

AI Created Works and Copyright

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1. Introduction

The emergence of Artificial Intelligence (“AI”) is challenging the copyright system.

When computers emerged, it was argued whether works made by computers could be protected by copyright. However, it was obvious that computers were not creators of works but just tools with which authors could save labors, time and money in creating works. In other words, they could not make works without human intelligence.

The AI technologies have shown dramatic development since 2010. Behind this background is the development in the information processing technologies such as Deep Learning and the emergence of Big Data. These have enabled AI to win Chess games, Shogi games or Igo games against human beings. The Internet environment has diffused into people’s lives, and Big Data on people’s tendencies and preferences is being collected. These kinds of collected Big Data enable computers to judge and decide what people tend to like, feel beautiful, or find funny. The computers then will be able to draw pictures, make music or make stories that satisfy human beings’ demand by combing expression elements according to people’s tendencies.

Works created by Artificial Intelligence (“AI Works”) might not be as high quality as those created by genius, but it might be better than those created by ordinary or unremarkable authors. AI Works may contain intelligence equivalent to that in the works created by human beings. The intelligence in the AI Works is not human intelligence of a computer user. While it is rather generated by AI, it is made of collection and selection of human intelligence in the Big Data. Accordingly, the AI Works satisfy people’s demand just as works created by human beings do. In other words, the AI Works can provide people with what they demand for, and therefore, protecting the AI Works by copyright and enhancing the creation of the AI Works serve the public interests.

Currently, the laws in many countries only protect works created by human intelligence and do not protect works created by machines. The AI Works there are not acknowledged as “Works” and thus are not subject to “Copyright.” This has brought up an issue of whether the AI Works should be protected by copyright. This issue is pushing the copyright systems of the world to be reconsidered and rebuilt.

2. What is AI? What can AI do?

The 3D-printed painting, “New Rembrandt,” which was made public in 2016, is a portrait drawn and painted by AI using Rembrandt’s brushwork after having AI learn 346 works of Rembrandt, who was the artist in the Netherlands in the 17th century (<https://www.nextrembrandt.com/>). By setting the drawing conditions to Caucasian man, in his 30s, with facial hair, in black clothes with a white collar, and a hat, and facing right, AI was able to draw and paint the picture almost identical to that painted by Rembrandt himself.



[Illustration 9] New Rembrandt

Source : <http://www.bbc.com/news/technology-35977315>

The song, “Daddy’s Car,” which was made public in 2016 (available at: <http://amass.jp/78513/>), is a song whose music is composed by using the AI software called the “Flow Machines” developed by Sony Computer Science Laboratories, Inc. (SONY CSL) and then musical arrangement and lyric are added to the music by human beings. The “Flow Machines” is composed of music databases, music composition tool and others, and when a human being selects a style, it creates new lead sheets using the music composition tool, and then connects all completed melodies together and

completes a song.

Google had AI learn 11,000 unpublished books or more, and then after that it gave 2 sentences to AI and had it write a poem (<http://www.wired.co.uk/article/google-artificial-intelligence-poetry>).

Nagoya University had AI write 2 short stories entitled “My Job” and “The Day a Computer Writes a Novel” and applied for the third Hoshi Shin’ichi Award. The latter work passed the 1st screening. “My Job” has a scene where a robot mutters, which surprises me with the fact that AI is able to recognize humor. However, it has been said that around 80% of the story is written with the help of human beings.

My job is to work in the line of the factory and get on with my work routine. I wake up at the same time every morning, get on the same train to head to the factory, do the same work, and go back home at the same time everyday. Recently, the economy is weak and I sometimes have nothing to do even though I come into work. There is nothing new, and I do not find anything funny or sad these days. I feel like I am a robot. No, I would rather want to be a robot. (Satoshi Sato, “The Day a Computer Writes a Novel,” 90, Nikkei Publishing Inc., Japan, 2016)

The musical “Beyond the Fence” performed in London (Arts Theatre) in 2016 is a piece created by AI. It was written by having AI learn the data of successful musicals. Since there seems to be a lot of human intervention in writing, it is hard to say that AI wrote up this musical.

It seems a tough challenge for AI to make stories, but it may be just a matter of time before that is realized.

3. May AI Works be protected by Copyright?

Then, may AI Works be protected by Copyright under the current statutes?

(1) Japan

The Copyright Law of Japan defines a copyrightable work as “a production in which thoughts or sentiments are expressed in a creative way and which falls within the literary, scientific, artistic or musical domain.” The critical requirement “creativity” here is construed by the court cases that the personality of an author is revealed in expression in any way.

Accordingly, only human created works may fall within the protectable works.

Although there is no case on AI works, it is obvious that the current Copyright Law of Japan does not protect AI works.

(2) Germany

The Copyright Law of Germany provides that “Works in this Law are only individuals’ intellectual creations” (Section 2, Paragraph 2).

