『社会科学ジャーナル』53〔2004〕
The Journal of Social Science 53 [2004]
pp.*57-76*

An Analysis of Virtual Currencies in Online Games

Hiroshi Yamaguchi*

1. Introduction

MMORPGs (Massively Multiplayer Online Role-Playing Games) are becoming increasingly popular entertainment among people in many countries, especially in Asia. For example, in China and Korea, more than 10 million people are playing these games. In Japan, the growth of online game business has been sluggish for these few years. However, as broadband Internet connection becomes popular, the number of subscribers is rapidly increasing. For example, Ragnarok Online has now 450,000 subscribers in Japan.

Many online games prepare elaborate social systems for players to feel the virtual worlds of games as real as well as enjoyable. Economic and monetary systems are included in such examples. This paper aims to analyze the economic and monetary system of these games, and to discuss its implications on our real economy.

1.1. Virtual world and the currencies

[1] first analyzed the economic activity in the virtual world in an online game "Everquest." Everquest was introduced in the U.S. market by Sony in 1999, and now has approximately 430,000 players worldwide (330,000 from the U.S.). In this game, a player as an avatar (other self) ventures either independently or in cooperation with other avatars in "Norrath," a virtual world in the Internet.

In the game, players purchase various items required for advance of the

*Research Fellow, Social Science Research Institute.

game. The monetary unit in this world is called PP (platinum piece). Players acquire items by the activities in the game, or purchase the items by trades among avatars using PPs. However, some (if not many) American players, despite the forbid in the game, trade the items in the real world using actual currency through auction sites in the Internet, such as eBay.

Situations are similar for other online games. Let us take "Lineage" as an example. Lineage is an MMORPG developed in Korea, and now has approximately 6 million subscribers in Korea, Taiwan, Hong Kong, US, and Japan. For Japanese Lineage players, the in-game currency "Adena" is valued at 100 Adena = 1 yen (Asahi Shimbun, August 5, 2003).

1.2. Exchange rate with Everquest money

[1] understood such a phenomenon that there emerged an exchange rate between real and virtual currencies based on purchasing power parity. For example, suppose that an item in Everquest is 100 PP. If the same item is traded in the real world at US$1, we can calculate that 1PP = 1 cent. Dr. E. Castronova, an associate professor at the Indiana University and the author of [1], [2], and [3], releases the Virtual World Currency Index (VWCI) on his own website,[(1)] as shown in the Table 1. This index represents the weighted average of the values of virtual currencies of leading online games. The index shows a downward trend.[(2)]

Table 1: Virtual World Currency Index

Quarter	Q2-02	Q3-02	Q4-02	Q1-03	Q2-03
VWCI	100.00	101.90	77.90	37.46	68.44

Source: Website of Dr. E. Castronova.

In addition, [1] calculated the mean hourly earning of players in Norrath as US$3.42, by using the hour of playing game necessary for the average player to earn PP. By using this, [1] also calculated "per capita GDP" in Norrath. According to the calculation, the per capita GDP was greater than that of India or China.

2. Economic analysis of virtual worlds

The aim of this paper is to discuss and analyze the currencies in virtual worlds. To do so, however, we need to clarify what the economic activities in virtual world are like. Many MMORPGs, including Everquest, have similar features in terms of economic system. I extend Castronova's analysis in [3] by specifying the properties of the utility function, which were not present in [3].

2.1. Meaning of virtual world research

In ordinary economics, we do not think of Norrath as if it were a real country. Any economic activities in Norrath are imaginary. That is, what we see on the screen is digital data consisting of graphics, texts, and sounds. And playing the game in the U.S. is only consumption or recreation in the U.S. In economic statistics, the activities are recognized accordingly.

Nevertheless, many economists have noticed that economic principles were functional also in this virtual world. For example, a price in case an avatar sells off an item to other avatar(s) within the game is decided by the negotiation between both parties. And we observe that scarce items, such as newly introduced items, have higher demand, and as the supply is increased, the prices tend to fall. Moreover, the chances of transactions are high in the place where many people (avatars) gather. Such a place evolves eventually to become a "market."

