Effects of Botting on World of Warcraft®

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SUMMARY

World of Warcraft is a Massively Multiplayer Online Role Playing Game (MMORPG) in which hundreds of thousands of players from all over the world can interact in a persistent, online fantasy universe. The World of Warcraft ("WoW") universe is an immersive fantasy world full of dragons, wizards, elves, orcs, trolls and other beings straight out of lore. WoW has a vast economy that includes treasure and items looted from vanquished enemies; player-to-player sales and barter of armor, weapons, raw materials and other in-game goods; a system of goods created by players that spend months learning different tradecrafts (e.g., tailoring, enchantment, jewel-crafting, blacksmithing, leatherworking, etc.); sales of all these things through a universe-wide auction system, and more. The economy of WoW is the backbone of the game, and the engine that drives all game-play. Because the WoW economy is so realistic, it is susceptible to the same influences as real-world economies.

Glider is an application that permits WoW users to automate gameplay. Because Glider does not eat, sleep, go to work or attend school, it can control a player's WoW character all day and all night, all the while accumulating virtual wealth and experience points for the player that uses it. Glider, like all other bots, is prohibited by Blizzard's Terms of Use Agreement (TOU), which all users must agree to before they can play the game.

Glider is an advanced application that a relative novice can purchase, install and configure in a short period of time. Glider's accessibility and ease of use, along with its advanced ability to defeat efforts to detect it, make it the most popular character automation program available for use with World of Warcraft. Many thousands of people currently use Glider, for two main reasons:

1. Glider accumulates experience points and increases character levels considerably faster than the average human user; and

2. Glider accumulates virtual property, including in-game items (armor, weapons, potions, etc.) and virtual currency (WoW gold) considerably faster than the average human user.

As I will demonstrate, each of these uses results in harm to WoW's players, the WoW community, and ultimately, WoW's owners, Blizzard Entertainment, Inc. ("Blizzard").

I. WHAT IS "BOTTING"?

In gamer parlance, character automation (the practice of automating the play of a character within a computer game) is called *botting*, and botting programs like Glider are called "bots," a shortened version of the phrase "software robot." With Glider a player can make his character do most of the things players ordinarily do in the course of the game. A great deal of the game play in WoW involves finding, confronting, and defeating adversaries, then taking the "loot" they leave behind, which may consist of in-game items

(armor, weapons, potions, etc.) and/or virtual currency (WoW gold). Glider automates this process completely, so that users can simply walk away from their computer while the Glider program "plays" their character for them. Glider is one of the most advanced botting programs available, is very easy to use, and therefore allows anyone to easily and completely remove the human element from the game. Moreover, Glider includes very effective anti-detection software, making it extremely difficult for Blizzard to automatically ban Glider users from the game, thereby decreasing the risk associated with using the bot.

II. GLIDER BOTS AND THE WOW EXPERIENCE POINT SYSTEM

One of WoW's primary benefits to its players is the sense of achievement they get from building the wealth, power and experience level of their characters over time. The experience level of the character is measured broadly by its *level*, and levels are attained by gaining *experience points*. One of the primary ways to earn experience points is to defeat adversaries, usually monsters (a/k/a "mobs"). WoW is designed to permit players to complete quests and adventures which require them to defeat these mobs, thus gradually accumulating experience points and levels. Glider permits users to greatly accelerate this process, leading to a significantly shorter

average subscription period for Glider users. This short subscription period results in a direct loss of revenue for Blizzard.[1]

Although the direct loss to Blizzard is significant, most of the damages caused by Glider are felt as a result of its impact on players that *do not use* Glider. The game play experience of Blizzard's average, TOU-abiding players is reduced as a result of Glider's use. Relative to Glider bots, average players accrue experience, virtual goods and gold at a much slower pace. This makes the game appear unfair, decreasing the quality of game play and even driving players from the game. In fact, Blizzard has registered more than 300,000 user complaints that specifically reference bot usage.

This sense of unfairness in the leveling system imposes two direct damages on Blizzard. First, it causes some current players to cancel or let lapse their subscriptions. Second, it hurts the reputation of the game, which lessens the chance that new players will buy the game.

