of as a diversion. Furthermore, the ideas of Future Design itself detailed in this article, although unfinished, is not some sort of far-fetched fantasy but a new challenge that we must all face.

The following will survey democratic and market institutions that shape modern society, and how they steal the resources of future generations without any remorse. Next, I will investigate how optimism bias, a part of human nature, creates tensions between current and future generations (optimism bias dilemma). Therefore, it is necessary to create institutions to supplement these shortcomings. The framework from which to create these institutions will be "Future Design".

2 Three Human Oddities

According to Robert Sapolsky, a biologist and neuroscientist at Stanford University, humans have three oddities.[5] The following might not be how Sapolsky imagined it but I will try to interpret them in my own way.[6]

[4] I found this citation from the postscript by Jun Hoshikawa who translated the book by Grinde Jr. and Johansen (1991).

[5] See Sapolsky (2012).

[6] The description of the three oddities comes from a part of Introduction by Saijo et al. (2013).

The first oddity is that of "contrasts" or "relativity". Our five senses are more adept at gauging the relativities of each item rather than absolutes. For example, we are quite sensitive when it comes to detecting relative changes in light or sound. This is because change is likely to lead to danger, so having swift reactions to changes in our environment must have been necessary to raise the probability of survival. In this sense, reacting to the change of brightness is "relativity" instead of absolute brightness.[7] Of course, this "relativity" is not restricted to our five senses alone. The human brain is said to react strongly to one's own position relative to others. To survive in a group of humans being chased by a lion, it is not necessary to be absolutely fast, for all it takes is to not be at the back of the group.

The second oddity is "sociality". Humans are not physically more developed in any given physical trait compared to other animals. Humans cannot outrun dogs, let alone horses, nor can they smell better. So in order to survive vis-à-vis other mammals, humans must have had to have a deep understanding of interpersonal relationships. For example, it must have been impossible to hunt large game individually. Sociality was essential to in order for people to work together and communicate for a single goal, so it must have evolved that way.

The third is "short-sightedness". It is hard to, for example, resist eating something delicious when it is put in front of you. In order to increase one's survivability, it must have been essential for one to eat something as soon as one finds it. That is to say, myopic strategies must have been reinforced by evolution.

3 What Are Markets?

The three human oddities are closely related to the market. Let us first consider "relatively". We are very sensitive to changes in prices. If there we see a petrol stand that is cheaper than the alternative by just a cent per gallon, we would undoubtedly choose the cheaper one. Relativity is related to the idea of marginality in economics. In economics, marginality is the idea of marginal revenue, the increased profit gained by manufacturing another unit of a product as well as the idea of marginal cost, which is the cost of manufacturing another unit of a product. Manufacturers change the volume of production depending on the difference of marginal revenue and cost, which is marginal profit. If marginal revenue is bigger than marginal cost, that is, if the marginal profit is positive, then the manufacturer will increase production. On the other hand, consumers will buy more of something if the marginal utility of buying it is bigger than the cost. This means that both producers and consumers react to relative measures, not absolute ones.

The market is in fact a tool to erase sociality. Before the advent of markets, it was normal to treasure a sweater because your grandmother made it for you, but nowadays it is doubtful that somebody knows the individual who actually made anything that

[7] In fact, the reaction might be depending upon the second derivative as well as the first derivative such as "sudden darkness".

they wear. They probably wear garments mass-produced in places like China, and bought it based on one's preferences and the price of the product, and ignored the sociality behind the garment. This fact is not limited to garments; the same can be said for most commodities these days. In this way, markets erase "emotions".[8]

Markets are adept at expressing people's sense of "relativity" while erasing "sociality", and creating a balance between supply and demand. When supply matches demand, the sum of all marginal profits (producer surplus) and the sum of all marginal benefits (consumer surplus) are maximized.[9] The fundamental theorem of welfare economics stipulates that markets maximize economic surplus (the sum of consumer and producer surplus). That is to say, markets do not create inefficiency. This theorem has been the cornerstone of pro-market thinking since the days of Adam Smith.

Let us consider some of the assumptions behind the fundamental theorem of welfare economics. First, it does not take time into consideration. It may even be said that it is a model that takes instantaneous frames in time, so the participants are static. It only thinks of the people living at that point in time and there is no place for people in the future. Furthermore, the amount of resources to be traded and consumed is static as well. If one employs the market in this sort of situation, then the market will consume all of the available resources. In this situation, the equilibrium is at a point in which none of the participants are unable to increase their utility without decreasing the utility of somebody else (Pareto efficiency), that is, the situation does not create waste. Of course, there is production of goods and services, but this model assumes that production is instantaneous once the resources are implemented.