Accordingly, only those works created by individuals may fall within the protectable works, and the Copyright Law of Germany does not protect AI works.

(3) The U.K.

The Copyright, Designs and Patent Act of the U.K. protects AI works. Section 9, Paragraph 3 of the Act defines the author of a work as follows:

In the case of a literary, dramatic, musical or artistic work which is computer-generated, the author shall be taken to be the person by whom the arrangements necessary for the creation of the work are undertaken.

(4) The U.S.

The Constitution of the United States authorizes Congress to enact copyright laws, which says “the Congress shall have power ... To promote the progress of science and useful arts for limited times to authors ... the exclusive right to their respective writings ...” (Article 1, Section 8, Clause 8).

Accordingly, it is expected that only those works created by authors may be protected as protectable works. The U.S. Supreme Court expressly said that “writings are founded in the creative powers of the mind” (*Trademark Cases*, 100 U.S. 82 (1879)). Although there seems no case on AI Works, it is not expected that the U.S. Copyright Law will protect AI Works. The U.S. Copyright Office has in fact declared that AI Works may not be registered (Compendium, § 306).

4. Should AI Works be protected by Copyright?

Apart from the current statutes, the next issue is whether the philosophies of copyright system may allow or demand copyright protection for AI works.

(1) The Labor Theory

John Locke states in his work “Second Treatise of Government,” Paragraph 27 as

follows:

Though the earth, and all inferior creatures, be common to all men, yet every man has a property in his own person: this nobody has any right to but himself. The labour of his body, and the work of his hands, we may say, are properly his. Whatsoever then he removes out of the state that nature hath provided, and left it in, he hath mixed his labour with, and joined to it something that is his own, and thereby makes it his property. (Emphasis added)

This theory considers that as labor creates value, the man who has given birth to a thing should also enjoy it. However, this theory considers that only labor of human beings can make property.

(2) The Personality Theory

For example, Georg Wilhelm Friedrich Hegel considers in his work “Philosophy of Right” that putting a man's will into a thing makes it property. Paragraph 44 of the work reads:

44. A person has as his substantive end the right of putting his will into any and every thing and thereby making it his, because it has no such end in itself and derives its destiny and soul from his will. This is the absolute right of appropriation which man has over all things. (Emphasis added; Knox trans. 1967)

This theory considers that a man who has given birth to a thing by putting his expression into it should have that thing as his property, and that the creator of intellectual property produces two things: a universal method of so expressing and a copy. The creator holds intellectual property in the universal method of so expressing independently from the ownership of a copy.

According to this theory, AI Works cannot be considered property to be protected by copyright as they are not derived from AI's will.

(3) The Incentive Theory

The Constitution of the United States shows that the purpose of copyright is not to protect labor or personality of authors, but to promote the progress of science and useful arts. The Supreme Court of the United States in the case *Sony Corp. v. Universal City Studios, Inc.*, 464 U.S. 417 (1984) expressly set forth the incentive theory as follows:

The monopoly privileges that Congress may authorize are neither unlimited nor primarily designed to provide a special private benefit. Rather, the limited grant is a means by which an important public purpose may be achieved. It is intended to motivate the creative activity of authors and inventors by the provision of a special reward, and to allow the public access to the products of their genius after the limited period of exclusive control has expired.

Under this theory, the purpose of copyright is to promote creation of works for the benefits of the public and copyright is a means to motivate the creative activity of authors.

Accordingly, if AI creates works, copyright may be given to promote creation of works under this theory.

(4) The Vehicle Theory

Looking squarely the function of copyright, copyright as a bundle of exclusive rights is a vehicle to make enjoyment of works into such merchantable commodities that can be bargained for in the markets. Without such an exclusive right, nobody would pay price for any enjoyment of works.