It is important to note that players may sense unfairness in WoW's leveling system without realizing that Glider bots are the cause. From the perspective of the average player, all he knows is that there are other players who somehow have gained 20 levels while he has gained only 2 or 3. Is it difficult for another user to confirm that the players gaining levels at an accelerated pace are botting, so the average player concludes that either he must be an incompetent player or the system is balanced against him. Either way, he may quit the game and encourage others not to purchase it. The

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[1]   See Section VII for the calculations leading to this conclusion.

more than 300,000 botting complaints that Blizzard has received does not include complaints lodged by the many current and former players whose game experience was adversely impacted by bots, but did not know the reason for their less-than-perfect gaming experience. Unfortunately, there is no way to ascertain this number, or to quantify these damages. However, after researching Glider and the WoW gaming environment, I believe the financial damages suffered by Blizzard as a result of lost business are significant.

III. GLIDER BOTS AND THE WOW ECONOMY

In addition to obtaining levels at an accelerated rate, people also use the Glider bot to "farm" WoW's economy. "Farming" is the practice of extracting large amounts of resources from a virtual environment like WoW by spending long periods repeatedly killing the same mobs and collecting the "loot" that results. Farming distorts WoW's delicate economy and damages other players.

WoW's economy is a carefully designed part of the gaming experience. WoW players gain access to various economic resources, such as virtual property, including in-game items (armor, weapons, potions, etc.), and virtual currency (WoW gold). These resources are used by players to enhance their character by buying new armor, weapons, or the consumable resources needed to engage in the games most rewarding adventures – dungeon quests.

All of these resources must be harvested, created or purchased by players. The WoW economy is designed to make the acquisition of these resources fun and rewarding.

It is extremely difficult to design a game economy so that it functions efficiently. In the case of WoW, the in-game economy is based on a system of inputs and outputs. The inputs are virtual property, including in-game items (armor, weapons, potions, etc.) and virtual currency (WoW gold), both of which enter the economy in the form of treasure taken from defeated mobs. The vast majority of the time, what is found on these mobs includes both gold (or some lower denomination of currency such as copper or silver) and one or more resource items. The player can use the gold as a form of currency to buy things from other players or in-game vendors. The player can use the resources it receives to create more valuable items, or can sell (for gold pieces) or barter them. The sale of these virtual goods takes place directly from player-to-player or through a massive in-game auction system called the Auction House.

Blizzard designed WoW's economy with the intent that a normal player, killing mobs as part of normal quests and adventures, will accumulate enough gold to purchase a reasonable package of useful items and services from other players. For example, a player might spend two hours completing a quest and pick up 6 gold pieces and one Essence of Water, a raw resource item. The Essence of Water item is designed as an ingredient

for the production of several advanced items, including various armors. The armors are powerful and provide protection against some of the game's toughest mobs. As such, many players seek out those armors, and the price they command in the Auction House is high. Because the armors command a high price, their ingredients, including the Essence of Water, command high prices as well. Accordingly, when a casual player picks up 1 Essence of Water, he is supposed to have picked up a fairly valuable item, one that Blizzard has intended to sell, for purposes of this example, for 6 gold pieces. All told, then, Blizzard's design intent is for the casual player to earn perhaps 12 gold pieces in his hour of hunting -- 6 gold in virtual currency and 6 gold in the form of key resources like Essence of Water. The effort that goes into designing this type of economy is significant.

Glider bots destroy this design, distorting the economy for the average player in two specific ways. When a Glider bot "farms" an area, it picks up not only experience points for its owner, discussed above, but also the "loot" that is dropped by the mobs killed by the bot. Because Glider can run constantly, it kills far more mobs than anticipated by WoW's designers, thus creating a large surplus of goods and currency, flooding the economy with gold pieces and loot like the Essence of Water. This surplus distorts the economy in a specific way.