It is noteworthy that such economic phenomenon spontaneously arises in an artificial environment. Generally speaking, laboratory experiments are more difficult, if not impossible, in social sciences such as economics. However, by observing MMORPGs, researchers can analyze economic phenomenon under somewhat controlled environment. These can potentially be valuable opportunities for economists to see how an economy evolves and how people make economic decisions in the economy.

2.2. "Castronovian" utility function

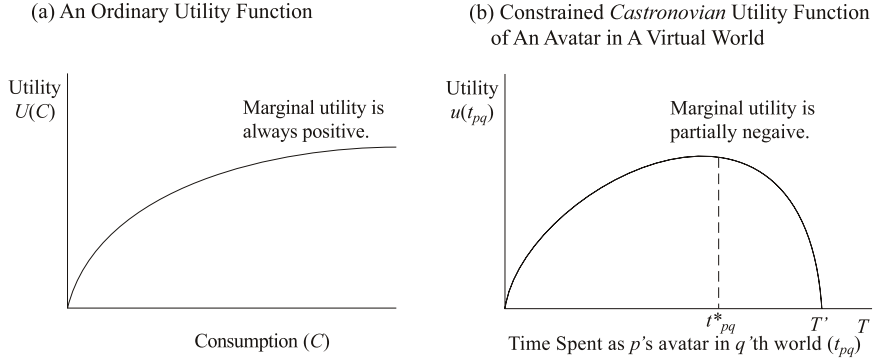
However, economy of a virtual world can be different from that of the real

world in many important ways. [3] analyzed virtual economies based on an idea that the virtual world was no less important than the real world. This reflected in the utility function that he developed in [3].

In ordinary utility functions as in the panel (a) of the Figure 1, economic agents maximize their utility by adjusting the consumption of goods, subject to the corresponding budget constraint. On the other hand, in "*Castronovian*" utility function, an economic agent is considered as a meta-self who possesses many personalities (avatars) in many worlds, including the real self in the real world. The meta-self allocates her time to each of avatars, and tries to maximize the utility of the meta-self. In this paper I adopt the idea and extend analysis of the virtual currencies. Assume that an economic agent (player) has j avatars in i worlds. As in [3] , the *Castronovian* utility function takes the form

$$U(...)=\sum_w\sum_a u(t_{wa};h(\underline{x},\underline{\mathrm{v}}_{wa},\underline{z}_w)), \tag{1}$$

Figure 1: Ordinary and *Castronovian* Utility Functions



where t_{wa} is the time spent as a=[0,1$\cdots$$j$-1,$j$] avatar in w=[0,1,$\cdots$$i$-1,$i$] world, $\underline{x}$ is the attribute of the player, $\underline{\mathrm{v}}_{wa}$ is the attributes of a's avatar in the w'*s world*, $\underline{z}_w$ is the attributes of w's world, and $(\underline{x},\underline{\mathrm{v}}_w,\underline{z}_w)$ is the function that aggregates these factors. That is, the function $u(t_{wa})$ represents the utility from spending time as a's avatar in the w'th world.

[3] did not provide further detail on the properties of the utility function. Thus I add constraints with respect to the time allocation, that is,

$$\sum_w \sum_a t_{wa} = T, \quad \text{and} \tag{2}$$

$$t_{00} \geq \underline{t}_{00}, \tag{3}$$

where T is the total available time, t_{00} is the time spent as the real world personality, in other words w=0, a=0, and $\underline{t}_{00}$ is the minimum time that t_{00} can take.

