

Looking to Sell: Assessing the Real World Value of Virtual Property

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by

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Abstract

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With the increasing popularity of massively multiplayer online gaming, virtual property is beginning to become a significant new phenomenon. Not only is this new form of property being increasingly recognized by people around the world, but large quantities of it are bought and sold daily. This paper discusses the definition of virtual property and attempts to fit virtual property into the traditional understanding of private property. This paper analyzes how virtual property in online games is being treated by players and, more importantly, by the game developers. The paper then turns its focus to the manner in which virtual property behaves in real world markets, using World of Warcraft and the real money trade for its virtual currency of gold coins as a case study. Finally, this paper discusses how the differing treatment of virtual property by different game developers affects the players and the game developers associated with that virtual property and what legal and economic issues have and will likely be faced in regard to this new form of property.

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I. Introduction

When one thinks of property, one typically thinks of land, houses, cars, and other objects that a person can acquire out in the world. Over the past decade, however, the appearance of a new form of property has begun to alter the traditional understanding of the term. This new property, virtual property, exists entirely on the internet, but, despite the fact that it is essentially nothing more than a collection of computer code, large numbers of people are buying and selling it every day using real money. The most noteworthy virtual property being traded today consists of property that exists within massively multiplayer online games. Large sums of real money change hands daily in exchange for these virtual goods, often against the wishes of the developers responsible for creating the online games from which the virtual property originates.

This paper discusses the emerging phenomenon of virtual property. To start, the author reviews the traditional understandings of private property and its philosophical origins. Within this context, this paper discusses how virtual property fits into and expands the general understanding of private property. To further illustrate how virtual property is perceived and what role it has begun to play in economic affairs, this paper analyzes its treatment in two different massively multiplayer online games, Second Life and World of Warcraft. The contrast between the treatment of virtual property by the developers of each game serves to shed further light on the nature of virtual property. Furthermore, this paper utilizes a regression analysis of real world markets dealing with virtual property in World of Warcraft to determine whether virtual property may be observed to behave the way that real property does in economic markets. Finally, the

paper draws on the expanded understanding of virtual property to explain the reluctance of many game developers to acknowledge any potential for the right of virtual property ownership by online game players and to discuss the consequences that may occur if it such rights are recognized.

II. Property

A. Private Property

Private property, in practice, has existed for as long as life has existed on earth. After all, a bird that defends its nest from intruders indicates to the world that said nest belongs to the bird and is not free for all to share. Hence, the nest is effectively a piece of private property in the most basic understanding of the term. One assumes, however, that the bird does not have an understanding of private property as a concept or what qualities make something private property. The bird only understands that it needs that nest for itself and its young. Similarly, it may be that the first humans to inhabit the earth did not have a firm understanding of private property. Despite this initial ignorance, the evolution of human societies has eventually led to understandings of private property and, furthermore, social rules regarding ownership thereof (Engels, 1972).

In societies consisting of nomadic or semi-nomadic tribes, possessions were few, including little more than clothing, crude tools, a shelter, and whatever food was not immediately eaten and still fit for consumption over the following days. Shelter and food were certainly treated as private property, but, as most of these possessions were transient, the question of ownership beyond the right of immediate use was not of major concern. As these tribes, for instance the tribes of Mesopotamia and the surrounding

regions, settled into an agrarian lifestyle, their possessions became of a more permanent nature. Livestock, in particular, came to carry a great deal of value as these animals could provide a family with food indefinitely, making hunting and gathering no longer necessary. These valuable possessions became recognized as the property of the gens, or extended family, with a matrilineal system of inheritance among the Mesopotamian peoples. Still, some recognition existed of property belonging to an individual. For instance, the tools used by a man in his work would be taken with him in the event of a separation with his wife. The wife would retain her tools as well. These patterns of property retention show that, despite the general treatment of a household as a single entity, there existed rules to govern the distribution of property in the case of the household's dissolution (Engels, 1972).

It is from these ancient traditions that the modern perceptions of private property evolved, but history does not explain how an object or a territory that exists without previous ownership in the world may become a piece of private property. To this end, a significant contribution to the philosophical discussion of private property comes from John Locke. Locke asserts that, logically, one must agree that for most objects to be of any use, they must at some point become private property. For instance, an apple growing wild in nature must be picked from the tree and eaten in order to feed someone. When the person eats the apple, he or she deprives the rest of the world of that apple as a source of food. The apple, at some point, becomes private property and leaves the realm of the commons. Locke argues that the exertion of labor to make the object useful transfers that object into the realm of private property into the ownership of the laborer. In the case of

the apple, the labor takes the form of plucking the apple from the tree or picking a freshly fallen apple from the ground. Similarly, the development of a piece of land to make it useful for growing crops, feeding livestock, or any other purpose grants the developer the right to consider that plot private property (Locke, 1689).

Locke's philosophical approach to property is certainly imperfect. To start, it does not properly address the question of how private property should be distributed. Locke states that individuals have a right to own all property necessary to their survival, provided that sufficient resources exist in the commons. He adds that no individual may acquire property only to let it go to waste but may exchange any surplus for money, which can be hoarded in any quantity indefinitely as money does not expire on its own, generally speaking. This philosophy leaves open the question of whether and to what extent one person has the right to deprive another of a surplus in order to increase one's own wealth. Criticisms of Locke's philosophy on property also include his apparent assumption that all objects must be possessed to be used (Kramer, 1997). It may be argued that certain things, music being an example, may remain in the commons and still be of use. Critics have also questioned the sufficiency of exerting labor upon an object in order to obtain ownership. Gopal Sreenivasan argues that creation, not just an actively achieved increase in value, is necessary to grant the right to ownership. Furthermore, he calls into question the validity of gifts and inheritance's as these result in the transfer of private property without the exertion of labor or the exchange of other property, such as currency (Sreenivasan, 1995).

From the historical account of the development of private property recognition and the philosophical discussion thereof, one can reach certain conclusions about the nature of private property. First, private property has existed, in practice, since the dawn of humanity. As Locke pointed out, if food was not treated as private property, mankind would have starved to death. Furthermore, there appears to be an agreement that private property can be obtained through an act of creation that produces from the commons something of greater value, provided that the created property is of use to mankind as a whole or to one of its members and that it is then actually used in a productive manner. Even Karl Marx, arguing for the necessity of converting private property back into common property in direct contradiction of Locke's writing, states that private property is ours when it exists "as capital, or when it is directly possessed, eaten, drunk, worn, inhabited, etc., – in short, when it is *used* by us" (Marx, 1844).

B. Virtual Property

Unlike regular private property, an idea that has existed for ages, virtual property is a relatively new concept. "Virtual property is rivalrous, persistent, and interconnected code that mimics real world characteristics" (Fairfield, 2005). These characteristics set virtual property apart from other forms of computer code that can be found on the internet. A video that is submitted to a public online website may be viewed, copied, and saved by millions of users without depriving anyone of the ability to do the same. Conversely, virtual property, such as a domain name or an item in an online game, cannot be used by many people. Like rivalrous property in the real world, ownership by one person tends to prevent ownership by anyone else. Virtual property is persistent in the

sense that it continues to exist online after the user finishes interacting with it and turns off his or her computer. For instance, an email may remain in the user's inbox indefinitely after the user logs out of the email account. The same user or a different user with the proper authorization can then access this virtual property at a later time. Finally, virtual property can be described as interconnected because numerous users are able to interact with the same piece of virtual property without necessarily having ownership of said property, allowing the users to share a common experience with each other. For example, a website, though privately owned, may be accessed by millions of users with every user experiencing the website in the same way (Fairfield, 2005).

Although virtual property takes many forms, this paper focuses on virtual property as it exists in massively multiplayer online role playing games (MMORPGs). These games are characterized by the presence of a large virtual world in which players interact with one another in a variety of ways as the primary means of taking part in the game. These games often host a large number of players from across the globe with the games continuing indefinitely, making them distinct from games designed for online play among small groups for short periods of time (Castronova, 2005).