When bots gather key resources, they gather them in abundance. Owners of bots usually sell these resources to other players for gold, which

inevitably deflates their price. Blizzard's design intent is for the resources to command a certain high value, so that average players, who might get one or two of the resources in an average amount of play time, may obtain a decent amount of gold from selling them. But because characters controlled by bots flood the market with those resources, the market value of these resources is far less than Blizzard intended, and the average player realizes only a fraction of the intended value from the resources s/he finds.

The deflated value of key resources presents a critical problem for ordinary players trying to enjoy the game. Blizzard's game systems assume that players will be earning a certain amount of gold per hour, and many systems, such as repairs and travel, force players to make fixed payments of gold into WoW's systems. Buying a horse, for example, costs a certain amount of gold. That price is set by the game designers based on the assumption that normal players will accumulate gold at a certain rate, and that some of their gold will come from the value of resources that they harvest and sell. When the value of those resources plummets because of Glider, the amount of time it takes to accumulate the gold required for in-game expenditures like the horse skyrockets. This skews the economy, frustrates players, and, as a result of a less-satisfied user base, damages Blizzard.

The second way that Glider farming bots damage the economy is through gold harvesting. As mentioned, when a bot kills a mob, it receives

not just resources that can be sold on player markets, but also gold pieces. Players that use bots combine these gold pieces with the gold they earn from selling resources on the AH, and sell the combined treasure to other players for real money in violation of the WoW Terms of Use. The sales are not usually made directly from a player that uses bots (a "botter") to another player, but rather indirectly, from the botter to a third-party aggregator firm like IGE. Companies like IGE have established themselves as resellers or middlemen: they buy massive amounts of gold from botters, then sell it in large lumps to their customers in violation of the WoW Terms of Use.

The design intent of gold dropped by defeated mobs is similar to that of key resources, that is, that average players who defeat mobs in pursuit of quests and adventures will pick up spending money on the way. Blizzard designs the gold drop rate (the rate at which gold is "dropped" by defeated mobs) to allow a working pricing system and sensible earnings per hour for average players. It is anticipated that players will use their gold to buy items from other players, like potions, enchantments, armors and weapons. The market price of the potions, for example, will depend on how rare potions are, and how much money is present in WoW's economy. Blizzard designs the economy so that an average player should be able to buy a reasonable number of potions using the normal amount of money earned in normal play.

Glider bots dramatically disrupt these design intentions. These bots work 24 hours a day killing mobs and collecting the gold and other resources

that are dropped. When this surplus gold is resold to other players in violation of the Terms of Use, it creates a money supply well in excess of what the game was designed to support. Excess money supply leads to inflation which results in the price of player-sold goods skyrocketing.[2]

Faced with this situation, players may either farm gold themselves with as much intensity as the bots, or simply quit the game. If they quit, Blizzard loses the revenue. Either way, the reputation of the game is harmed as new, existing and potential players discovery that they may have to spend dozens of extra hours "farming" gold and resources just to stay competitive.

Do players realize that botting is behind the distorted economy? The 300,000 user complaints evidences that many do. Given that over 10 million WoW accounts have been created, however, it is reasonable to conclude that many more do not. Players only see ridiculously high prices for items they need, and ridiculously low returns for hours of game play that would otherwise provide more than enough resources for them to enjoy the game as designed. The ultimate root of these problems – Glider bots – is difficult to see.

IV. ACCELERATION EFFECTS OF GLIDER BOTS

In the preceding analysis, I stated that players dissatisfied with WoW's economy had the choice of farming like bots, or quitting the game. They

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[2]   The only exceptions to this rule are the resources that botters harvest. The price of the harvested goods are too low. Everything else is astronomically high.

actually have a third choice: they can buy WoW gold from botters. Rather than spend all of their time farming gold and resources, gold purchasers can enjoy the game with only minimal time devoted to the chore of defeating thousands of mobs for economic reasons. Rather than farm like the botters, players can pay real-world currency for the gold that for-profit botters farm from WoW. Unfortunately, this solution both violates the WoW Terms of Use and significantly raises the cost of the game to the average player.