Although somewhat extreme, let us think of a situation in which the fundamental theorem of welfare economics applies. In the early morning, fishermen catch all kinds of fish. At the moment that they return, the amount of fish (the amount of resources) is constant. The buyers assemble, and the fish are put on auction, and different fish will get different prices. Buyers can buy and all the fish are sold before noon. Supply and demand is balanced and no waste is created.

In this way, the market is good at balance of supply and demand on a short term in which there is no element of time, and this changes once time is factored in. There are many types of models that include time, but here I will explain the results of an experiment involving investment.[10] There are two elements of investment. One is the irreversible nature of investment. Once you are set on an investment and you put it into practice, it is not easy to go back to where you were originally. Another is the time lag inherent in investment. Even if you choose and invest now, the benefits will be reaped in the far future. For example, once one decides to build a fossil fuel power

[8] On the other hand, small lot production of many products makes explicitly who are the producers and how they produce them. That is, market started swallowing sociality.

[9] Consider a producer behavior for a given product price. The produce compares the cost or the marginal cost and the price for the first unit. If the price is greater than the marginal cost, the producer will produce the first unit. The producer will do the same thing for the second unit and continue until the price is equal to the marginal cost and hence the marginal profit becomes zero. The sum of all marginal profit is called the producer surplus of the producer.

[10] See Saijo and Kusakawa (2013).

plant, it will take many years for the environmental inspection and construction to be completed. Quite a bit of time will be needed until the plant would be able to produce power.

It is no surprise that investment implies irreversibility and time lags. With experiments that incorporate these elements, two general patterns are observed. The first is the bubble. When a higher price comes up than the balance of supply and demand suggests, then investors overestimate their profit and they overinvest. Once this occurs, then the good will be over-supplied and the price of goods will crash. That is, a bubble will grow and burst. The second outcome is success. If one starts with smaller amounts of investment at first, then it is possible to prevent an overinvestment and the price of the good is maintained, and a fairly good efficiency is achieved. However, it is impossible to know how it will turn out in the beginning. In this way, once there is investment, one cannot say that the market is stable.

Furthermore, excess liquidity spurs on economic bubbles. When investment capital has low interest rates, then excess investment is more likely. However, with the fall of commodity prices, it becomes impossible to pay back the loans and companies that made excess investments become bankrupt.

Investment itself is a method to increase future advantage by patiently forgoing current consumption. For example, by developing new medicines, the company can raise future profits and increase people's happiness in the future. However, most investments do not take place over multiple generations and is focused on profit in the near future.

As has just been described, markets are prone to fail with uncertain futures. This is reinforced by people's shortsightedness. The farther in the future something is, the less people worry about it. Even if there is future uncertainty, some may say that one only needs to examine the discount value that connects present and future. For example, the discount rate in American public works is 7%. Let us imagine for example, that in 500 years, a disaster occurs in Japan that costs 500 trillion yen, roughly the current GDP of Japan. When one assumes a 7% discount rate, however, the current value becomes 1 yen.[11] The bigger the discount value, the less people worry about the future because it costs less in present terms.

Another problem is that the market lacks any mechanism that distributes resources between current and future generations. Instead, markets exploit future resources without hesitation. Probably, people do not even realize that markets are institutions that thoroughly exploit resources of future generations. In this way, a new mechanism to distribute goods and resources that does more than efficiently manage and control markets is necessary. The government does some of this already, but this is not always put into practice. The national debt of Japan for example, is more than 200% of GDP. In fact, governments too are actively involved in exploiting resources belonging to future generations.

Even if markets exploit the resources of future generations without hesitation, why does the current generation not consume all the resources on earth? This is because

[11] According to HM Treasury (2011), the discount rate in England used to be 6%, but now it recommend to use 3.5%.

exploitation is limited by technology and labor. For example, we do not immediately deplete the world's oil supplies is because we do not have the technology or the labor to do so. Furthermore, even though the desire of the current generation is boundless, it cannot live simply on oil. In order to meet demands, a diverse array of goods and services must be produced and consumed using a multitude of resources.