In ordinary utility function as in the panel (a) of the Figure 1, utility is generated by consumption of goods. An economic agent maximizes her utility by selecting what to consume and how much. In contrast, in the *Castronovian* utility function, utility is determined by allocation of time among different avatars, including the real personality. If there is no time constraint, the utility function for the time allocation should look similar to the ordinary utility function. However, it is not the case because the available time is limited for us. Specifically, if the player spends too much time to the avater q in the world p, her real life has problems, physically, financially, or psychologically. This reduces her utility u_{pq}, and results in unique features of the function. First, the amount of goods for consumption has no limit in ordinary utility functions, but in the *Castronovian* utility function, total available time that economic agent use is fixed at T, as in the Equation (2). If a player allocates longer time for an avatar, the time remaining for other avatars is shorter.

Second, there is a limit on the time that could be spent for each avatar. An avatar in virtual world is a *derivative* of the real personality, and the basic human needs can not be satisfied in the virtual worlds. To play game, a player should earn money in the real world. Therefore, as in the Equation (3), t_{00} has the lower limit. Here we define the time that is disposable for online games as T' and

$$T' \equiv T - \underline{t}_{00}. \tag{4}$$

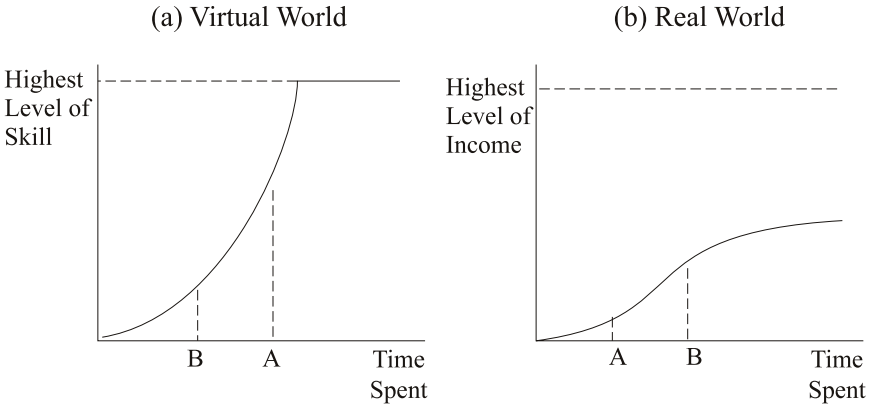
As the time spent in virtual worlds approaches T', the life of the player should involve an increasing degree of difficulty, due to the interaction among utilities of different avatars.[3] That is, the function u in fact is the constrained form. The panel (b) of the Figure 1 shows the utility function for q'th avatar in p'th world as $u(t_{pq}; K_{pq})$, where K_{pq} denotes the best possible allocation of time given t_{pq}. That is, $K_{pq} = [t_{00}, t_{11}, t_{12}, \ldots, t_{pq}, \ldots, t_{ij}]$, that satisfies

$$U(K_{pq}) \equiv \sup\left[\sum_{w}\sum_{a} u(t_{wa}) | t_{pq}\right]. \tag{5}$$

Then, in the constrained *Castronovian* utility function has a upward-sloping part for lower value of t_{pq}, but hit its peak at t^*_{pq}, and reduces to zero at T'. Thus we have relationships

$$\begin{aligned} &\partial u/\partial t_{pq} > 0 \qquad t_{pq} < t^*_{pq}, \\ &\partial u/\partial t_{pq} = 0 \qquad t_{pq} = t^*_{pq}, \\ &\partial u/\partial t_{pq} < 0 \qquad t^*_{pq} < t_{pq} < T'. \end{aligned} \tag{6}$$

Figure 2: Accumulation of Skills



As for the second derivative, we have $\partial^2 u/\partial t^2_{pq} < 0$, which is the same as in the case of the panel (a).

The *Castronovian* utility function substantially differs from ordinary utility functions, but what an economic agent does in the economy is not so different. In the former, avatars are like goods, and an economic agent purchases the avatars by spending time instead of money. The utility maximization through allocation of time for avatars is in essence the same as that through allocation of money to goods to consume. In this sense, we can analyze economic models based on the *Castronovian* utility function.