Many WoW players do not have the budget to pay for both the WoW monthly subscription and gold. At IGE.com[3], the smallest amount of gold one can buy is 300 gold, which currently sells for about $15. WoW's typical monthly subscription fee is also $15. If, in order to play the game as intended, a player is forced to buy gold just once a month, this means that the player must pay an additional $15 per month, just to play the game the way it was designed. When players face a doubling of the monthly costs of playing, they must certainly consider quitting the game. When they do, their recurring subscription revenue is lost to Blizzard Entertainment.

Even should a player stay in the game and buy the gold, this heightens every perverse incentive analyzed in the previous section. If more players buy gold for real money, the price of gold rises, and there is greater incentive for botters to farm gold from the game. If botters farm more, the hourly gold

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[3]   IGE (IGE.com) is the largest reseller of WoW gold. Selling WoW gold is a blatant violation of the WoW Terms of Use, and contributes to the damages articulated here. A class of WoW players is currently suing IGE for IGE's role in decreasing the quality of game-play in WoW. The complaint against IGE describes many of the same harms articulated here. Hernandez v. Internet Gaming Entertainment, Ltd et al., case no. 1:2007cv21403 was filed on June 1, 2007 in the United States District Court for the Southern District of Florida.

returns of ordinary players fall, and the prices ordinary players have to pay in the Auction House rise. This creates further incentive to buy gold, which starts the cycle anew. In the end, Glider's botters have so distorted WoW's economy that players *must* buy gold to play at all. By distorting prices and Blizzard's economic design, the botters have made themselves an integral and necessary part of the economy. This completely abuses Blizzard's original intent and damages the economy and the game at the same time. Moreover, when players continue to play in this manner, the $15 they would otherwise spend on an additional month of game play as Blizzard intended is instead diverted to third-party gold sellers.

Ordinary players, of course, cannot perceive this dynamic. Many simply view the economy as broken, and appreciate the fact that gold merchants are there to sell them anywhere from 300 to 5000 or more gold if the price is right. Most do not make the connection that the gold is only available because of botters, and fewer still make the connection that the purchase is only necessary because of botters. Ordinary players suppose that Blizzard is at the root of the economy's problems and distortions, and likely tell their friends as much. Moreover, many players cannot afford to pay Blizzard the subscription fee for the game *and* pay a great deal of real money to purchase gold pieces every month. Thus, this secondary, acceleration effect of botting drives away Blizzard's customers, by making the game more difficult and more expensive to play than Blizzard intended.

V. EFFECTS OF GLIDER BOTS ON BLIZZARD'S COSTS

Glider raises the cost of providing WoW in two ways. First, it raises customer service costs by increasing the number of customer complaints, all of which must be addressed. Second, Glider forces Blizzard to create and constantly update detection and enforcement systems to catch and discipline players using Glider.

The use of Glider in the game significantly increases Blizzard's customer service costs. Glider bots are frequently encountered by normal players who consider the bots a nuisance. When bots are encountered, players will often alert game masters (GMs) and ask that something be done. A GM must then go to that area of the game and investigate. Bot investigations take a long time to ensure that a player is not banned for engaging in bot-like behavior. Obviously, a GM cannot risk banning an innocent player, partly because this would be lost revenue, but mostly because of the negative impact it would have on the game's reputation and player confidence in the GM staff's abilities. Therefore, the process of investigating a bot claim is handled very carefully; a GM investigating a bot complaint will talk to players and interact with the alleged bot, all of which takes time.

Customer service costs do not end there. Blizzard must process thousands of complaints about bots and botting posted on their public web forums. Forum moderators (also Blizzard employees) must scan these posts

for their adherence to the forum's rules of conduct, and respond to enough of the posts such that the game community knows that Blizzard is trying to solve the bot problem.