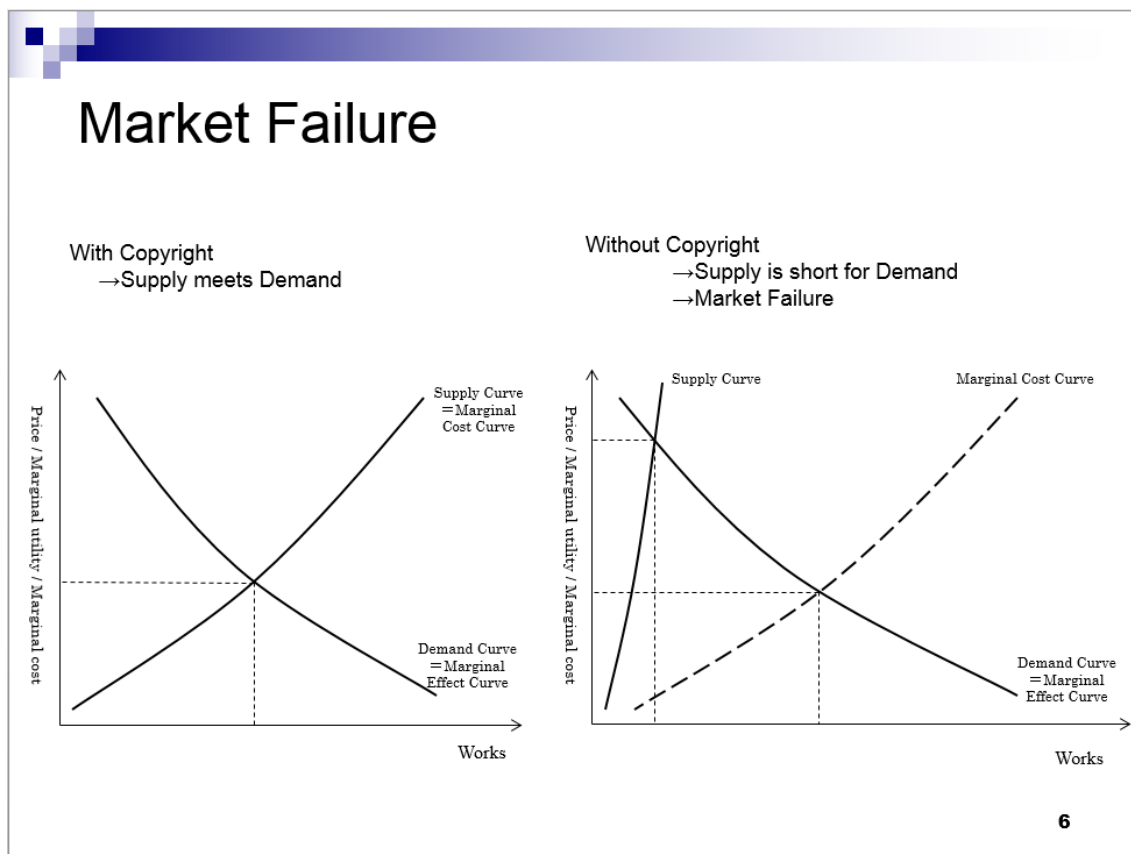
In the times when copyright did not exist, only kings or the like were able to pay a composer his musical works while others had chance to enjoy the musical works without any payment. If not only the kings but also all consumers would pay price for their enjoyment of musical works, the aggregate amount of the price would be enough to hire more composers and have them create more musical works. Here, the supply of musical works is too small to meet the demand of the works. This situation is so-called “Market Failure.” The enjoyment by others without paying price is so-called “Externality” or “Neighborhood Effect.”

Under the copyright system, any consumer has to pay price for his enjoyment of works. Here, the supply of musical works is balanced so as to meet the demand of the works through the market mechanism. The market succeeds here by “internalizing the externality” with copyright.

Without copyright, works that consumers need in quantity and quality are not supplied in the markets. With copyright, works that consumers need in quantity and quality may be supplied in the markets. That is why the Market Failure occurs unless enjoyment of works are effectively protected by copyright. When every enjoyment of works are loaded on a vehicle named copyright, every Externality is internalized and the

Market succeeds.

These illustrations show the above relationship between supply and demand.



The demand is the aggregate of each person's price which he would pay for his enjoyment of a work. The supply is the aggregate of each supplier's production cost for a work which he would create.

According to this theory, as long as there is consumers' demand for works and copyright to works increases supply of the works, the works should be protected by copyright so as to balance the demand and supply of the works in the markets. In other words, the first condition for copyright protection is that consumers would pay price for their enjoyment of works. The second condition is that copyright protection would increase supply of the works.

The AI Works may definitely attract the demand of consumers and rather be better than the works created by ordinary authors. If the AI Works are protected by copyright and copyright is vested in the operators of AI, the operators can increase the quantity of

the AI Works by increasing the number of AI, and can increase the quality of the AI Works by giving AI better big data. Accordingly, copyright protection for AI Works is necessary to balance demand and supply of AI works in the markets.

5. Copyright in the Age of AI

According to the above vehicle theory, the scheme of copyright system should be modified in some aspects for the age of AI. Let me take up the issues of subject matters, copyright holders, scope of exclusive rights, and duration of copyright protection.

Professor Paul Goldstein (“Copyright 2d” §1.14) talks on the favorable copyright system as follows:

“To give greater property rights than are needed to obtain the desired quantity and quality of works would impose costs on users without any countervailing benefits to society. To give fewer property rights than are needed to support this investment would give users freer access, but to a less than socially desirable number and quality of works.”

Under the vehicle theory, accordingly, copyright as a bundle of exclusive rights should be designed to be the most efficient vehicle to make enjoyment of works into such merchantable commodities that can be bargained for in the markets.

(1) Subject Matters to Be Protected by Copyright

From the view point of the vehicle theory, as already mentioned, any works should be protected as long as there is consumers’ demand for works and copyright to works increases supply of the works. In other words, any newly originated works should be protected with or without personality or individuality.