2.3. Why eBaying?

Next, I discuss the market of goods in virtual worlds. The particular focus is put on a question, "Why players trade virtual items in the real world auction sites such as eBay?" The real-world trading of virtual items, often called "eBaying", has become popular among players. Since the virtual currencies are used to purchase goods in the virtual worlds, we need to model the price mechanism that functions in the virtual world.

Due to the difference in utility functions, the market mechanism in the virtual world is somewhat different from that in our real-world economy. An important feature of this economy is that no firm exists in the games, and individual players (avatars) produce items and supply to the market. Time, the resource to be allocated, can be not only a source of utility but also a source of pain (which means, a decrease in utility), depending on the shape of utility function and allocation of time.

Assume that there is only one MMORPG virtual world, in which each player has only one avatar. Consider two players, A and B, and assume that A has higher in-game skills. Denote the level of skills of the two players as k_A and k_B ($k_A > k_B$), respectively. The skills affect time required to obtain in-game items. Define the necessary time for each of them to earn a newly introduced item as t_A and t_B ($t_A < t_B$), respectively. For simplicity, I assume here that $k_A t_A = k_B t_B$. And we denote the income in the virtual world per unit of time, denoted j_A and j_B, each of which is proportional to k_A and k_B, respectively. In addition, their real-world income per unit of time are denoted as h_A and h_B, respectively.

Players earn in-game skills based on experience in the game. The Figure 2 shows the patterns of skill accumulation in virtual and real worlds. To attract customers, as shown in the panel (a), the game operating company designs the game so that the players can accumulate new skills much faster than the players can accumulate real world skills in the real world. Some skills may be more difficult to obtain, but in many cases majority of players can reach the highest level by spending long enough hours to play. In contrast, as shown in the panel (b), we earn skills in the real world much more slowly, and many of us can not

reach the "highest" level. In this sense, the remuneration scheme in virtual worlds is similar to that of so-called *seniority* system (a typical characteristic of post-war Japanese-style management), rather than performance-pay system.

The assumption that player A has higher in-game skills leads us to another assumption that B has higher real-world income. That is, player A has higher in-game skill because she had already allocated a higher proportion of available time to the game than player B had. Player A could do so because the opportunity cost of time denominated by real-world income is lower than B. In contrast, due to the higher real-world income, player B put a higher priority to the real-world life, and allocate shorter time for game-play.

Each player has her own utility function for the time spent as the avatar. Up to now, they have allocated time period s_A and s_B for their respective avatars. Changes in utility when they allocate additional time for the avatar to obtain the new item depend on the current time allocation and the additional time requirement. When the player A increases her utility by playing the game by t_A longer, while the player B decreases her utility by spending additional t_B, both players would have incentive to trade items. More specifically, when there is a relationship

$$u(s_A + t_A) - u(s_A) > u(s_B + t_B) - u(s_B), \tag{7}$$

then player B would purchase the item from A.

The transaction price of the item in this simplified virtual world is determined by the opportunity costs of obtaining the item for both players in the virtual world. By assumption, these opportunity costs are identical; that is, $j_A t_A = j_B t_B$.

Limited virtual-world income relative to that of real world of player B provides her with incentive to purchase the item in the real world. In particular, since player B has short history of game play and allocates longer time for real-time job, it is likely that she owns limited amount of virtual money, and earns lower income while earning higher real-world income. Therefore, player B has higher opportunity cost in the real world than player A does, in other words,

$$h_A t_A < h_B t_B. \tag{8}$$

This means, both players A and B have incentive to trade the new item in the real world at the price between $h_A t_A$ and $h_B t_B$. If the item is rare, which is typically the case for newly introduced items, player B would be willing to pay up to her reservation price, $h_B t_B$. Then the exchange rate between virtual and real currencies is determined by h_B/j_B. As the supply of the item increases in the virtual world, the exchange rate would gradually decline to h_A/j_A.