Customer service is a difficult and expensive job. WoW has hundreds of servers and thousands of GMs worldwide, all of whom command decent salaries. For every minute of GM time devoted investigating and solving a botting complaint, some other player is waiting an extra minute to get a legitimate game issue resolved. For every hour a forum moderator spends reviewing public forum complaints about botting, an hour is lost to the important job of discovering how players feel about legitimate issues. To date, Blizzard has received over 300,000 complaints about botting from customers. Millions of additional complaints have been received in connection with issues of inflation, resource-hogging, farming and other issues that are likely tied directly to the existence of bots, but that players do not understand, or do not acknowledge, are connected to botting. These complaints damage Blizzard directly with respect to the cost of investigating and responding to those complaints and players that leave the game as a result of these issues. Blizzard is damaged indirectly to the extent that the reputation of WoW and Blizzard suffers, and fewer players enter the game as a result.

Secondly, WoW commits real resources to fighting Glider's bots technologically. It employs an entire team of programmers and investigators

to identify bots and ban them from the game. This team engages in manual bot detection, coordinates with GMs that receive complaints, and deploys an array of sensor algorithms designed to identify characters who are acting like bots. Because of the risks of false accusation outlined above, these technologies must have an extremely low error rate. The labor devoted to designing these countermeasures and interpreting their results is substantial, and is yet another direct cost for Blizzard. Their time is valuable and expensive for Blizzard to hire.

Glider bots occupy resources that Blizzard could otherwise put to other, more constructive uses. Because those resources are required to fight Glider, they are spent in a way that does not improve the game, but merely tries to mitigate the damage caused by Glider. From the standpoint of the Blizzard Entertainment, the money is a dead loss: it is money that has to be spent, but that does not make their product better.

VI.   Effect of Glider Bots on Overall Quality of Game Play

WoW is a role-playing, fantasy game. When Blizzard sells WoW subscriptions to the public, it is selling an immersive fantasy experience. Unfortunately, when Glider bots enter the picture, they remove the human element; bots cannot neither role play nor communicate effectively. This inability to maintain the fantasy, role-playing element destroys the immersive fantasy aspect for all players who encounter bots. Bots alter the

essential character of the game, and severely damage the essence of Blizzard's product.

To see this, imagine we were not talking about a video game but about an event in the real world. Consider the Baja 1000, a road race down the Baja peninsula. It's an off-road event where teams of drivers rotate shifts to cover the distance in times that range from 12 to 30 hours. In principle, the race could be botted. Simply outfit the cars with robotic driving systems instead of real drivers. The advantage would be that it eliminates the need for rotating the drivers because of fatigue. As robotic driving systems gain sophistication, one could imagine that botted cars would regularly win the race. Anyone owning a car would then have to decide about drivers: human or robot? If the robots were good enough, and easy enough to implement, eventually everyone would have to put a bot in their car or have no chance of winning. So, following their individual self-interest, each owner would bot her car. But what would the race be at that point? Would it still be the same race that Ted Mangels and Vic Wilson won in their dusty Volkswagen in 1967? No. It would be a different race, a race among programmed cars. No one is interested in such a race. Thus, botting the Baja 1000 would cause the community of humans interested in the race to evaporate, and as a result *it would destroy the race as it exists today*.

Glider has exactly the same overall effect on WoW. Players who bot get ahead faster and earn more money. Glider makes it easy for anybody to bot.

With the appearance and widespread adoption of Glider, all player incentives point to simply botting the character. It becomes a different game – World of Botcraft – one that few if any people would pay money to play. In this way, Glider has the potential to destroy WoW as we know it.

Would everyone bot their character? The answer, based on decades of research in economics, political science, public policy, law, and sociology, is YES. Botting belongs to a class of well-known economic problems known as the N-Player Prisoner's Dilemma (NPPD). In these situations, players are better off if all of them cooperate with some sort of enforcement regime. In this case, everyone would be better off if nobody uses Glider. But regardless of how many people use Glider, each player's individual incentive is actually to go ahead and use it. If, for example, no player is using Glider, then the first to use it will gains experience points and levels very rapidly, and become rich from farming resources and gold. If on the other hand every player is using Glider, then any player who does not use it will feel like a loser, gaining experience points and levels very slowly and living in complete poverty. Thus regardless of Glider's penetration, the incentive is always there to use it. Yet if everyone uses Glider, they destroy the game that they are playing. This is the essence of the NPPD: people following their individually rational choices will produce a collectively bad outcome.