(2) Copyright Holders

Those who are vested with copyright should be those who can increase supply of works. In the case of works created by human beings, copyright should be vested in authors. While publishers can increase supply of works indirectly through paying authors, authors can directly increase supply of works. Accordingly, it is most effective to vest authors with copyright.

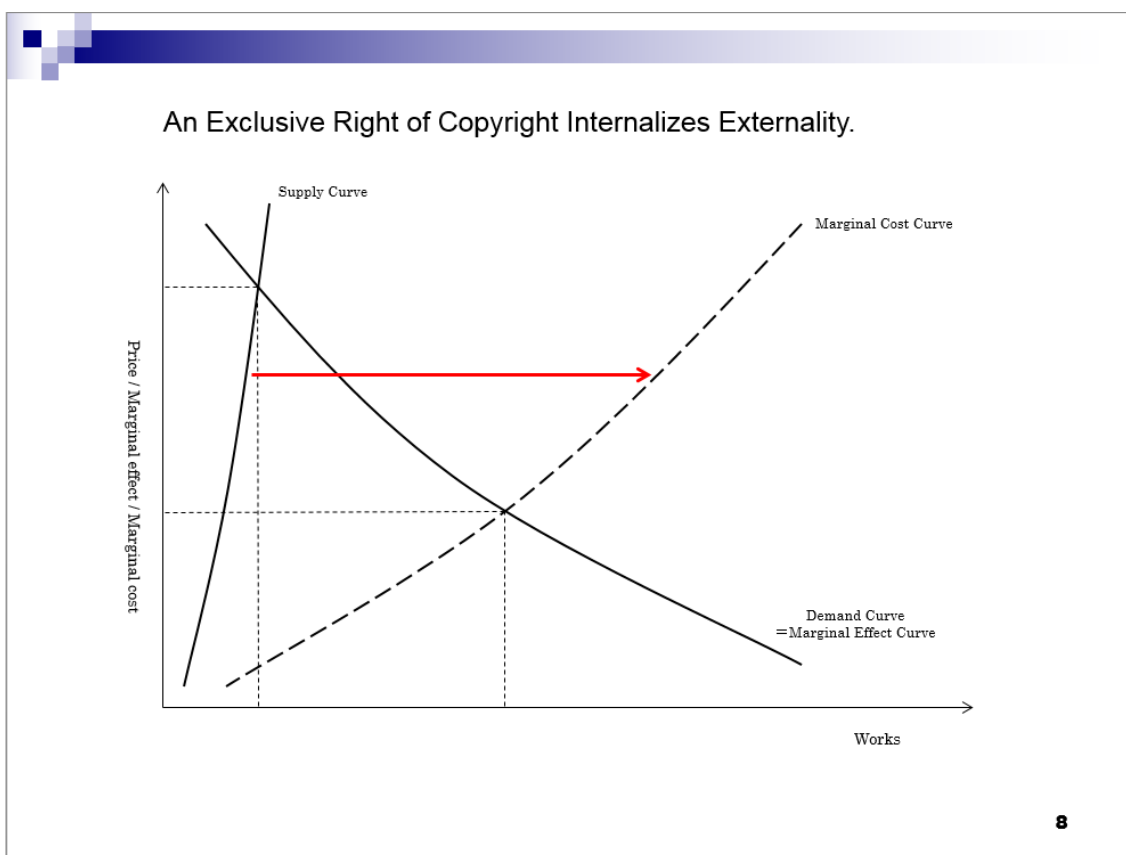
On the other hand, in the case of works created by machines, operators of the machines should be vested with copyright as only they can control supply of the works.

The operators can increase the AI Works in quantity by increasing AIs, and in quality by increasing the big data to be fed by AI.

(3) Scope of Exclusive Rights

Under the vehicle theory, copyright is a means to internalize the externality in the markets of works. In other words, an exclusive right of copyright should be extended to every kind of ways to enjoy a work. If a new way to enjoy a work appears or a consumer would pay a price for the new way to enjoy the work, a new exclusive right of copyright should be added to extend to the new way. If an exclusive right applies to non-enjoyment of a work, on the other hand, it does not affect the supply of the works and may cause a market failure.

Access right is one example. Cloud environment has enabled consumers to use works on remote servers through access without transmitting the works to the place of the consumers. Suppose that you use a database work on a remote server. You may access the database and use it, but you don't download the database work itself but only a few data. Any traditional exclusive right of copyright does not extend to such access to works. Therefore, WCT (Article 8) and WPPT (Articles 10 and 14) provide for the right of making available to the public. I believe that the right of making available to the public includes the access right.



(4) Limitations

Generally, every enjoyment of a work should be subjected to an exclusive right so that it can make the enjoyment merchantable commodities that can be bargained for in the markets. Exceptionally, the enjoyment whose market falls within the market failure, however, should be subjected to an exclusive right as the exclusive right cannot balance the demand and the supply to the enjoyment.