Within the virtual world that exists in each game, players interact with each other and the virtual world, usually through the use of avatars. An avatar is a character created in the game to represent the player. In most of these games, the avatar can acquire a large variety of virtual items.¹ The nature of these items and the manner in which they are obtained can vary from game to game, but the most common way of acquiring items is to

¹ The existence and functions of avatars and items vary from game to game. Both are discussed in greater detail in respect to specific games later in this paper.

receive them from non-player characters (NPCs). Some NPCs can be killed and “looted” to obtain items. Others are virtual merchants that will barter with players for useful items. Still others may give out items as rewards for completing tasks. Furthermore, these games usually have a system through which players can barter with one another for the items they want. For instance, if a player in a fantasy MMORPG wishes to slay a dragon, but finds his or her armament insufficient to survive the virtual battle, he or she may purchase the necessary equipment from another character using virtual currency or other virtual items (Bartle, 2004).

In addition to acquiring better items through the mechanics of the game, players can also often improve the characteristics of their avatar through game play. This acquisition of virtual property, in the form of items and avatars, through effort put into playing the game brings up the question of who owns the virtual property, if it can be owned at all. One can make the argument that virtual property can be owned simply because players agree that it can be owned. In a way, this is similar to buying shares in a company on Wall Street. No physical property may have changed hands, but the buyer and seller both agree that the buyer will be considered owner of the shares in exchange for a fixed sum and will thereby have certain rights that were previously held by the former owner in regard to those shares (Bartle, 2004).

Moving from the assumption that virtual property can be owned, different game developers take different stances on whether they or the players are the owners of the virtual property. Most developers state in their End-User License Agreements (EULAs) that the player has no rights to any game content, including the player’s own account.

One notable exception is Linden Lab, maker of the game Second Life, which acknowledges users' rights to all content they obtain or create within the game. Still, even Second Life's EULA grants Linden Lab the right to delete any and all user content for any or no reason (Horowitz, 2007).

Application of Locke's philosophy on property gives no clear answer to the question of virtual property ownership. Players put forth their time and effort into obtaining items and bettering their avatars. Locke's writings do not describe labor as an inherently unpleasant activity, but use it in the neutral sense of work done that creates a new object or increases the value of an existing object. Based on this definition, game play can certainly be considered labor, as Locke uses the term. This argument for the creation of property through game play, however, assumes an existence of a commons from which private property may be taken. This assumption is debatable. When a player kills an NPC and obtains an item, that player has effectively created an item that did not exist previously in any useable fashion. In fact, the item may not have existed at all if the code used in that particular game only generates the item once the NPC is killed. Still, it is the developer that created the NPC in the first place, along with the player's avatar and equipment that allowed that player to kill the NPC. Using an intellectual property argument, one may claim that a party providing the framework in which a second party is able to create private property through labor does not grant ownership of that property to the first party. For instance, if the first party tells the second party about an idea for a song and the second party uses that idea to write a song independently of the first party, the first party cannot claim ownership of the song (Horowitz, 2007). Conversely, if one

considers that the NPC, avatar, and avatar's equipment are the property of the game developer, then it cannot be said that the player is entitled to ownership of the item by virtue of putting labor into killing the NPC that held it. Such a statement would be tantamount to declaring that a painter could take ownership of another person's house, provided that he painted a mural on the house wall and thereby increased the value of the house (Bartle, 2004).

Further light can be shed on the ownership of virtual property by looking at the court ruling in the *Bragg v. Linden* case settled in late 2007. In 2006, Bragg had his Second Life account terminated for participating in an illegal sale of virtual land². When Linden terminated his account, Bragg sued, claiming that the terms of service agreement he made when he opened his account was unconscionable, due to his inability to debate the terms. The court found in favor of Bragg and ordered his account and virtual property restored (Dougherty, 2007). It should be noted that Second Life is known for placing a high value on players' rights to own the virtual property that the players create and acquire. Still, the court's willingness to overturn a terms of service agreement and to regard virtual property as analogous to real property indicates that the legal claim of developers to virtual property may not be as strong as their EULAs indicate. These principles of virtual property ownership are particularly important in relation to the phenomenon of real money trade (RMT) for virtual property, discussed at length in this paper.

² Land ownership within Second Life is explained in the next chapter.

III. Second Life

One massively multiplayer game that deserves special attention is Second Life, created by the Linden Lab. This particular game is significant for two reasons. First, the game world is primarily defined by player created content. Second, as noted earlier in this paper, all player created content in Second Life is considered to be the property of the players, although Linden reserves the right to delete any content it chooses or to cancel player accounts (Dougherty, 2007). Combined with the game play mechanics of Second Life, this treatment of player created content has led to a recognition, unlike that seen in many other massively multiplayer games, of virtual property as private property.

The game is designed to allow players to live online any life they would like, provided they are willing to make the effort to construct it. As in other MMORPGs, players are portrayed in the world as avatars. These avatars can go shopping, dance in a club, have sex with other avatars, pilot spaceships, go skydiving, and do anything and everything else that the player can imagine. Using “prims,” the basic building blocks that make up all objects within the game, and the game’s scripting language, players can produce any object they desire, including but not limited to buildings, furniture, vehicles, pets, fruit, and weapons. Players can also customize their avatars. The most basic customizations include changing clothing or altering skin tone, body type, facial features, and hair. Other avatar alterations include creating robotic arms, vampire teeth, or animal tails, or making the avatar look like a dragon or other mythical creature. One player even created an avatar that looks like Marcel Duchamp’s “Nude Descending a Staircase.”

Further popular customizations include the addition of scripts to allow the avatar to perform various actions like dancing or hugging (Rymaszewski et al., 2008).

With a nearly unlimited ability to create, it is only logical to include the ability to exchange. Players can buy and sell any player created content they desire within the game. Such exchanges are typically paid for in Linden dollars (L\$), the official currency of the game world in Second Life. Virtual currency in the game is obtained through stipends, selling items, or completing tasks that provide a reward. Not surprisingly, a vibrant economy has emerged, with players creating, buying, and selling virtual property within the game. Purchasable items include everything from clothing to weapons to avatars. In mature rated areas of the game, players can even purchase avatar animations to allow their avatar to perform adult themed activities (Rymaszewski et al., 2008).

Consequently, the ownership of territory within the game world is an important part of the game play. A player is allowed a limited quantity of prims, dependent on the amount of land the player owns within the game. As a result, productivity may be limited by a lack of property. Furthermore, the possession of real estate allows players to construct a shop or other public attraction on that piece of virtual land. Shops allow players to earn Linden dollars by selling their original virtual property. Other types of buildings may also generate funds. For instance, a player receives a certain amount of Linden dollars for large numbers of other players' avatars congregating on that player's property. Therefore, the creation of any sort of popular venue would allow players to earn virtual currency that could then be spent on desirable items. It should also be noted that creation of original content and interaction with other players' avatars are central to the

idea of Second Life so property ownership yields nonmonetary benefits, as well (Rymaszewski et al., 2008).