The dynamics of NPPDs and similar problems have been analyzed by many experts over the past[4]. The basic finding, documented in dozens of studies, is that if the situation is left unregulated, people will erode and eventually destroy the common resource they are sharing. It follows as a logical certainty, based on a half-century's work in social science, that if Glider is left unregulated it will destroy WoW.

To an average player, the ongoing destruction of WoW has been gradual and almost imperceptible. At first, players heard rumors about gold farming bots. Then the economy began to erode. Then it became hard to play without buying gold. Then gold prices began to rise. Then convenient packages like Glider came into the players' common awareness. At this point, the following reasoning begins to dawn: why pay gold farmers for gold when I can bot my character and farm gold myself? This reasoning has led to the continued growth in the number of Glider users. Heated debates have erupted, as non-botters insist that WoW is not about botting. Hardened botters, and profiteers in the gold-farming industry (such as MarkeeDragon ("10 Years of Service to the MMO Community") and IGE ("Industry Trailblazer and Market Steward")), have counter-argued that they are making the situation better for average players.[5] In fact, they are the cause

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[4]   *See, e.g.*, H. Scott Gordon, *The economic theory of a common property resource: the fishery*, 62 J. OF POL. ECON., 124-42 (1954); Garrett Hardin, *The tragedy of the commons*, 162 SCI., 1243-8 (1968); Elinor & Victor Ostrom, *The Quest for Meaning in Public Choice*, 63(1) AM. J. OF ECON., 149-60.

[5]   *See,* posting and video of Marcus Eikenberry (a/k/a Markee Dragon), *Markee Dragon Celebrates 10 years of service to the MMO Community, at* http://www.markeedragon.com/ (Oct. 30, 2007) (copy of posting on file with author). *See also, Our Business* (IGE.com), *available at* http://www.ige.com/about (last visited Nov. 5, 2007).

of the problems. Grasping this, players who oppose botting have begun to quit in disgust. As they do, any social norms against botting are weakened. The tipping-point dynamic[6] shows that once norms erode past a certain point, they evaporate completely. When the norm against botting drops away, as it surely will do if this dynamic continues, World of Warcraft will transform into World of Botcraft: everyone remaining in the game will have become a botter.

The problem for Blizzard, of course, is that the number of people who would subscribe to the World of Botcraft is far less than those who subscribe to the World of Warcraft as designed by Blizzard.

VII. MONETARY ESTIMATES OF THE DAMAGE OF GLIDER BOTTING

Studies of normal WoW players indicate that attaining the highest level in WoW takes about 480 hours of play time.[7] The casual player might be expected to average perhaps 2 hours a day playing the game, in which case the player would get to the top level in 240 days, or about 8 months. During

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[6] The tipping point dynamic was first discussed by 2005 Economics Nobel Prize winner T.C. Schelling in the context of racial segregation in his highly influential paper "Dynamic Models of Segregation." (Thomas Crombie Schelling, *Dynamic Models of Segregation*, 1 (2) J. OF MATHEMATICAL SOC., 143–186 (1971).) *See also* Romans Pancs & Nicolaas J. Vriend, *Schelling's Spatial Proximity Model of Segregation Revisited*, 91 J. OF PUB. ECON., 1-24 (2007), *available at* http://www.qmw.ac.uk/~ugte173/abs/abs.pubec.html (last visited Nov. 6, 2007); Avinash Dixit, *Thomas Schelling's Contributions to Game Theory*, 108 (2) SCANDINAVIAN J. OF ECON., 213–229 (2006).
[7] According to the Palo Alto Research Center (PARC), going from level 1 to level 60 takes 20.3 24-hour days, or about 480 hours total. (PARC, *Leveling Time, available at* http://blogs.parc.com/playon/archives/2005/07/leveling_time.html (Jul. 8, 2005) (Last visited Nov. 13, 2007).

those 8 months, the casual player pays Blizzard the monthly subscription fee of about $15. With Glider, however, a user can let his bot fight his battles for him, all day and all night; a Glider bot has the ability to run 24 hours a day. Using Glider, a player could get through 480 hours of play time in just (480 / 24) = 20 days, or less than one month. Those missing seven months, in effect, are months of revenue that Blizzard loses, and constitute a *direct* loss for the company of (7 lost months) x ($15 per month) = $105 per Glider user.