For example, trivial reproductions. Suppose that a consumer copies one page of a book which is copyrighted by another. In the analog environment, the transaction cost to obtain a reproduction license for the copy will amount to much more than the market price of the book. The consumer would never obtain the license and give up the enjoyment through the copy. This means that the market for such trivial reproduction fails. It would never increase the supply of a work to apply an exclusive right to such trivial reproduction, and therefore, would never be justified under the vehicle theory.

(5) Duration of Copyright Protection

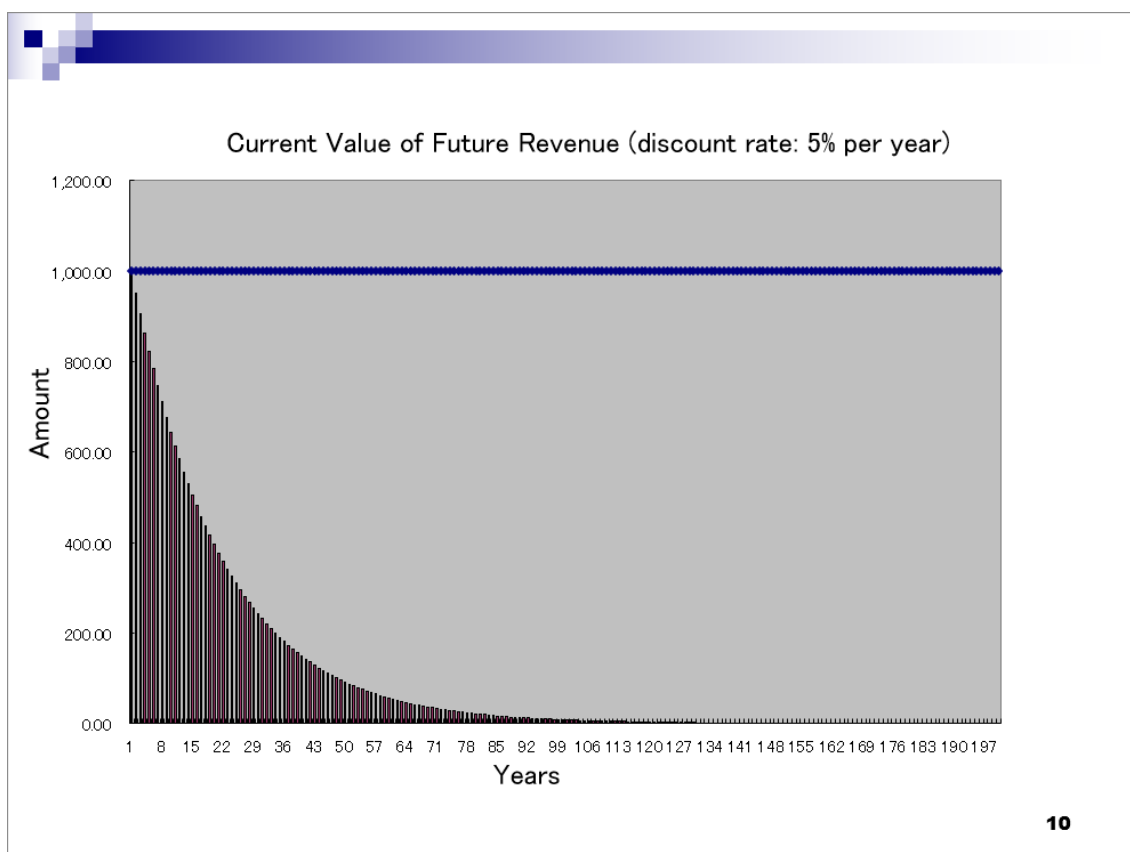
- Economically Rational Behavior

Some of the authors may say “I do not create works for money” while most of the

authors create works for money. The authors who do not create works for money would create works, whether with or without copyright at least as economic rights. From the view point of the vehicle theory, accordingly, copyright should be designed based on the economic behavior of the authors who create works for money.