With the desire of players to own property within the game, real world money begins to play an important role in the lives of Second Life players. While a basic Second Life account is free, these accounts do not allow players to own land. In order to become a land owner, without subletting from other players, players must apply for a premium membership. This membership costs approximately \$10 per month with a discount for paying in annual lump sums (Rymaszewski et al., 2008). Land can then be purchased from Linden, also for real currency. In 2008, the smallest piece of virtual land one could buy in Second Life was 768 square feet and cost \$70 in real-world money. There is also a monthly maintenance fee which depends on the amount of land a player owns. With real world monetary values assigned to virtual property in this manner, it is nearly inevitable that an exchange rate would develop between real-world money and the Linden dollar. This is, in fact, the case, officially indicated by the establishment of LindeX, Linden Lab's currency exchange which buys and sells real currency in exchange for virtual money. Historically, the exchange rate has fluctuated between 200 and 300 Linden dollars to one US dollar. Given the exchange rate, a dollar value can reasonably be assigned to any item being sold within the game for virtual currency. Also, while there might not be an efficient way to calculate GDP for the Second Life economy due to the large number and variety of virtual goods in existence, one can calculate the dollar value of the game's money supply. In 2008, the virtual money supply was roughly equal to 1.8

billion Linden dollars. At an exchange rate of L\$267.70 to \$1, the money supply could be estimated to be equal \$6.9 million (Terdiman, 2008).

The practice described above of trading real-world currency for virtual currencies and items is known as real money trade (RMT). It is RMT that gives virtual property quantifiable value. Without RMT, Linden dollars are essentially equivalent to the scrip that used to be injected into economies in the real world when the money supply fell too low to allow for cash to be distributed to workers (Rymaszewski et al., 2008). Like scrip, Linden dollars in an RMT-free environment only have value because players agree that they have value. Should this understanding be abandoned, the value of the Linden dollar would drop to zero. With the introduction of RMT, however, the Linden dollar begins to derive its value, not from the consent of the players that populate Second Life, but from legal tender issued by the United States and other governments. It should be noted that in the case of *Bragg v. Linden* mentioned earlier, the two parties disagreed about Linden's right to deprive Bragg of his property and the value of said property. Neither party, however, made the argument that the property did not have value in terms of real currency. Linden estimated Bragg's property to be worth \$5,902.80, while Bragg arrived at the estimate of \$8000 (Dougherty, 2007).

It is this assignment of value to virtual property in Second Life through the mechanism of RMT that makes the issues of ownership particularly important. Generally, players have full rights over the content they create or acquire. The players are able to profit from their work by selling their creations and converting them into real world currency, while Linden Lab profits from their work in creating the virtual world in the

form of land fees and premium membership dues. From a Lockean perspective, one can argue that all parties are receiving the property which they have created through their labor. The problem occurs with Second Life's terms of use clause allowing Linden Lab to expel players from the game, depriving them of their property. Economically, this clause results in inefficiency as the risk of losing time and money invested in the game economy through a canceling of one's account or the deletion of one's property may discourage individual players, as well as real world firms, which have begun establishing themselves within Second Life to expand their business, from committing to their money-making endeavors, reducing the growth of Second Life's economy. Legally, the court recognized the right of users to virtual property within Second Life in the *Bragg v. Linden* case, making future exercise of this clause unlikely. At the other extreme, giving up the right to prevent players from playing Second Life deprives Linden Lab of control over the platform of Second Life, something that clearly falls into the category of Linden's private property. To address these issues, Caramore suggests in her paper that Linden Lab should have control over whether players can continue to access the Second Life virtual world but be required to compensate players for the value of the property lost (2008). The question this argument begs is whether legal rulings for the rights of the player with enforcement through the paying of damages are economically efficient. Linden's unwillingness to ban Bragg and compensate him for his losses indicates that the costs of such an approach may be too high for the game developer.

Second Life presents a more straightforward approach to virtual property than many other massively multiplayer games. All content created through the efforts of the

player is considered to belong to that player, and RMT is allowed and even encouraged. The rights of players to their virtual property has even been supported by the courts, despite Second Life's terms of service agreement, which claims that Linden Lab can deprive Second Life players of their property rights if it so chooses. Thus, the prevalence of RMT in association with Second Life greatly lends support to the view of virtual property as effectively no different than any other form of private property and thus the property of those individuals or groups responsible for the creation of that virtual property.

IV. World of Warcraft

By design, Second Life treats virtual property as private property owned by those who purchase or create it. Furthermore, the RMT system established within the game makes it easy to assign real-world value to the virtual property that exists within Second Life. The same cannot be said for MMORPGs that do not recognize users' rights to the avatars and items they acquire during play. As stated earlier in this paper, many of these games feature EULAs that state that the developer retains ownership of player accounts and everything contained therein. To examine whether and what real-world value can be assigned to virtual property in these games, it is useful to look at the market mechanisms that exist within these games and the RMT that exists for the virtual property generated or otherwise acquired by players. This paper examines World of Warcraft, in particular, as a case study.

A. The Game World

To properly analyze the market mechanisms within World of Warcraft, it is first necessary to discuss the rules of the game, so to speak.³ Players purchase a subscription to the game service, paying \$14.99 monthly with a discount for lump payments for several months at a time. Once the player has set up his or her account, he or she must select a game server. Each server is an identical copy of Azeroth, the game world. Game play on these servers only differs based on the rules that govern game play on the server and the decisions made by the players who populate each server. The one rule that binds all players is the one regarding unsolicited player versus player violence. Player versus Player (PvP) servers allow players of differing factions to attack one another at will, provided that the territory in which the combat is to take place is not designated for beginner players. In these areas, the designated invading faction cannot initiate combat. Normal servers, by contrast, only allow combat between factions in official “battlegrounds” or in cases when both players expressly indicate that they would like to engage in combat.⁴ By allowing for unexpected assault from other players, PvP servers provide a much more Hobbesian experience for players than the normal servers. Another rule, albeit a less enforceable one, is role-playing. Most servers are not role-playing servers. That is, players are free to be themselves on these servers. Alternately, several servers are designated as Role Playing (RP) servers. These servers are intended for

³ The author has over three years of firsthand experience playing World of Warcraft. All information, unless otherwise noted, regarding World of Warcraft game play is given from firsthand experience and can be verified by consulting the World of Warcraft game guide (Blizzard Entertainment, Inc., 2009).

⁴ Battlegrounds take the form of competitions between the two factions with two teams fighting against each other in games such as capture the flag, king of the hill, and other variations.

players who would like a more immersive experience and choose to take on the persona of their avatar in action and speech.

Once a server is selected, players must select a faction: Horde or Alliance. The factions differ in the locations that they dominate within the game world and various other details, but game play is generally the same for both. The choice is largely based upon player tastes. Once the server and faction are selected, players must choose between the five distinct races available to each faction and then from a number of classes available to each race. Having made these decisions, along with purely aesthetic ones regarding gender and appearance, the player creates an avatar to represent him or herself in the game world. Unlike in Second Life, the player cannot continually customize his or her avatar after the avatar is created. An avatar's race and class are fixed forever, as are some aspects of the avatar's appearance. This avatar can explore the game world, interact with other avatars, fight monsters, accept and complete tasks for NPCs, collect objects, and increase in power and skill as a result of his or her adventures.

Objects that an avatar can collect within the game fall into two broad categories: currency and items. Currency takes the form of coins, with one hundred bronze coins to one silver coin and one hundred silver coins to one gold coin. Coins can be "looted" from monsters after they are killed, received as a reward for completing quests, or obtained from the sale of items. Similarly, items are obtained from looting monsters, by completing quests, through harvesting the environmental resources directly, or by purchasing them with currency. For the most part, the process by which items and coins

are acquired is similar to the process of hunting and gathering through which early nomadic cultures obtained their property.

There are two major markets that exist within the game. One market is composed of NPC vendors. These characters are permanent fixtures of the game world. They buy most items in unlimited quantities at a price that is fixed for each item. Each vendor also has an invariable and infinite stock of specific items which can be bought in unlimited quantities at a price that is fixed for each item. Vendors can also repair weapons and armor for a price based on the quality of the armor and the extent of the repairs.

The other market is composed of a system of auction houses. The auction houses are found in major cities throughout Azeroth and are connected into a single market for each faction with a third market for neutral cities that can be used by both factions. For a small fee, any item can be put up for auction by a player, giving other players the opportunity to bid on the item, much as people do on eBay and other real world auction websites. Players specify a minimum bid amount and, if they so choose, a buyout price. If an auction is successful, the seller gains coins equal in value to the sale price minus a service charge, and the buyer receives the item after having the appropriate currency value deducted from his or her inventory.