The incentive for eBaying is affected by the differences in shape of the utility function and the real-world income. In the Equation (7), as the difference between the left and right hand sides widens, both players are to a greater extent better off by trading the new item. That is, the incentive for trading of the items in the game is accelerated. Likewise, in the Equation (8), as the real-world income of player B rises relative to that of player A, the incentive to trade the item in the real world is enhanced.

The above analysis reveals that the incentive for eBaying among players is inherent to the game design. In many MMORPGs, players earn skills and higher status based on in-game experiences. To make players feel achievement and fun, game developers tend to exaggerate the improvement of skills, and design the game so that the accumulation of skills occurs more rapidly than in the real world. This enhances *relative* difficulty of obtaining items for less experienced players. In addition, unlike in the real world, the skill accumulation basically does not depend on player's talent but on the time allocated to the game. Any player can reach the highest level as long as she allocates enough time for the game. Then for those players who are more constrained in terms of time allocation but less constrained in real-world income, it is rational to trade the virtual items by using the real currency. Player A, to maximize her utility, exploits her comparative advantage in the available time for the game. Likewise, player B exploits her comparative advantage in the holding of real currency.

3. Analysis of virtual currencies

Next, I analyze the currencies in virtual worlds, the main theme of this paper.

3.1. What is a "currency?"

In ordinary economics, we do not classify in-game virtual currencies as *real* currencies. For example, Monopoly, one of the most popular board games, has a currency called "dollar." However, this is only a part of game, and the Monopoly dollar can not be a real currency. Then, what are the differences between virtual currencies of MMORPGs and ordinary games?

Money has been an important subject of analysis in the history of economics. Many researchers discussed what is money in many different ways. In this paper, I do not go into detail about the definition of money. In general, money has the following three functions: (i) medium of exchange, (ii) measure of value, and (iii) mean of storage. For an object to function as money, the value should be assured in some way. In the past, many societies used precious metals (gold, silver, and etc.) for money. Nowadays, the assurance of the value of money in many nations is credit of the issuers, backed by the government. Money is money because people believe it as money.

In this sense, we should admit that many virtual currencies, such as Monopoly dollar and PP in Everquest, have these three functions in the virtual world of games. For example, Monopoly dollar is the medium of exchange, the measure of value and the mean of storage of value.

Virtual currencies can be valid only in the corresponding virtual world. But this is not a problem for the virtual currency as a currency. Any real currencies in the world are used within some geographical boundaries. For example, we can not purchase goods with Zimbabwe dollar in Japan. But this does not contradict with the fact that Zimbabwe dollar is the legitimate currency in Zimbabwe.

The goods in the virtual world are only imaginary and have no physical substance, different from real-world goods like bread or automobiles. But this is not a problem, too. In the real world, we have goods that do not have physical substance, for example, brands and information. An online game is a kind of information service provided through the Internet. There is no reason for us to distinguish an in-game item (a piece of information) from other piece

of information provided in other websites. These virtual goods are "rare" in economic sense in the virtual world, and have value for the dwellers in there.

The government does not assure the value of virtual currencies. But this is not a problem, too. A currency is a currency because people believe so, and thus the assurance of value by the government is not necessary if the value is assured in other ways. For example, Sony, the creator and the ultimate authority of the virtual world, assures that PP, the currency in Norrath of Everquest, as the legitimate currency. Players have no concern about the value of PP in the game. And this is the same for Monopoly dollar. In this sense, in-game virtual currencies are the same as the real currencies.

Therefore, it is only a preoccupation ("virtual worlds are not the object of economic analysis") that has divided the virtual and real currencies. When we adopt the basic idea in [3] and take human activities in virtual worlds into consideration, the distinction has lost its reasoning. Virtual currencies *are* currencies.