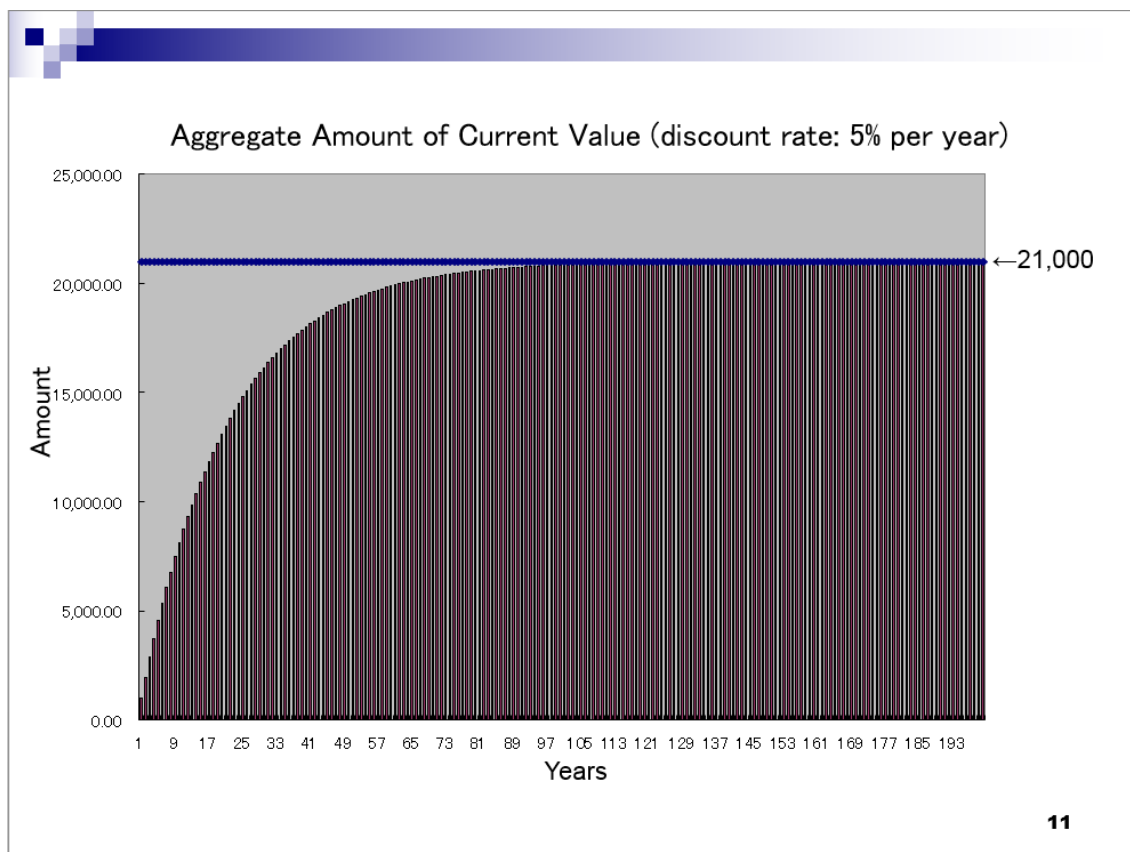
The rational behavior of such authors is to weigh the current cost for creating a work on one side and the future revenue from a work on the other side, and then decide to create the work if the latter exceeds the former. For considering the future revenue, however, \$1,000 after ten years is not the same as the current amount of \$1,000 since the current amount of \$1,000 would be \$1,620 after ten years at the compound interest rate of 5%. In business, we use DCF, Discounted Cash Flow, to calculate the future revenue into current value.

As you see in the chart below, \$1,000 after ten years is almost \$0 in the current value at the discount rate of 5%.



How much does the aggregate of \$1,000 a year for unlimited period amount to in

the current value? It only amounts to \$21,000 at the discount rate of 5%. The chart below shows the relationship between the aggregate amount and years.



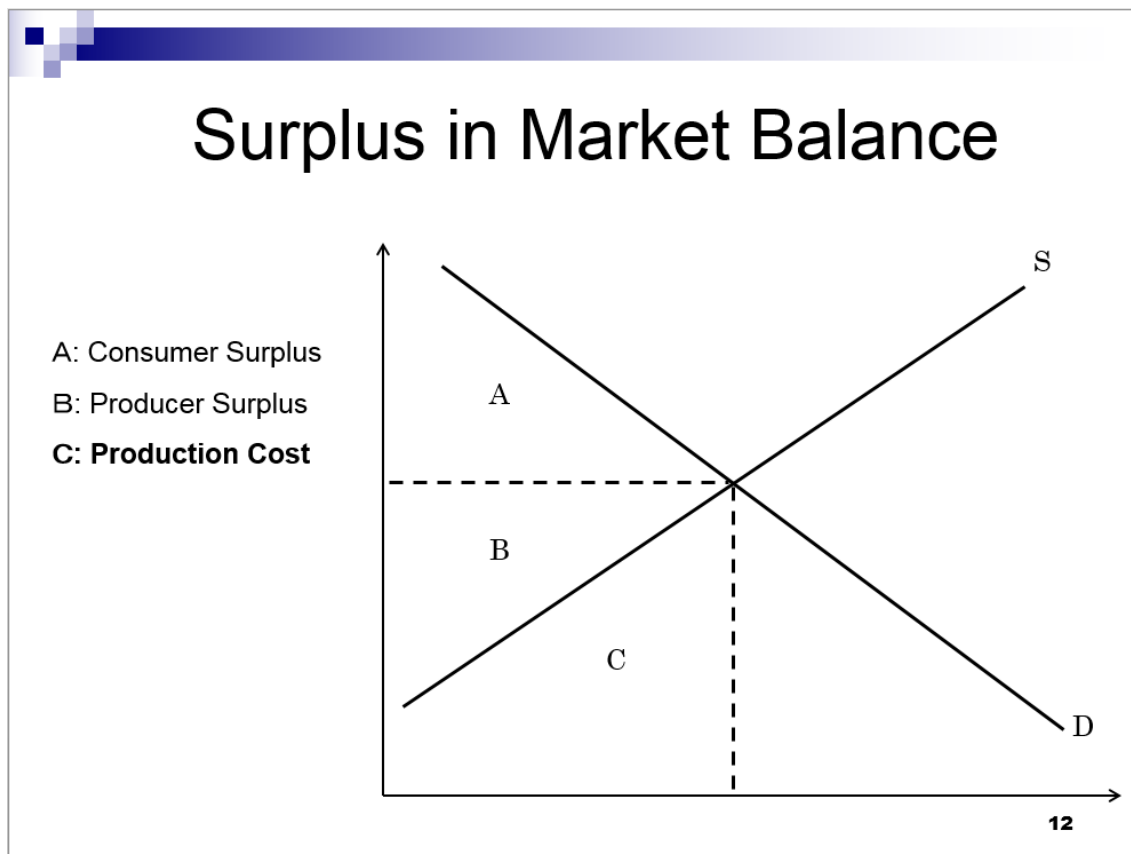
As you can find, it is not the case that the longer the term of copyright protection is extended, the more the supply of works increases.