Even if the current generation used the market to exploit future resources, if the amount exploited is small enough then it would not be problematic to keep exploiting that resource until humanity dies out. However, with regard to fossil fuels we already know that we do not have enough left to last until extinction. Here, important issues arise in terms of how we ought to think about future generations.

Another problem is that of externalities. Markets do not control NOx and Sulfur Dioxide emissions, and companies can emit them for free, but they still affect the welfare of current and future generations. The problem for current generations is generally thought of in terms of short-term or in the near future. However, these actions can affect future generations decades or even hundreds of years in the future. Both problems cannot be solved through markets alone.

4 Democracy and Future Generations

Let us think about the features of democracies. Although there are many forms of democracies, most modern democracies are indirect, representative democracies. The citizens choose representatives who decide policy in a legislative body.

The constitution of a nation is a set of fundamental principles that bind the power of the nation. The coverage of it is not restricted to a particular place or a time, but it should be applied to "anytime and anywhere." That is, people born in the future should be protected and covered by it. Therefore, from the viewpoint of the constitution, the distance from it should be the same between current and future generations, and hence no explicit references such as "future" and "generations".

On the other hand, the coverage of the constitution is for the people who are alive now when we understand the constitution from the viewpoint of a citizen of the nation. For this reason, the distance between a person who will be born in a future generation and "you" is far larger than the distance between a person in the current generation and "you". Let us take a look at several current constrictions from a person who is alive now. First, let us examine the Japanese constitution. There are almost no mentions made of future generations in the Japanese constitution. However, there is one passage in the preamble that mentions the Japanese people's "desire peace for all time" and another that mentions basic human rights in Articles 11 and 97.[12]

> Article 11. The people shall not be prevented from enjoying any of the fundamental human rights. These fundamental human rights guaranteed to the people by this Constitution shall be conferred upon the people of this and future generations as eternal and inviolate rights.

[12]The citations in constitutions of various countries are due to Takahashi (2007).

That is to say, basic human rights are not laid out in terms of negotiating, opposing or cooperating with future generations but as something given to individual citizens.

Although the US constitution is supposed to be carrying over the spirit of the Iroquois confederacy, there is no mention of "generation" in the US constitution. However, in the articles about judicial power there is a mention of the word with regard to "future treaties". For Canada's, ROK's, and PRC's constitutions, there are no mentions of "future" or "generation" at all. These constitutions, like markets, reflect the myopic nature of human beings. That is to say, the application, limitation, and restraining of state power, as well as the stipulation of guaranteed rights and liberties applies only to currently living people.

For this reason, citizens of many countries including Japan have no constitutional obligation to care about the nation after one's death. Of course, nothing stops people from voting for more far-sighted policies out of one's conscience, but people naturally gravitate towards policies that give out benefits within one's lifetime. Therefore, indirect representative democracies do not implement institutions that take future generations into account.

Furthermore, the representatives themselves only care about reelection, so they are unlikely to implement policies that benefit future generations at the cost of the current generation. Therefore, it is hard to prevent policies that make future generations pay for the benefit of the current generations including massive borrowing and exploitation of resources.

However, there are a few constitutions that include passages about the "future" and "generations". The preamble of the 1999 Swiss constitution contains a passage that says "conscious of… their responsibility towards future generations". The preamble from the 1993 Russian Constitution also includes a passage that reads "striving to secure the wellbeing and prosperity of Russia and proceeding from a sense of responsibility for our homeland before the present and future generations". However, these passages remain largely abstract.

Even in the EU, which leads the world in terms of climate change and sustainability, the 1993 EU treaty does not have any passages about future generations.[13] Some of the member states, however, include passages that mention "future" and "generations" in their constitutions, including the 1949 Basic Law for the Federal Republic of Germany, Article 20a.

> Article 20a [Protection of the natural foundations of life and animals].
>
> Mindful also of its responsibility toward future generations, the state shall protect the natural foundations of life and animals by legislation and, in accordance with law and justice, by executive and judicial action, all within the framework of the constitutional order.

In this article, the natural foundations of life and animals are to be protected not through the constitution but through statutes.[14]

---

[13] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:11992M/TXT:EN:HTML.

[14] There are six locations mentioning future or generations in the basic environmental law in Japan. For example, Article 3 states that "Environmental conservation shall be conducted appropriately to ensure that the present and future generations of human beings can enjoy the blessings of a healthy

France's 1958 constitution also does not mention "future" or "generations". However, the 2004 Charter of the Environment contains a passage that explicitly addresses this issue.