With sufficient data and time, it would be possible to quantify many of the other costs of Glider to Blizzard Entertainment. In prior research, I have developed a damage model for quantifying the effects of botting and similarly rule-breaking behaviors[8]. I will summarize the results of this model here.

The model follows ordinary economic demand theory in assuming that that the quantity of game subscriptions demanded depends on the price of subscriptions, quality of game play, player income, the costs of other games and entertainments, and so on. It follows ordinary economic supply theory in assuming that the quantity of game subscriptions supplied (by a company such as Blizzard Entertainment) depends on the price of subscriptions, the costs of content creation, maintenance of networks, customer service, and so on. The model thus enables one to identify how changes in the quality of game play affect the demand for game subscriptions. Furthermore, changes in things like customer service costs and anti-cheating enforcement costs can

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[8]   Edward Castronova, *A Cost-Benefit Analysis of Real-Money Trade in the Products of Synthetic Economies*, 8 (6) INFO - THE J. OF POL'Y, REG. & STRATEGY FOR TELECOMM., 51-68 (Oct. 2006), *available at* http://ssrn.com/abstract=917124 (last visited Nov. 6, 2007).

be traced to supply. The model assumes that changes in these inputs have minor effects on the overall demand and supply for game subscriptions. For the sake of argument, the paper assumes a one percent increase in a cheating behavior (an increase in gold-selling), and assumes further that this causes a 1/20th percent decrease in demand for the game, and a 1/20th percent increase in the supply costs. (The intent is to assume, conservatively, that demand and supply in this market are not very sensitive to changes in cheating behaviors.) Finally, the model assumes that whatever these supply and demand effects are, they increase and decreases on a one-for-one basis with the extent of cheating. That is, if cheating goes up 10 percent, these supply and demand effects would be 10 percent larger.

With these assumptions, the analysis shows that even if the effects of a cheating behavior like gold-selling are small, as assumed, the total social cost of this activity is about $1.8 million per 100,000 users per year. Half of that cost is born by players as a loss of consumer surplus (a monetary quantification of the pleasure they get from playing), the other half is born by the game company as a loss of profits.

This analysis applies to World of Warcraft and the Glider case. The cheating behavior in question, botting, clearly decreases game satisfaction, and therefore unquestionably reduces the demand for World of Warcraft. Furthermore, the cheating unquestionably increases Blizzard's costs of operation, and therefore clearly raises the supply curve. The model analyzes

exactly this situation – a cheat that decreases demand and raises supply cost. If the model's responsiveness assumptions are carried over (a one-percent increasing in botting leads to a 1/20th of a percent decrease in demand and a 1/20th of a percent increase in supply, along with a one-for-one correspondence between the magnitude of these effects and the magnitude of cheating), then the social costs analysis carries over as well. This would imply that the social costs of Glider are $1.8 million per 100,000 users per year , with $900,000 of that cost born by players in the form of decreased game satisfaction, and $900,000 of it born by Blizzard in the form of lost profit. Since World of Warcraft has not 100,000 players but more than 2 million players in North America alone, this would mean a loss for Blizzard of ($900,000) x (2m / 100,000) = $18 million per year in its North American operations.

This figure is an underestimate, since it does not consider the effect of widespread botting on norms against botting, nor the long-run effect of botting on the overall nature of the game. It also does not consider other effects of botting beyond the farming of gold. These facts can only increase the responsiveness of supply and demand to the cheat that botting represents. Increases in responsiveness beyond the assumed 1/20th of a percent would increase Blizzard's damages accordingly. In my judgment, the response to botting of World of Warcraft's demand and supply, is greater than that assumed in this analysis. The costs are almost certainly greater as well.