- The Most Favorable Term

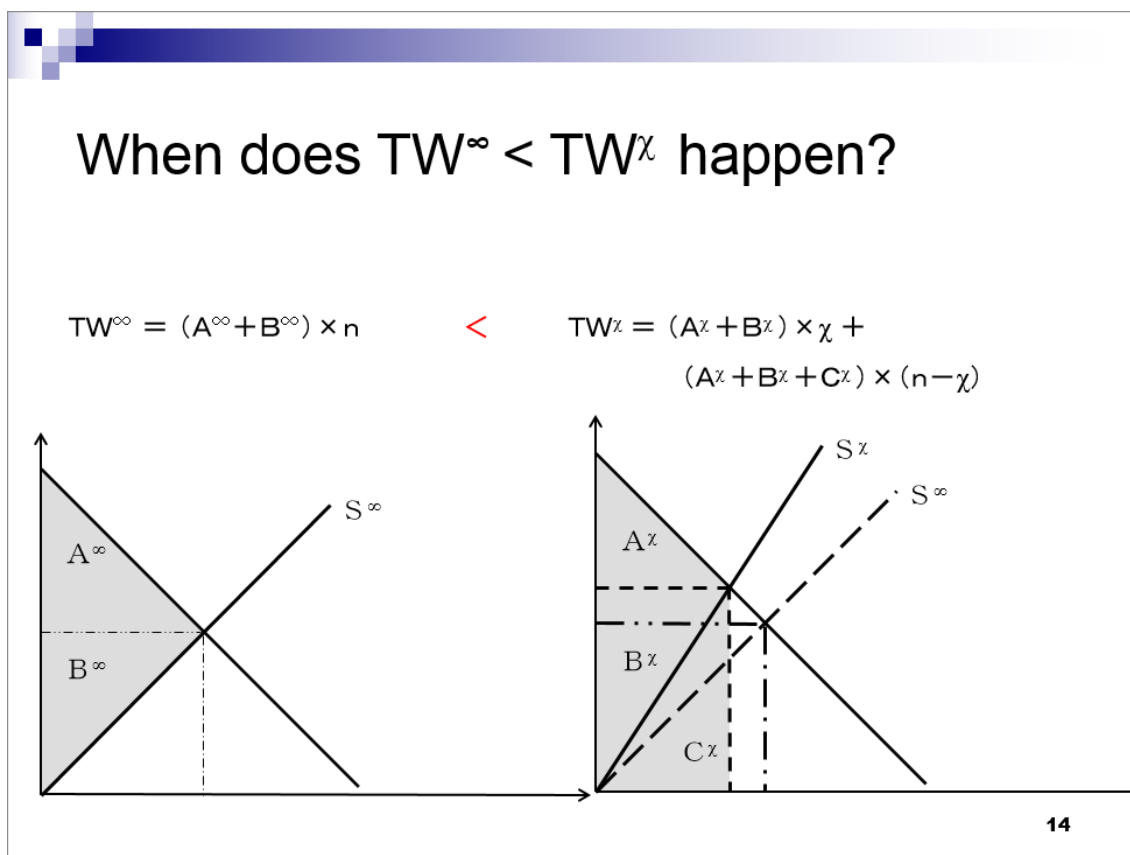
Then, how long is the best term of copyright protection? Let me consider this issue from the view point of the welfare generated by the markets.