> That in order to ensure sustainable development, the choices designed to respond to the needs of the present must not compromise the capacity of future generations and other people to satisfy their own needs.

In this way, modern constitutions generally do not have articles about sacrifice by the present generation for the benefit of future generations in the same way the Iroquois do, with the exception of French and German environmental legislation. This is reflective of the fact that with varying degrees, democracies contribute to the exploitation of future resources without hesitation. However, as the French and German cases show, it is possible to incorporate the welfare of future generations into democracies.

5 Optimism Bias Dilemma

Is your driving skill above average? Although this is a bit old, according to a survey conducted among American automobile drivers, more than 90% people surveyed thought that their driving skill was above average.[15] Even in a survey conducted among people hospitalized for automobile accidents, drivers showed overconfidence.[16] Similarly, in a survey of one million American high school students, almost all of them said that they "get along well with others", and one in four answered that they were in the top one percent in terms of social skills.[17]

Camerer's market entrance game experiment provides very interesting results on optimism bias.[18] Fourteen subjects first take a trivia quiz, and the top six divide $50 amongst themselves while the others must pay $10. If eleven people join, then the top six gain $50 total while the rest pay $50 in total. The total benefit is zero amongst all the subjects, so the individual expected benefit ought to be zero as well. The subjects understand this well, but usually 12 or 13 people join, indicating that most people consider themselves above average and therefore unlikely to lose.

---

and productive environment and that the environment as the foundation of human survival can be preserved into the future, in consideration that preserving the healthy and productive environment is indispensable for healthy and cultured living for the people, and the environment is maintained by a delicate balance of the ecosystem and forms the foundation of human survival, which is finite in its carrying capacity and presently at risk of being damaged by the environmental load generated by human activities."

[15] See Svenson (1981).

[16] See Preston and Harris (1965).

[17] See Camerer (2003).

[18] See Camerer and Lovallo (1999).

Optimism is not just a human trait—it is also seen in other animals including birds.[19] Train a bird to pull a blue lever when a sound is played for two seconds while pull the red bar when a sound is played for 10 s by giving it food every time it pulls the lever, but give food instantaneously for the blue lever but delay the food for the red lever. If one plays a sound for 6–8 s, birds tend to pull the blue lever. This means that they preferred instantaneous gratification to delayed satisfaction.

Does this optimism apply to predictions about the future? Sharot (2011b) gave one hundred questions on events that may happen over the course of a month to Israeli students.[20] The question asked about events like receiving presents, getting in a traffic jam, and being late for a meeting. It turns out that once Sharot classified the events into positive, neutral, and negative, answers for the positive events were about fifty percent more than the negative ones. Furthermore, the results showed that students thought that positive events happen sooner while negative ones happen later. When the students were polled after a month, the number of replies for positive, neutral, and negative events was roughly the same.

Why does optimism bias occur?[21] When someone thinks that the probability of getting a certain kind of cancer is 20%, and one tells him that the actual probability is about 10%, then he is rather likely to change his thinking on the matter. However, if one tells the same to a person that thinks that the possibility for the same cancer is 5%, then it is much less likely that the person will change his opinion. Humans react more readily to positive information than to negative information. Furthermore, positive information is processed in the left inferior frontal gyrus, while the processing of bad information is hindered by the left inferior frontal gyrus.

The one-sidedness of information processing is not economically optimal. This is because one cannot maximize expected benefit through one-sided information processing. However, there is a non-monetary benefit to this. In fact, optimism bias is very good for your health. According to Sharot (2011a), a survey conducted on 97,000 people reported that optimistic people are 14% less likely to die between the ages of 0–65 and the probability of death by heart attack decreases by 30%.[22] It is probably not an exaggeration to say that we evolved to have optimism bias.

Optimism may increase individual survivability, but it can lead to negative consequences for society. Many factors contributed to the 2008 economic crisis, but one reason is that optimism bias caused a bubble, which crashed. This is an example of how optimism among individuals can lead to negative consequences for both individuals and society as a whole. Let us call this the *optimism bias dilemma*.

Optimism bias is one reason why estimates for public works tend to exaggerate the benefits and understate costs. Another reason is strategic manipulation by politicians and contractors.[23] According to a study of 14 countries, the cost of building railroads

[19] See Matheson et al. (2008).

[20] See Sharot (2011b).