Given this market structure, there exist distinct similarities and differences between the virtual economy that exists in World of Warcraft and most economies observed in the real world. In the real world, governments issue currency. The amount of currency in circulation is controlled by these governments to regulate inflation. In MMORPGs, there are typically no money issuing institutions. Instead, money, like items,

is spontaneously generated from the environment. One of the older MMORPGs, Ultima Online, had a system of fixed resources to prevent inflation. Under this system, currency and items were generated from a pool of resources and the pool of resources was replenished when currency was spent or items were used or destroyed (Svatos, 2005). The same system does not exist in World of Warcraft. Killed monsters and harvested items reappear in the environment after a short time, resulting in an infinite supply of obtainable items which can then be sold to obtain unlimited quantities of currency. While currency is expended to repair equipment, purchase items from NPCs, pay for transportation, and accomplish other objectives, the drain may be much slower than the rate at which currency enters the market. An experienced player can attest that, aside from the (at most) three time purchase of a mount to increase travel speed, virtually all major expenses involve purchases from the auction house, which redistribute wealth among players but do not remove currency from the economy.

Also, no system of credit exists. All purchases in the game must be made with coins or through an exchange of items, though the latter is rare. Banks exist within the game only for the purpose of storing items and currency. No interest is earned and everything placed within the bank may be withdrawn at any time. The primary use of the bank is storage and convenience in the sense that any item deposited into a bank may be withdrawn at any other location that possesses a bank. This banking system constitutes part of an economic system more primitive than that of ancient Greece and Rome (Finley, 1999).

Conversely, the workings of supply and demand mechanisms for the auction house market work very similarly to the perfect competition model used by economists to explain markets in the real world. All goods in the market are standardized. That is, all incarnations of an item are identical, with very few exceptions. For instance, one “green woolen bag” does not differ in any way from every other “green woolen bag” in the game. Equilibrium prices are determined by the supply of a good being sold in the auction house and the demand for said good by people shopping at the auction house. If demand is high in relation to supply, either sellers will take the initiative to obtain or create more of said item or, especially in the case when the act of obtaining the item is work or time intensive, sellers will increase prices (Castronova, 2001). The fact that all active auctions for a given item are visible at the auction house helps to ensure that sellers will not price items far above or below the equilibrium price and, similarly, that buyers will not buy at prices high above the equilibrium price. NPC vendors play virtually no role in the establishment of equilibrium price as the value of any item that players would be interested in purchasing is highly undercut when selling said item to an NPC vendor. Thus, it is only logical to sell to NPC vendors if the demand for the item by players is virtually zero (Castronova, 2001). These vendors can best be likened to recycling centers in the real world that pay a fixed rate of a few cents for aluminum cans even though the cans are effectively worthless.

B. Real Money Trade beyond Second Life

Despite the official ban on the real-world sale of virtual property by World of Warcraft players, RMT for this property still exists, just as it does in other, similar games.

The primary incentive to purchase items for real currency is the opportunity cost of playing the game in order to obtain the desired items or a powerful avatar (Kelly, 2004). This reason for using real currency to purchase virtual property is somewhat different than those that motivate the same activity in Second Life, where virtual property is often purchased as an investment or because the player lacks the creativity or scripting knowledge to create something similar on his or her own.

A survey done of MMORPG players indicated that approximately half of the players work full time (Svatos, 2005). Thus, time spent playing an MMORPG deprives the player of time that could be spent working. It may, therefore, be less costly for a player to engage in RMT, spending \$20 to purchase a virtual good that would take four hours to acquire through game play, if the player can make \$7 for every extra hour he or she works. The end result is that the player can maximize utility from play by securing a powerful, well equipped avatar, which, in turn, allows the player to explore more exciting places and participate in more exciting events without sacrificing time that could be spent earning income in the real world.

The desire of some players to acquire powerful avatars without sacrificing time that could be spent on other activities has led to the phenomenon of power leveling. Power leveling is a service through which a player hires a professional to play the game with that player's avatar with the sole purpose of advancing the avatar's level, a rough measure of how powerful the avatar is compared to its peers. These professionals raise avatar levels through the completion of a variety of tasks intended to do just that. Power leveling can also be used to increase an avatar's skill at performing a certain activity.

Power leveling is expressly forbidden in the World of Warcraft EULA (Blizzard Entertainment*, Inc., 2009). Consequently, no coherent, centralized market for such activities exists, but rather numerous websites exist, offering players the chance to purchase these services. At the time of writing, Gametag, a website that offers power leveling services offers a packaged deal to increase a World of Warcraft avatar's level from 1 to 80, the current limit, over the course of 25 days for the price of \$170.99. This package provides a lower price than the basic power leveling estimate given on the same website, which prices such a service at \$217.05 over the same period of time (Gametag, 2009). If one assumes that market forces drive the prices listed on this website to resemble equilibrium prices in the power leveling market, one may conclude that a considerable number of players consider the disutility of spending 25 days advancing their avatar to level 80 is at least \$180.⁵ Testing the assumptions involved in this argument is beyond the scope of this paper, but the prices listed on the website serve to illustrate that players and the entrepreneurs that cater to them place a dollar value on time and effort spent in raising an avatar's level. This valuation is understandable as players spend that time and effort in order to take part in game play more entertaining than the game play undertaken to raise the avatar's level, which may actually be less entertaining to gamers than pursuing other activities altogether.

The same principles that apply to RMT for avatars and items apply to RMT for virtual currency. Since virtual currency can be used to purchase virtual items, buying

⁵ This statement assumes that a typical player can increase the level of their avatar as quickly as a professional power leveler. Considering the amount of time, skill, and knowledge necessary to increase an avatar's level by 79 in less than a month, this assumption is rather unlikely.

virtual currency with real currency is hardly any different from purchasing the items directly with real currency. For this reason, a vibrant market for virtual currency, items, and accounts has existed since the start of this century. Auctions for these virtual goods were prevalent on eBay until pressure from MMORPG producers forced these transactions off of eBay and onto lesser known sites (Lehdonvirta, 2005). The market for RMT for virtual currency has grown to the point that people, most notably in China, have made a profession of “farming,” that is rapidly collecting, virtual gold for the purpose of resale for real world currency (Dibbell, 2007).

This phenomenon has not gone unnoticed by economists. Dr. Edward Castronova has led the way in researching the value of virtual currency. Castronova proposes that the dollar value of virtual currency can be determined using the basic supply and demand model, with a downward sloping demand curve and an upward sloping supply curve (Castronova, 2006). Supply and demand of virtual currency, as they pertain to the online RMT market, are determined by the supply of and demand for virtual currency within the game, which, in turn, are determined by various factors within the game, which are based on the gaming environment and the supply of and demand for virtual items within the game (Castronova, 2001).

Unfortunately, little other research exists on the topic. A chart developed by Zachary Simpson illustrating the flow of resources in virtual economies is often cited in papers dealing with the topic (Svatos, 2005). Also, a small amount of econometric analysis has been conducted, without substantial results. The majority of papers on the topic primarily set out to summarize the facts behind the RMT phenomenon rather than

expand upon what is already known.⁶ Dr. Castronova's papers' reference pages, which consist largely of academic papers on related topics, non-academic journal articles, and quasi-professional internet websites, give an indication of how little meaningful research exists on the topic of RMT.