In the market, the price and the volume of supplied works are determined at the cross point of demand curve and supply curve. The demand curve consists of the aggregate marginal utility of every consumer in the market. The supply curve consists of the aggregate marginal cost of every supplier in the market. The triangle A shows the consumer surplus generated by the market, and the triangle B shows the supplier surplus generated by the market. The triangle C shows the aggregate production cost of the

works.



The chart below compares the welfare when copyright continues for an unlimited term and the welfare when copyright continues only for a limited term. Let me call the former as “Unlimited Term Welfare,” and the latter as “Limited Term Welfare” for short. Compared with the supply curve in the case of an unlimited term, the supply curve in the case of a limited term shifts to the left. As you can see, the Unlimited Term Welfare is bigger than the Limited Term Welfare during the term of copyright protection. After the term of copyright protection expires, however, the Limited Term Welfare consists of A, B and C, all of which becomes consumer surplus.

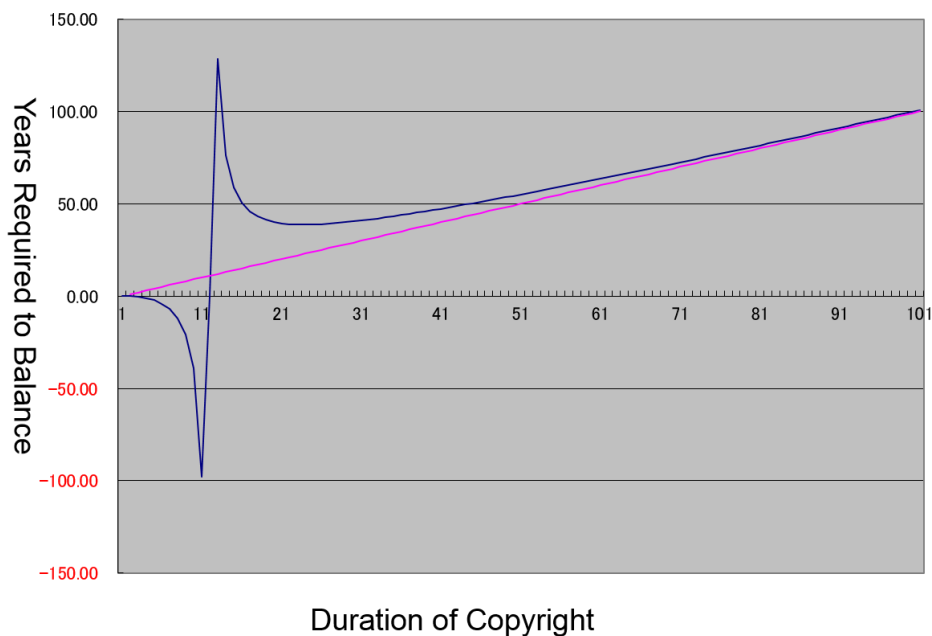


Several years after the copyright protection expires, the aggregate of the Limited Term Welfare may exceed the aggregate of the Unlimited Term Welfare due to the additional surplus C. When does this happen?

The chart below shows when it happens based on a model analysis at the discount rate of 5%. According to the chart, 12 years term of copyright protection is the best, because it enables the aggregate of the Limited Term Welfare to exceed the aggregate of the Unlimited Term Welfare at the earliest. For your reference, based on a model analysis at the discount rate of 10%, 6 years term of copyright protection is the best.

Under the vehicle theory, accordingly, I believe the term of copyright protection should be 20 years at most.

When the Duration is 12 years, $TW^\infty < TW^\chi$



- Copyright for Posterity

Some may say “A long term protection of copyright is necessary for authors’ posterity to get fruits from the authors’ works.” However, the function of copyright expected there is not to promote creation of works but to become financial asset just like corporate stocks or national bonds. It is not justified to use copyright as financial asset since copyright restricts free use of works by the public. If authors wish to leave property for posterity, they should buy, for earned royalties, the financial asset such as corporate stocks and national bonds, instead of making copyright term longer.

(6) Enforcement

Copyright should be designed to make each enjoyment of a work a merchantable commodity that can be bargained for in the market and internalize the externality of the market for the enjoyment of a work. However, internalizing the externality of the market with copyright cannot be achieved unless copyright may be “effectively” enforced.

In addition to remedies such as injunction and damages against copyright infringement, technical measures to prevent or restrict unauthorized use of a work should also be protected.

6. Conclusion

Intellectual property rights are the engines that drive forward the economy by encouraging investment to the development of intellectual resources. The copyright is especially important as this engine to push forward the economic development in the information society. Highly sophisticated and efficient engine enables a rapid and big progress in the economic development. Looking squarely the function of copyright, copyright as a bundle of exclusive rights is a vehicle to make enjoyment of works into such merchantable commodities that can be bargained for in the markets. The copyright system in the age of AI should be reorganized from the view of the Vehicle Theory including reconsideration of fundamental principles.