3.2. A "meaningful" virtual currency

However, we cannot conclude that the Monopoly dollar is identical to the real currency. As Adam Smith told, the demand for money is determined by what we purchase by using the money. That is, the virtual currency in a MMORPG is used for consumption in the virtual world. Both a building in Monopoly and an item in Everquest are imaginary goods. However, it is quite different that many Everquest players are willing to purchase the in-game items by using the real currency; on the other hand, no one would buy an imaginary building in Monopoly by paying real money. Therefore, PP is characterized as a "meaningful" currency, which can be exchanged for the real money. This effectively means that we have exchange rate between PP and real currency. Not so many virtual currencies have exchange rates. In this sense, PP has become a "meaningful" virtual currency that is first analyzed.

4. Virtual currency as "LETS"

Despite the similarity of virtual currencies to real currencies, the former is significantly different from the latter in some important ways. This leads us to a hypothesis that we should view these virtual currencies as so-called Local Exchange Trading System (LETS).

4.1. Differences between virtual and real currencies

The major differences between the virtual and real currencies are twofold. First, players themselves issue PPs. In many MMOROGs including Everquest, players obtain items by activities in the game, and sell them to earn PP. The total amount of money in the virtual economy is unchanged if a player sells the item to other players, but it does change when she sell the item to a computer-controlled merchant. There is no central bank in the game, and no one controls the money supply.

The absence of the central bank has a significant meaning when we analyze the economy of Norrath. One of the major roles of the central bank is to issue currency, and to control the total amount of money in the economy and affect the general price level. But there is no such institution in Norrath. Thus the balance between goods and money is determined by collective consumption/saving decisions by players. The total wealth of avatars, in other words the sum of virtual items and money, is increased rapidly. Therefore, as time passes, the scarcity of virtual items and virtual money relative to those in the real world declines. What makes PP as a "meaningful" currency is the existence of the items that players are willing to buy by using US dollar. Thus this decreases the value of PP compared to that of real currencies. In other words, virtual money is destined to depreciate.

Second difference is that there are no interest rates in virtual worlds in general. The absence of interest rates, *ceteris paribus*, reduces incentive for saving and raises that for consumption. Since in many virtual worlds such as Norrath does not have inflation, we can not say in general that consumption is preferred in virtual worlds relative to the real world. Nevertheless, still there

should be greater incentive for consumption compared to the case in which there are interest rates.

4.2. History and Current Status of LETS

The above differences can be better understood if we the view virtual currencies as *local currencies* rather than ordinary currencies. Many of local currencies that we see today in the world are similar to the Local Exchange Trading System (LETS) developed by Michael Linton in U.K. A LETS is defined as "a trading network supported by its own internal currency; it is self-regulating and allows its users to manage and issue their own *money supply* within the boundaries of the network."(4) In ordinary LETS, each participant has an account with initially zero balance. She lists the goods or services that she can provide, and records a sale when she provides the goods or service, and a purchase when provided. The values of goods or services exchanged are denominated in the local currency.

Notice here that the LETS is issued by participants. In this scheme, a participant can theoretically continue to purchase (goes deep in the red) while providing no goods or services. But since the system is operated in a relatively small community, such free-riding behavior tends to be discouraged. The absence of interest rate intends to enhance "consumption" of goods and services. In fact, many LETS involve administration costs that are subtracted from the accounts. These costs effectively mean a negative interest rate. These characteristics are shared by many virtual currencies. In other words, the virtual currencies in MMORPGs are local currencies in online cyber-communities.

Historically speaking, LETS has been considered as an antithesis to capitalism and a mean to resist against exploitation by outside capitalists. As Nishibe (1999) described, the discussion has been in the context of communism. But now, the proponents of LETS put more emphasis on enhancement of local economic activities and environmentalism; it is an alternative for globalization.

In recent Japan, many local economies in countryside are still sluggish. Under the circumstance, more than 100 local communities adopt LETS to

enhance consumption in the local economy.