C. Model

The basic concept behind the model to predict the exchange rate of dollars to virtual gold coins, World of Warcraft's official currency, comes largely from Castronova's explanation of the market for gold within MMORPGs (Castronova, 2006). The value of virtual gold coins in American dollars must depend on the supply and demand for currency. Due to the lack of money regulating institutions within the game world, there is no way to measure supply or demand directly. Thus, other explanatory variables must be relied upon to account for the unobservable variables of supply and demand. Based on the basic principles of money supply and inflation, a large supply of gold coins in the economy would cause price inflation, leading to high nominal prices for goods being purchased in the auction house market. In his research, Castronova compiles a price index for powerful pieces of armor for Everquest, an older MMORPG similar in most ways to World of Warcraft (Castronova, 2001). Unfortunately, such data is not available across enough servers for World of Warcraft to be used reliably. Instead, the author has chosen Netherweave Cloth, a frequently traded item used almost exclusively as an ingredient for the creation of other items. The item is commonly found on dead monsters by avatars adventuring in the more dangerous part of the game world, ensuring

⁶ That is, the majority of papers discovered by the author.

that the item is usually available in an auction on most servers. At the same time, weaker avatars are unable to kill the monsters that carry the item, establishing a high enough demand for the item to keep it from simply being sold to NPC vendors. According to the basic economic principles regarding the money supply, a high supply of currency should lead to inflation in the price of all goods traded in a perfectly competitive market. Thus, an increase in the supply of gold on a server should increase the auction house price of Netherweave Cloth, along with all other items, in terms of gold coins per unit of cloth. Simultaneously, a large supply of gold on a server should, according to Castronova's model for the dollar value of virtual gold coins, decrease the value of gold due to overabundance, decreasing the dollar value of the virtual gold. Therefore, a large supply of gold on a server should drive Netherweave Cloth prices up and the dollar value of virtual gold down, resulting in a negative correlation between Netherweave Cloth prices and the dollar-to-gold exchange rate.

The next logical variables are population and the age of the server. As stated earlier in the paper, the amount of virtual currency available on a server grows over time as virtual currency is created at a faster rate than it is destroyed. Thus, older servers should have more virtual currency in circulation than new ones. Similarly, a larger population should produce a high supply of currency as there are more players to generate gold through killing monsters and selling the items thus obtained to NPC vendors. The variables included in the explanatory equation will be a variable for the total server population and a dummy variable for years 2004-2007, omitting 2008. If the assumptions above hold, older servers should have a lower dollar to gold coin exchange

rate due to a large supply of gold coins. Similarly, servers with larger populations should have lower exchange rates.

Since exchange rate data for each server is split by faction, a faction dummy variable is included. Furthermore, a variable corresponding to the percentage of the population constituted by one of the factions and a variable indicating the ratio of activity of that faction to the other, that is the frequency with which players on the server actually play the game, are included. These variables are included because a large percentage of the population playing the game frequently should increase the virtual currency supply for the corresponding faction on the corresponding server.

Finally, a variable equal to 1 for a PvP server and 0 for a normal server and a variable equal to 1 for a RP server and 0 for a non role playing server, is added. These variables will attempt to determine if player tastes and differences in game play may affect the equilibrium dollar price of virtual gold.

The final equation is as follows:

$$\begin{aligned}
 \text{Exchange rate(in \$ per 20000 gold coins)} = & \beta_0 + \beta_1 \text{Netherweave price(in gold coins/unit)} \\
 & + \beta_2 \text{Population} + \beta_3 \text{Percentage Alliance} \\
 & + \beta_4 \text{Alliance to Horde Activity Ratio} \\
 & + \delta_1 \text{Alliance} + \delta_2 \text{PvP} + \delta_3 \text{RP} \\
 & + \delta_4 \text{year2004} + \delta_5 \text{year2005} + \delta_6 \text{year2006} \\
 & + \delta_7 \text{year2007} + u
 \end{aligned}$$

D. Data

The data for exchange rates is measured in dollars per 20,000 virtual gold coins and is collected for each faction on each server. It is obtained from GDPChina, a website that specializes in the sale of virtual currency for real world currency (GDPChina, 2008). Census data regarding server populations, the percentage of the population that corresponds to each faction, the Alliance to Horde activity ratio, and the type of each server are obtained from a World of Warcraft census website. This website uses a program that collects census information from the game every time the game world is accessed (Warcraft Realms, 2008). Finally, the Netherweave Cloth price used is the median price, in terms of virtual gold coins per unit, for which the item sold over the past thirty day period. This data is obtained by means of a program that collects auction house data from World of Warcraft and places the data online (Helix Systems Incorporated, 2008). The data is summarized in Table I.

The summary statistics indicate that exchange rates and server populations in the data set vary over a broad range. There are servers in the data set that are populated by avatars that belong exclusively, or very nearly exclusively to a single faction. It should be noted that the maximum observed exchange rate of gold coins to dollars is much higher than the minimum and average exchange rates. These values come from a single server that became active shortly before the data was collected.⁷ The summary statistics without the data for this server are shown in Table II. Still, though the exchange rate data from

⁷ November, 2008.

this new server may be an outlier, it is very likely that its magnitude is related to the novelty of the server, and so should not be disregarded immediately.

E. Results

Table III summarizes the results of the OLS regression of the equation stated earlier. This regression includes the data from the new server. The intercept and the year dummy variables are all strongly statistically significant. The Netherweave Cloth price variable is statistically significant at the 5% significance level. The negative coefficient on Netherweave Cloth price supports the hypothesis that item price and the exchange rate should be inversely correlated, since a large supply of virtual currency would lower the dollar value of gold coins and would inflate the price of goods in the auction house market.

The coefficients on the year dummy variables are highly negative and very close to each other in value. This result indicates that the exchange rate in terms of dollars to virtual gold coins in World of Warcraft is significantly higher for servers created in 2008 than for servers created earlier. This result fits with the hypothesis that older servers should have a larger supply of currency. If the new servers have a significantly lower virtual currency supply than the older servers but have comparable levels of demand, then the equilibrium price of gold coins in terms of dollars on the server would be higher than that on other servers where the gold supply is higher, as per Castronova's characterization of the virtual gold market in MMORPGs (Castronova, 2006). One must note, however, that this result also coincides with the fact that the observed exchange rate for the latest server to come online was much higher than all other servers. The presence of this outlier

may greatly inflate the statistical significance of the 2008 dummy variable, as well as the magnitude of all year dummy variable coefficients.

None of the other variables are statistically significant independently or jointly. This lack of statistical significance on the other variables forms a stark contrast with the results of the same regression run without the outlying data from the new server. Table IV summarizes the results of the regression. The new results display statistically significant and positive coefficients on the PvP and RP variables. The year dummy variables are jointly statistically significant with a positive value for 2007, a negative value for 2006, and increasingly negative values for 2005 and 2004, respectively. These results are also in keeping with the idea that the supply of virtual currency will decrease with time as more currency accumulates on the server, resulting in a lower exchange rate over time. These results are not, however, as supportive of the idea of currency supply growth over time as those obtained with the outliers as the year variables are not independently significant this time. Still, the notable difference in sign and magnitude between the year dummy variables gives a greater indication that the exchange rate varies over time than do the nearly identical year variable coefficients in Table III, which suggest that the exchange rate plateaus over time. Also, it appears that the exchange rate may be slightly lower for servers founded in 2008 than for those in 2007. The possible reasons for this phenomenon are discussed later. Finally, the Alliance to Horde activity ratio is statistically significant at the 10% level of significance. The possible reasons for this result are also discussed later.

The two results that remain the same between the two estimations are the statistically significant, negative coefficient on the price of Netherweave cloth and the highly statistically significant, positive y-intercept estimator. The apparent negative correlation between the price of Netherweave cloth within the game and the exchange rate further supports the hypothesis that a large amount of virtual gold in a server's economy will simultaneously drive down exchange rates due to low demand and drive up the price level as the result of an excessive money supply. The large, positive intercept value indicates that the base rate for the exchange of virtual gold for dollars is fairly fixed. Unfortunately, the R^2 value obtained from this regression is rather low compared to the first regression. This difference in R^2 values is to be expected, however, as there are fewer major variations in the reduced data set that can be as easily explained, as opposed to the regression with the outliers included, where very large variations in the exchange rate are highly correlated with the server's foundation year.