VIII. BLIZZARD'S OPTIONS IN DEALING WITH GLIDER

The research on NPPD situations like Glider, where perverse incentives cause a community of people to destroy a resource they all share, indicates that there are numerous ways to handle the problem. Unfortunately, Glider's uniquely destructive technology makes the usual responses almost impossible.

The first solution analysts proposed was to have the central government regulate the situation[9], e.g., pass a law stating that the problematic activity was not acceptable beyond some limit, then impose fines for those who go beyond the limit. This is how we handle speeding and the attendant probability of accidents. Subsequent research[10] showed that community social norms might work better, because it is hard for the central authority to monitor infractions, to see who is doing what, when. Members of the community have much more information. If one allows the community to impose sanctions against norm-breakers, that may be enough to keep the undesired activity within its proper limits.

With Glider, enforcing Blizzard's rules against botting is very difficult; Glider is protected against automatic detection by some very sophisticated software. Glider also makes it difficult to enforce social norms against botting. Glider creates a disconnect between the botting player and the

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[9] ARTHUR CECIL PIGOU, THE ECONOMICS OF WELFARE (Transaction Publishers 2002) (1920).

[10] Ostrom, *supra.*

community. While the player sleeps, the bot goes on its annoying and disruptive way. Fairly soon, other players become aware that this alleged colleague in the area is not human. They can then say nasty things to the bot, but the player won't hear them. Rather, when the player wakes up, the bot is there with all of his experience points and treasure, and no evidence at all that someone may have been upset at what the bot was doing.

Glider thus makes it hard to deploy the usual remedies that analysts have proposed in NPPDs. Direct central regulation and social norms are difficult to enforce against botting. The task would become impossible if everyone were allowed to run a program, such as Glider, that makes botting trivially easy to do. Thus, Glider represents a significant danger to the health of the entire game, one which the game's owners have difficulty stopping using the usual tools.

IX. CONCLUSION: THE HARMS OF GLIDER

In this report I have identified the following ways in which Glider causes harm to Blizzard Entertainment:

1. Users of Glider increase their characters' level considerably faster than human players, reducing the time spent playing the game;

2. Frustration and loss of game satisfaction by average players when Glider bots gain experience points more rapidly than the average user;

3. Frustration and loss of game satisfaction by average players when Glider bots decreases the amount of gold average players can earn during ordinary play;

4. Frustration and loss of game satisfaction when the in-game economy is hyper-inflated, resulting in significantly decreased buying power for normal users;

5. Increase cost to play when average players feel they *must* pay real world money for in-game gold in order to play the game as intended by Blizzard;

6. Increased cost of providing the game when Blizzard's customer service representatives must respond to hundreds of thousands of complaints about bots, and millions of complaints about in-game problems caused by bots;

7. Cost of resources devoted to detecting Glider bots, and the cost of ongoing programming efforts to overcome Glider's constant development and improvement of its anti-detection software; and

8. Loss of game satisfaction by average players when the presence of Glider bots destroys the immersive fantasy aspect of the game, which is the essence of the product.

The paths by which these effects become direct damages to Blizzard are as follows:

1. As a result of the decreased time required to level (1 above) Blizzard is deprived of approximately $105 in subscription revenue for every user of Glider;

2. Every game satisfaction effect (2-4 and 8 above) results in a loss of revenue as dissatisfied players quit the game;

3. Every game satisfaction effect also reduces revenue through reputation effects: new players will not try the game when they learn about these dissatisfying features;

4. The increased cost to play WoW, imposed because Glider makes buying gold for real money a virtual necessity, is beyond the budget of many players, who quit the game (denying Blizzard future revenue) simply because of cost;

5. Potential new players will not try WoW once they learn that they must also commit to buying gold for real money on a regular basis, just to play the game as intended.

6. The increased customer service and monitoring costs that Glider requires Blizzard to expend are a loss to the company's bottom line: expenditures that the company must make that do nothing to make their actual product better.

Reviewing these categories in light of existing research on the social cost of bots in games like WoW, I am confident that Glider's damages to Blizzard Entertainment exceed $20 million per year.

SIGNATURE

Respectfully submitted,

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