The greatest difference between virtual currencies and real world LETS is that the virtual currencies are not subject to geographical boundaries. An ordinary LETS is geographically bounded because implementing the system requires implicit binding power of community. Any existing LETS are valid only in some relatively small communities in small areas. Therefore, the values of the LETS, by which people can purchase goods and services, link with specific real currencies, such as yen or dollar. Thus they do not need to worry about exchange rates. In case of MMORPGs, a community can consist of members from all over the world, irrespective of physical and social boundaries. In fact, Everquest has approximately 100,000 out of 450,000 subscribers living outside the U.S. In this sense, I understand the emergence of "meaningful" virtual currencies as an early sign of a "global LETS."[(5)]

5. What does the virtual currencies bring us?

In this section, I discuss the implication of the emergence of the "meaningful" in-game virtual currencies. A virtual currency is considered as an important part of the economy of the virtual world. And the analysis of virtual worlds is often useful in understanding our real economy. In addition, if we broaden our view to the entire fields of Internet, we can see a potential impact of the global LETS on our real economy. Global LETS can potentially be a numeraire of the value of information and services in the Internet, where there are emergence of non-monetary-based activities.

5.1. Implications to the real worlds

In recent years, we have been observing an expansion of activities of people in online networks. A government survey released in this April revealed that in Japan, 62 million people, more than 48% of total population, have access to Internet through PCs. 42% of individual Internet users have broadband access at home, and 40% access online everyday. About 11% of the individual Internet users through PCs play online games. A different survey, the White Paper on

Information and Communication 2001, reported that online game users on an average play a few hours a day, and at least a few times a week. If we suppose that a user plays online games 3 hours a day, 3 times a week, she plays 9 hours a week. It is not negligible compared to the fact that the legal working hours in Japan are 40 hours a week.

The human activity in virtual worlds, despite its increasing importance in our lives, does not reflect in the existing economic indicators. As [3] argued, players of MMORPGs enjoy utility from activities as avatars in the games. The satisfaction of the players affects their behavior seeking for utility maximization. Similarly, people's activities in cyberworld other than games increase the importance in their lives. But the importance of these activities is not fully understood. Enhanced activities in virtual worlds mean that people allocate longer time for the virtual worlds. Given that the total amount of human activities is the same, this effectively means shrinkage of our real-world economy. However, this is not necessarily our worse off; taking the virtual-world activities into account, we may be in fact better off by increased total utility from the "off-account" virtual economies.

At least a part of the activities in the Internet clearly has more than negligible importance in terms of quality, too. In many fields of cyberworld, a boundary for professionals and amateurs has become increasingly ambiguous. Contributions by individuals or groups of people not for monetary compensation are now equally important to the contributions by profit-seeking professionals. For example, Linux, an operating system that was developed by a university student, has grown up to a leading competitor to the market dominator, Microsoft Windows, because many engineers provided spontaneous contributions for improvement with no monetary motivation.

When we think of the virtual world economy, we should not neglect that the value system in cyberworld is not necessarily compatible with that of our existing real-world economic principles. In principle, the Internet is based on participation of spontaneous participants. Exchanges of information and services there involve reciprocity. In other words, the values of the information

and services that are exchanged in the cyberworld, as long as the two parties agree, are not necessarily consistent with the value system of the real world. It is less likely that arbitrage trading occurs in virtual economies. Notice that this characteristic is similar to that of a local currency, which is effective in a small community consisting of people with shared value system and interest. In case of the virtual currency, the community exists in the cyberworld, irrespective of physical distance.

Virtual worlds have become meaningful to our lives. However, we have not yet known fully on what is the mechanism of exchanges of information and services in these worlds. Virtual currencies in MMORPGs share common value system with the human activities in other field of the Internet. Thus the analysis of these currencies provides us with important insights on how we should think of the virtual worlds.

In addition, for those opponents against government intervention on the Internet, the concept of virtual currencies has further importance. As people's activities in the Internet expand, governments of many countries may become interested in taxation on items and transactions in the cyberworld. When we denominate values in virtual worlds into the real currencies, it is more difficult to defend these values from taxation. In this sense, values in the virtual world should be denominated in a unit that is unique to the virtual world.