In interpreting the results of the empirical analysis, it is important to keep in mind that omitted variable bias is essentially unavoidable due to the limited amount of data available, as well as the lack of general knowledge of which factors may influence the market in question. Tests for omitted variable bias confirm this assumption. A more manageable form of variable bias to be considered is simultaneity bias. The rules governing a server and the year a server was established are invariable for each server and are established before exchange rates can be calculated. Similarly, one may generally assume that players arbitrarily determine choice of faction, server population, and player activity before exchange rates are calculated, and these factors are unlikely to change in

response to changes in exchange rates due to opportunity costs associated with changing servers or factions or altering the amount of time one allots to playing the game.⁸

Logically, Netherweave price is the only variable that may be determined simultaneously with the exchange rate, as a lower exchange rate may allow players to purchase more gold with which to buy Netherweave Cloth, and higher Netherweave prices may provide an additional incentive to purchase more gold at higher prices so that this gold may be used to purchase extra Netherweave.

In order to test for endogeneity, the author used the Durbin-Wu-Hausman Test.

The author estimated the following regression:

$$\begin{aligned} \text{Netherweave Cloth price} = & \beta_0 + \delta_1 \text{PvP} + \delta_2 \text{RP} + \delta_3 \text{Alliance} \\ & + \beta_1 \text{Percentage Alliance} \\ & + \beta_2 \text{Alliance to Horde activity ratio} + \beta_3 \text{Pop} + \delta_4 2004 \\ & + \delta_5 2005 + \delta_6 2006 + \delta_7 2007 + v \end{aligned}$$

The error term, v , was then regressed against the exchange rate along with the other variables to determine endogeneity. Surprisingly, the estimated coefficient on v is not statistically significant, indicating that there is no simultaneity bias associated with the Netherweave price variable. Based on this result, all explanatory variables can be considered exogenous.

Notably, the omission of Netherweave Cloth prices from the regression has almost no impact on the rest of the coefficient estimates, as indicated in Table V. The year dummy variable coefficients remain jointly significant and the intercept is highly

⁸ Changing factions or servers requires players to create a new character and start over or to pay a set dollar amount to Blizzard to have an existing character transferred from one server to another.

statistically significant, showing no change in sign and only superficial changes in magnitude. The change in the magnitude of the coefficients corresponding to PvP and RP are also small. The R^2 value decreases by approximately .01, indicating that the omission of Netherweave Price reduces the degree to which the regression estimate the true variance in dollar-to-gold exchange rates. These findings indicate that the estimation of the intercept, PvP, and RP coefficients is robust in regard to omission of other statistically significant variables.

When the regression, including the Netherweave price, is run separately for each faction, the results are somewhat different, illustrated in Table VI. As in the general OLS estimation, the intercept coefficient is highly statistically significant and positive. For the Alliance faction, the PvP coefficient is statistically significant at the 5% level of significance and the server population coefficient becomes negative and statistically significant at the 10% level of significance. The coefficient on Netherweave cloth price is no longer statistically significant, but the year dummy variables remain jointly significant. For the Horde faction, the intercept coefficient is statistically significant at the 1% level of significance. The coefficients on PvP and RP are positive and the one on Netherweave cloth price is negative, all three only at the 10% level of significance. These results are generally consistent with the results from the general regression. The loss of statistical significance is likely due to a reduction in the sample size. The coefficient on the population variable is positive and not statistically significant. The Netherweave price variable appears to become less significant when the sample size is reduced by limiting it to a single faction. When an interaction term between the faction dummy variable and the

Netherweave price is included in the general regression discussed above, the interaction term estimate is statistically significant, confirming that the correlation between Netherweave price and the exchange rate differs across factions to a statistically significant degree.

F. Interpretation of Results

The evidence from the regressions discussed in this paper indicates that the age of a World of Warcraft server has a significant impact on the exchange rate of dollars to virtual currency. The joint significance of the year dummy variables, combined with the increasing negativity of their associated coefficients indicates that the exchange rate of dollars for virtual gold tends to fall over time, supporting the hypothesis that the concentration of virtual gold in a server's economy should increase over time, driving down the demand for virtual gold, and thus lowering the exchange rate. Interestingly, it appears that servers founded in 2008 may have a lower exchange rate than those founded in 2007.

The fact that the two exchange rate observations that were discarded for being too large corresponded to the most recently founded server suggests that exchange rates for new servers may be unpredictable or may spike early and then drop below equilibrium price before they stabilize. The exchange rate data available at the time of this writing supports this hypothesis. Currently, the exchange rates for the most recent server created are \$257 for 20,000 gold coins for the Horde faction and \$237.20 for the Alliance faction. The prices for 20,000 gold for the other servers founded in 2009 are between \$170 and \$178, inclusive. The same prices hold for the next 15 youngest servers, with some of the

ones founded in 2008 reaching exchange rates close to \$200 for 20,000 gold coins. Thus, the current exchange rate listings support the theory of a sudden spike in exchange rates when a new server is founded with prices then falling rapidly over the following months. The current exchange rate for the server that was removed from this study as an outlier is \$183.80 for 20,000 gold coins for the Horde faction and \$170 for Alliance, compared to its original \$1442.20 and \$730.20, respectively (GDPChina, 2008).

The statistically significant, negative coefficient on the Netherweave Cloth price variable indicates a negative correlation between the value of virtual gold and the price of Netherweave Cloth. These results are consistent with the hypothesis that the dollar value of virtual gold is inversely correlated with the supply of virtual gold on the server and, thus, is inversely correlated with item prices in the auction house market since a large supply of currency tends to inflate item prices.

The statistical significance of the PvP variable at the 1% significance level and of the RP variable at the 5% significance level is somewhat more puzzling. It is highly probable that the difference in exchange rates simply has to do with tastes. In particular, this hypothesis is supported by the statistical significance of the RP variable with fixed effects for the Horde faction but not for the Alliance faction. Some of the races of the Horde faction may be regarded as evil in nature, and a person role playing as an evil character may be more willing to “cheat” by engaging in RMT. Testing such a hypothesis is beyond the scope of this paper.

The significance of the PvP variable may be due to the fact that players on these servers must compete with one another. A player on a normal server typically competes

against NPCs who remain in their own designated areas, waiting for a player to come challenge them. In contrast, a player on a PvP server may at any time be attacked by a more powerful player who is seeking out weaker opponents to kill. This Hobbesian existence may provide a powerful incentive to engage in RMT in order to outfit one's avatar with the best armor and weapons possible, especially if others on the server are already engaged in RMT and have an unfair advantage. In this way, the purchase of virtual gold with real currency may further increase demand, driving prices up higher than they would reach on a normal server. It is also possible that, players engaged in PvP do not obtain as many items and coins as players on normal servers, resulting in a lower concentration of, and thus a higher demand for, virtual gold.⁹ This situation would also drive up the dollar price of virtual gold.

Finally, the positive, statistically significant coefficient on the Alliance to Horde activity ratio indicates that more alliance characters playing corresponds to a higher willingness to purchase virtual gold with real currency. Again, this may be due to player tastes. Players who choose to play as Alliance characters may have personalities more disposed to acquiring gold through RMT. The higher exchange rates of dollars for gold may also be due to an increased need to compete with the enemy on the part of Horde players. If these players are constantly under attack from the Alliance in the game world or outnumbered and outmatched in the battlegrounds, Horde players may resort to purchasing gold to acquire weapons and armor that could help them destroy their

⁹ Other players' avatars cannot be looted if killed in the world. If killed in one of the battlegrounds, a very small amount of currency can be looted from the body. This amount hardly compares to the wealth obtained from killing NPCs.

enemies. High Alliance activity may also encourage Alliance players to resort to purchasing virtual gold in order to better equip themselves for the battlegrounds if they have less opportunities to enter these competitions due to long waits caused by overcrowding. This hypothesis is supported by the negative correlation between server population and Alliance exchange rates, indicating that crowded servers make Alliance players demand more gold coins. Further speculation is best avoided at this point.