[21] According to Sharot et al. (2011), depressives react to positive information as well as to negative information. That is, the information processing is both sided.

[22] See Sharot (2011a).

[23] See Flyvbjerg et al. (2005).

are on average 45% more than the estimate and the ridership estimates are 106% more than the actual ridership. This trend was almost unchanged for 70 years. To remedy this, British Ministry of Finance published a new guideline on cost estimates and benefits of public projects in the 2003 "The Green Book"—a novel attempt at regulating optimism bias and strategic manipulation.[24]

Let us now think about climate change that affects the earth over the course of hundreds of years. Despite IPCC findings that, climate change can cause a rise in sea levels, extreme weather, and warming, most people will keep emitting greenhouse gases.[25] This is because the cost of climate change is minimal for the current generation but increases with the passing of time—for which future generations must pay dearly. Although this might be extreme, unchecked optimism bias may endanger human survival itself.

6 Incorporating Future Generations into the Present—Future Design

Markets and democracies are, as we have discussed before, systems that use up future resources without any remorse, and their effects are reinforced by optimism bias. Then, how do we regulate markets, change democracies and control optimism bias? That is to say, how can we design the future?

The British finance ministry's The Green Book is a sort of future design in that it tries to eliminate optimism bias and strategic manipulation, but it does not seek to fundamentally change markets and democracies for the benefit of future generations. Ehara et al. (2007) examined many conditions necessary for a low carbon society by 2050 and suggested two alternatives. In terms of designing future societies, this is a radical idea but they do not go into how exactly either choice would be chosen.

One idea set out in this book is that it is possible to create representatives of future generations in today's society. Of course it is impossible to transport a person form future to the present. Therefore, it is practical to use the human tendency to be able to think of how others think in their hearts and create a group of people who act as a person from the future world.[26] This group will be a sort of imaginary future generation, and make institutions to make it possible for them to bargain with the present generation. We shall call this group the Ministry of the Future.

[24] See HM Treasury (2011).

[25] Humans tend to dislike any changes called status quo bias that is related shortsightedness. Especially, they have tendency to dislike being bad to status quo. Fleming et al. (2010) found the processes of changing the status quo.

[26] Regarding a theory of mind of the chimpanzee, see Premack and Woodruff (1978). As for mirror neurons and the theory of mind reading, see Gallese and Goldman (1998), Gallese and Sinigaglia (2011).

Of course, here we encounter the problem that the very nature of future generations depends on present decisions. This problem is Parfet's non-identity problem.[27] This includes the fact that almost everything in the future, even future populations are dependent on current actions. In this book we will assume that the same kinds of people will always be born to deal with the population issue by increasing or decreasing the distribution.

We will call these people the Ministry of the Future, but it is not always necessary for these people to represent future generations. The Ministry needs only to come up with possible problems that people will face in the future, and create several alternatives from which current generations can choose the course of action. Then, we randomly select a number of individuals from society and through dialogue and debate with the Ministry of the Future, make them represent future generations. Then, we must also choose a group of people to serve as representatives of the current situation. The process will have the two sides and the ministry discusses and argues to decide upon a single course of action to solve problems to be faced by future generations. We will look at examples in Chap. 5. Of course, this process is only an example and there can be other processes.

A method to support the various options that the future ministry suggests is backcasting. For example for greenhouse gas emissions, we must eliminate outright choices that are physically impossible but agreeable to both sides. Instead of predicting the future, we must determine possible outcomes and "retrodict" what the current generation must do to.

For example, let us assume that the future and current generations have agreed on a limit on the use of a natural resource. How each generation uses it will probably use techniques like grandfathering and auctions used in emissions trading, or a combination of both.

Furthermore, by regulating the market from the perspective of future generations, myopic democracy will have to change as well. Perhaps constitutions will be amended and new legal systems will be built up on the basis of a "basic law of the future".

7 Do Imaginary Future Generations Really Work?

Even though we introduce imaginary future generations in current decision makings, the current generation does not have any monetary incentives to reduce the payoff and to increase future generations' payoff as far as participants in our societies are selfish as economists assume. In order to answer this suspicion, Kamijo et al. (2017) conducted an experiment using human subjects.

Let me introduce the experiment performed by Kamijo et al. (2017). More than a hundred students got together in a large classroom. They were told that they should not talk each other. Experimenters picked up fifteen students randomly and made five groups of three subjects. Each group went to another small room so that groups

[27] See Parfit (1981).