5.2. Lessons from virtual worlds

Furthermore, our observation of virtual worlds of MMORPGs has become increasingly important opportunities to improve our real society. Recall that the virtual world can be a laboratory for experiments in economics. Although online games are operated for fun rather than research, the cyberworld in these games provide important opportunities on how we design and operate our economy.

Lessons learned from the experience of running virtual worlds are useful to run our real economy because our economy has turned into "fun-based" economy. In many advanced economies, people become less concerned about threat against their lives. They basically own everything they need to their

everyday lives, and become less interested in further improvement of living standard. We have been steadily losing the centripetal force that has united our society as a group.

In such an environment, policy makers should become more concerned about how to motivate people toward socially meaningful activities. And some people focus on "fun" element of the economy. In conventional economics, job is only a pain. People try to minimize labor. But we know that some people are in fact willing to work longer and harder, not because of monetary income, but of fun. Notice that the reason for those people to work is the same as that for the players to play MMORPGs. That is, self-fulfillment. Game companies try their best to attract customers by designing the "quests" or jobs in the games more enjoyable. Why don't we utilize the know-how of these firms to design our real-world economy?

6. Concluding remarks

Many people might think that the virtual worlds are different from the real world. Yes, they are, for the time being. But remember the situation 20 years ago. How many of us could imagine such a rapid expansion of the Internet, and resulting changes in our lives? Our current situation has gone far beyond our imagination in those days. What we observe today may be a sign of our own future. Virtual worlds can potentially be our new frontier. Some of us have already let their avatars "migrate" there, and are building new communities. Understanding the virtual worlds and their economy is beneficial for both of the (real) society and ourselves.

Note

(1) http://mypage.iu.edu/~castro/home.html

(2) The index rose in the third quarter of 2003. Dr. Castronova analyzed that this phenomenon had a specific reason; introducion of new games to the market.

(3) In Korea, a 24-year-old male died after playing an online game for consecutive 86 hours (IT Media News, October 9, 2003).

(4) http://www.gmlets.u-net.com/home.html

(5) We should put some reservation on this point because in reality many MMORPGs, game companies set up different servers from region to region.

References

[1] Castronova, E., "Virtual worlds: a first-hand account of market and society on the cyberian frontier", *CESifo Working Paper* 752, California State Univ. Fullerton, 2001.

[2] Castronova, E., "On virtual economics", *CESifo Working Paper* 752, California State Univ. Fullerton, 2002.

[3] Castronova, E., "Theory of the Avatar", *CESifo Working Paper* 863, California State Univ. Fullerton, 2003.

[4] Nishibe, T., "Chiiki tsuuka LETS - Kahei, Shinyo wo Koeru Media," in K. Karatani ed., *Kanou Naru Communism,* Ohta Shuppan, Tokyo, Japan, 1999 (in Japanese).

オンラインゲーム中の仮想通貨に関する分析

＜ 要 約 ＞

山口　浩

多人数参加型オンラインロールプレイングゲーム（MMORPG）のプレイヤーたちの一部は、ゲーム中の仮想世界のアイテムを現実通貨で取引している（この行為はアメリカで俗に「eBaying」と呼ばれる）。本稿においては、Castronova（2001）のモデルに基づき、仮想世界および現実世界における仮想財の価値について分析を行った。「eBaying」を行おうとするインセンティブは、ゲームのデザインから生まれる。ゲーム中の仮想世界における仮想通貨は、限られたコミュニティで使われ、「中央銀行」によるマネーサプライのコントロールを受けず、金利が存在しないなどの特徴から、通常の通貨ではなく、いわゆる地域通貨（LETS）と考えたほうがよい。これらの仮想通貨は地理的な制約を受けないことから、「国際」地域通貨になりうるものといえる。「eBaying」の存在は、仮想通貨が現実通貨との為替レートを持ち、現実経済にとって「意味のある」通貨となったことを意味する。今後、インターネット内のオンライン世界がわれわれの生活にとってその重要度を増していくにつれ、これら仮想通貨もより重要な存在となってくる可能性がある。