Future research is required to shed better light on how these many factors come together to determine the demand for virtual currency. This research should also consider the effects of the black market nature of RMT for World of Warcraft currency on the demand for virtual currency obtained by these means. Comparison of illegal systems of RMT with officially sanctioned ones, like those observed in Second Life, may shed light on the effect of the black market nature of RMT on virtual currency demand.

V. Restrictions in the EULAs

Given the treatment of virtual property within Second Life and the qualitative and quantitative analysis of the treatment of virtual property in World of Warcraft, one may conclude that virtual property behaves and is often treated like any other sort of private property. From this conclusion comes the question of why so many MMORPG developers are adamant about retaining the rights to all virtual property within their games when they do not choose to trade in the property, themselves. The reasons for the developers' desire to maintain control of all virtual property within the virtual worlds of their creation fall into two categories: RMT's effects on game play, and potential legal and fiscal consequences of authorized RMT for the game developers.

A. Effects of RMT on the Gaming Experience

As the title implies, MMORPGs are games. More specifically, they are games that feature role playing as an important part of the game play experience. To this end, the virtual worlds of these games are typically designed to be worlds separate from the real world. Certainly, interactions with the real world are inevitable, but the nature and extent of these interactions greatly affect a player's experience within the game (Castronova, 2005).

Different players play for different reasons. Many of these reasons fall into the categories of achievement, social, and immersion. Players concerned with achievement may play because they want to achieve a high rank or level within the game or because they wish to be able to defeat other players in combat. Players who play for social reasons may use such games to spend time with old friends or to make new ones. One of the particular advantages of playing online is that friends no longer need to be physically near one another in order to play games together. Finally, players interested in immersion derive their enjoyment from exploring new locations, getting lost in the story they create for their avatar, or just escaping from the real world for several hours (Lehdonvirta, 2005). RMT has an impact on all of these goals.

The ability to purchase items or avatars causes a serious problem for players who care about achievement of goals within the game. The ability to buy a high level avatar with a rare, powerful suit of armor cheapens the same achievement for players who spent several months within the virtual world to make their avatar strong enough to enter the

dungeon from which, after a dozen “raids”, they may obtain the same suit of armor.¹⁰ In essence, buying items and characters is comparable to purchasing property in monopoly for real money. It allows an unfair advantage based on a player’s possessions outside of the game and is tantamount to cheating (Bartle, 2004). Certainly, one may argue that it is unfair that people who have more time to play the game are at an advantage over those who do not, but, under the same reasoning, one could argue that athletes who do not have as much time to train as they would like should be allowed to use steroids to keep up with their peers.

Conversely, those playing for social reasons may benefit from RMT. If they desire to play with a friend who has been playing the game longer and possesses a more powerful avatar than the players could produce promptly, they could simply purchase such an avatar and proceed to exciting adventuring with their friends. Those playing for immersion may also benefit in the same way as purchasing powerful items and avatars would allow them to explore the more dangerous regions of the virtual world. Still, the bubble of the fantasy world may be broken by such means, bringing thoughts of the real world to players trying to escape from it (Lehdonvirta, 2005).

The disruption of the game experience by RMT may also take a more clearly economic form. There are many individuals and organizations in existence that professionally farm gold. In its prime, it was estimated that Everquest players could obtain an average of three US dollars’ worth of virtual property per hour (Castronova,

¹⁰ A raid in World of Warcraft refers to a group of 15 to 40 players entering a dungeon and, with careful teamwork, fighting their way through the dungeon’s inhabitants with the intention of slaying a particularly powerful NPC who has a chance of relinquishing a valuable item upon death. It is not uncommon for such raids to take several hours.

2001).¹¹ As this amount may exceed the minimum wage in some countries, companies can hire foreign labor to work in shifts around the clock farming gold and items. Other efficient methods of gold farming also exist. There is even a record of a single person setting up 24 computers in his home with an automated program that allowed each computer to continuously harvest items from the environment in Ultima Online's virtual world. While he used the revenues to pay off his debts, the value of the currency fell on eBay due to the actions of this individual and his many fellow gold farmers (Dibbell, 2003). Correlation is not always equivalent with causality, but the analysis of RMT in World of Warcraft presented earlier in this paper indicates that virtual currency behaves much in the same way as real commodities do, implying that a continuous drop in price is likely due to a saturation of the game's economy with virtual currency. The major problem that follows from this overabundance of currency is uncontrolled inflation within the game. This, in turn, poses a serious problem for players who rely heavily on buying items within the game. As players involved in RMT buy items with purchased virtual currency, they drive the prices of these items beyond what anyone obtaining currency through conventional channels can afford.

Still more simply, RMT may incentivize behavior that makes items and parts of the game world in general inaccessible to most players. This may happen if a certain item is particularly rare and in high demand, for instance if a certain item can only be obtained by killing one particular NPC that can only be found in one place in the game world. Professional players, players who play in order to earn real world money, may swarm

¹¹ This figure assumes an ability to sell the virtual property for real currency.

around that monster, making it nearly impossible for players to acquire the item or even move through the area where the item may be found (Bartle, 2004).

The prohibition of RMT contained in the EULAs prevents the aforementioned effects of RMT from causing too large an impact on the game play experiences of the players within the virtual worlds. By limiting RMT, the developers reduce the issues of cheating and breaking the barrier between the real world and the virtual worlds, allowing players to derive more enjoyment from their achievements and role playing.¹² It appears to be the view of the developers that such concerns outweigh the desires of social players interested in quickly being able to join their friends in the game world.

B. Potential Consequences of RMT for Developers

In addition to the dangers it poses to the gaming experience, RMT has potential consequences for the game developers as well. By allowing RMT, developers would recognize that virtual property has real world value, just as physical property does. If this were to become the case, developers would then be responsible for the safety of the virtual property within their virtual world. No developer can guarantee that the game software does not contain any bugs. In fact, it is highly likely that all game software contains bugs. If one of these bugs caused a piece of virtual property to be damaged or destroyed, the developers would be responsible for compensating the property's owner for the damages caused by the bug (Bartle, 2004).

The developers would also face the risk of having to compensate players for regulatory takings. Regulatory takings occur when property does not change hands but

¹² The EULAs cannot be enforced with perfect efficiency.

decreases in value due to new rules being passed that damage its worth. For instance, if a change were made to a game so that the maximum level an avatar could reach became 70 instead of 60, all avatars level 60 would lose value because they would no longer be the most powerful avatars available. If the RMT market value of a level 60 character dropped by \$50 as a result, the developers could potentially have to compensate each user according to the diminution of value test principle established in the Supreme Court ruling on the case of *Pennsylvania Coal Company v. Mahon* (1922). In this case, the Court established that, a party that diminishes the value of another's property through the creation of a rule may have to compensate the injured party based on the loss in property value. According to this ruling, an increase in the avatar level cap that dropped the value of level 60 avatars could make the developer liable for damages of up to \$50 to every player with a level 60 avatar. Similar regulatory takings could occur every time a patch was created to make changes to the game. For instance, World of Warcraft developer Blizzard frequently creates new patches that slightly change the workings of the game. Explanations of the changes are often as vague as "Spore Cloud: This ability will now work properly" (Blizzard Entertainment, Inc., 2009). Regardless of what the actual change is, it is almost certain that it either benefits the class of characters that use this ability, increasing their value, or hurts them, decreasing their value.¹³ In fact, almost any change, including bug fixes, is likely to affect the value of almost all virtual property in the game. If Blizzard were to acknowledge that virtual property within the game has real

¹³ Hunters

value, they would be unable to make changes to the game to improve game play for fear of being taken to court for diminution of value.

Such a restriction on the game developers would prevent them from making changes to the game world necessary to address complaints from players or to attract new players. A further restriction would come in the form of the need to compensate people for the loss of their property if their account had to be canceled. In 2001, a group called Black Snow took Mythic, the creator of the game Dark Age of Camelot, to court, seeking compensation for property lost when the group's account was canceled for using cheap labor in Mexico to farm gold and items and then selling this property for profit. No ruling was made on the case as Black Snow became involved in another lawsuit, stopped paying their lawyer, and eventually dropped the suit (Dibbell, 2003). Still, given the recent ruling in the Bragg case discussed earlier in this paper, it appears that developers would do well to avoid recognizing virtual property as private property that players can buy and sell.

VI. Conclusion

Upon careful examination, one can see that virtual property fits the traditional model of private property, despite its incorporeal nature. The method by which it is obtained fits into the Lockean understanding of private property as derived from the use of labor to create something private from the commons. Its existence as a legitimate form of private property is supported by Linden Lab, the producers of Second Life, and the official exchange market for the virtual currency and the US dollar which places a clear monetary value on the virtual property being created and traded within the game. This view is further supported by the Court's ruling in *Bragg v. Linden* that players deprived

of their virtual property have the right to have it restored to them or to be compensated for it in real currency.

The view held by Blizzard, the developer of World of Warcraft, gives support to the opposite attitude—that virtual property created within an MMORPG does not constitute private property and remains under the control of the developers as part of the game those developers created. From analyzing the potential hazards, both to the players and the developers, of allowing RMT for virtual property obtained in MMORPGs, it appears likely that the objections made by online game developers to private player ownership of their virtual property is motivated by the desire to avoid legal and financial hardships rather than a genuine belief that virtual property is not comparable to real property. In fact, regression analysis of the RMT market for World of Warcraft gold indicates that virtual currency behaves in inter-world markets much in the same way any other form of property would. Given the discussion of virtual property presented in this paper, it is likely that virtual property will become an increasingly important topic of economic and legal discourse as it grows in abundance, leading to further legal suits and economic challenges that will have to be faced as RMT markets continue to grow and evolve.

VII. References

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VIII. Tables

Table I. Data Summary (with outliers)

Variable	Observations	Mean	Std. Dev.	Min.	Max.
Exchange rate (\$/20,000 gold)	456	286.8	65.1	227.2	1442.2
PvP	456	0.5	0.5	0	1
RP	456	0.1	0.3	0	1
Alliance	456	0.5	0.5	0	1
Percentage Alliance	456	51.7	22.0	0	100
Alliance to Horde activity ratio	456	1.3	0.7	0	5.1
Server Population	456	18388.7	13107.7	1936	220760
Netherweave Cloth price (gold/unit)	456	0.1	0.1	0	0.2
2004	456	0.4	0.5	0	1
2005	456	0.1	0.4	0	1
2006	456	0.3	0.4	0	1
2007	456	0.2	0.4	0	1
2008	456	0.0	0.2	0	1

Table II. Data Summary

Variable	Observations	Mean	Std. Dev.	Min.	Max.
Exchange rate (\$/20,000 gold)	454	283.3	29.4	227.2	346.8
PvP	454	0.5	0.5	0	1
RP	454	0.1	0.3	0	1
Alliance	454	0.5	0.5	0	1
Percentage Alliance	454	51.7	22.0	0	100
Alliance to Horde activity ratio	454	1.3	0.7	0	5.1
Server Population	454	18434.4	13118.4	1936	220760
Netherweave Cloth price (gold/unit)	454	0.1	0.1	0	0.2
2004	454	0.4	0.5	0	1
2005	454	0.1	0.4	0	1
2006	454	0.3	0.4	0	1
2007	454	0.2	0.4	0	1
2008	454	0.0	0.2	0	1

Table III. OLS Estimates of Exchange Rate of One Dollar to 20000 Gold Coins of Virtual Currency (with outliers)

Regressor	Coefficient	Standard Error
Netherweave Cloth price (gold/unit)	-91.5**	43.8
Server Population	-0.0	0.0
Percentage Alliance	-0.0	0.2
Alliance to Horde activity ratio	7.3	6.5
Alliance	6.4	5.8
PvP	2.7	9.2
RP	4.4	10.0
2004	-117.9***	17.6
2005	-114.7***	18.5
2006	-113.0***	17.6
2007	-105.9***	18.3
Intercept	396.2***	22.1
R ²	0.12 (F=5.41)	

* The coefficient is significantly different from zero at the 10% level, two-sided tests.

**The coefficient is significantly different from zero at the 5% level, two-sided tests.

***The coefficient is significantly different from zero at the 1% level, two-sided tests.

Table IV. OLS Estimates of Exchange Rate of One Dollar to 20000 Gold Coins of Virtual Currency (without outliers)

Regressor	Coefficient	Standard Error
Netherweave Cloth price (gold/unit)	-49.7**	20.4
Server Population	-0.0	0.0
Percentage Alliance	0.1	0.1
Alliance to Horde activity ratio	5.1*	3.1
Alliance	3.1	2.7
PvP	12.5***	4.3
RP	10.3**	4.6
2004	-6.5****	8.8
2005	-4.6****	9.1
2006	-1.0****	8.8
2007	7.4****	9.1
Intercept	271.3***	10.9
R ²	0.06 (F=2.62)	

* The coefficient is significantly different from zero at the 10% level, two-sided tests.

**The coefficient is significantly different from zero at the 5% level, two-sided tests.

***The coefficient is significantly different from zero at the 1% level, two-sided tests.

****Jointly significant.

Table V. OLS Estimates of Exchange Rate of One Dollar to 20000 Gold Coins of Virtual Currency, Omitting Netherweave Cloth Price (without outliers)

Regressor	Coefficient	Standard Error
Server Population	-0.0	0.0
Percentage Alliance	0.1	0.1
Alliance to Horde activity ratio	5.0	3.1
Alliance	2.7	2.7
PvP	13.6***	4.3
RP	9.2**	4.7
2004	-8.9****	8.7
2005	-7.0****	9.1
2006	-3.0****	8.8
2007	5.2****	9.1
Intercept	269.3***	10.9
R ²	0.05 (F=2.26)	

* The coefficient is significantly different from zero at the 10% level, two-sided tests.

**The coefficient is significantly different from zero at the 5% level, two-sided tests.

***The coefficient is significantly different from zero at the 1% level, two-sided tests.

****Jointly significant.

Table VI. OLS Estimates of Exchange Rate of One Dollar to 20000 Gold Coins of Virtual Currency by Faction (without outliers)

Regress	<u>Alliance</u>		<u>Horde</u>	
	Coefficient	Standard Error	Coefficient	Standard Error
Netherweave Cloth price (gold/unit)	-26.2	31.4	-51.8*	27.7
Server Population	-0.0*	0.0	0.0	0.0
Percentage Alliance	-0.1	0.1	0.1	0.1
Alliance to Horde activity ratio	6.5	4.2	4.3	4.4
PvP	14.4**	6.0	10.9*	6.2
RP	10.3	6.4	11.3*	6.7
2004	-1.1****	12.0	-10.5	12.6
2005	10.6****	12.4	-19.3	13.3
2006	12.3****	11.9	-14.6	12.7
2007	16.8****	12.3	-1.7	13.1
Intercept	267.3***	14.9	279.4***	15.5
R ²	0.12 (F=3.18)		0.13 (F=1.53)	

* The coefficient is significantly different from zero at the 10% level, two-sided tests.

**The coefficient is significantly different from zero at the 5% level, two-sided tests.

***The coefficient is significantly different from zero at the 1% level, two-sided tests.

****Jointly significant.

