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# Virtual Worlds: A First-Hand Account of Market and Society on the Cyberian Frontier

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## Abstract

In March 1999, a small number of Californians discovered a new world called "Norrath", populated by an exotic but industrious people. Having just returned from a dangerous exploratory journey through this new world, I can report a number of interesting findings about its people and economy. About 12,000 people call it their permanent home, although some 60,000 are present there at any given time. The nominal hourly wage is about $3.42 per hour, and the labors of the people produce a GNP per capita somewhere between that of Russia and Bulgaria. A unit of Norrath's currency is traded on exchange markets at $0.0107, higher than the Yen and the Lira. The economy is characterized by extreme inequality, yet life there is quite attractive to many. The population is growing rapidly, swollen each each day by hundreds of émigrés from various places around the globe, but especially the United States. Perhaps the most interesting thing about the new world is its location. Norrath is a virtual world that exists entirely on 40 computers in San Diego. The entire dollar-based economy is underground, since the owning company, Sony, considers everything created in the world to be its intellectual property. Unlike many internet ventures, virtual worlds are making money – with annual revenues expected to top $1.5 billion by 2004 – and if network effects are as powerful here as they have been with other internet innovations, virtual worlds may be the next step in the evolution of internet (and possibly human) culture.

**KEYWORDS:** Internet, Virtual Worlds

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# Virtual Worlds: A First-Hand Account of Market and Society on the Cyberian Frontier

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Abstract: In March 1999, a small number of Californians discovered a new world called "Norrath", populated by an exotic but industrious people. Having just returned from a dangerous exploratory journey through this new world, I can report a number of interesting findings about its people and economy. About 12,000 people call it their permanent home, although some 60,000 are present there at any given time. The nominal hourly wage is about $3.42 per hour, and the labors of the people produce a GNP per capita somewhere between that of Russia and Bulgaria. A unit of Norrath's currency is traded on exchange markets at $0.0107, higher than the Yen and the Lira. The economy is characterized by extreme inequality, yet life there is quite attractive to many. The population is growing rapidly, swollen each each day by hundreds of émigrés from various places around the globe, but especially the United States. Perhaps the most interesting thing about the new world is its location. Norrath is a virtual world that exists entirely on 40 computers in San Diego. The entire dollar-based economy is underground, since the owning company, Sony, considers everything created in the world to be its intellectual property. Unlike many internet ventures, virtual worlds are making money -- with annual revenues expected to top $1.5 billion by 2004 -- and if network effects are as powerful here as they have been with other internet innovations, virtual worlds may be the next step in the evolution of internet (and possibly human) culture.

This report is based primarily on the author's personal experiences while traveling and gathering data in Norrath from April to September, 2001. Other sources include data made publicly available by Verant Interactive, data available for free or by fee from public websites, and data collected by the author from surveys. No one affiliated with Verant Interactive, Sony, or any private companies have sponsored the report or bear any responsibility for its contents. Any avatar names used in the report have been changed to protect the privacy of their owners. All errors in the report are mine.

## I. A New World

*Journal entry, 18 April. I have called my avatar 'Alaniel.' I land in Norrath for the first time, in a town called Freeport. I am standing in a stone courtyard behind a gate. I see several lean-tos and a firepit. All around I hear the sounds of footsteps and I see humanoids of various shapes and sizes running back and forth, names like "Zikon" and "Sefirooth" over their heads, wearing odd costumes, carrying strange implements. Are they people? Or merely beings created by the software? Statements flow into my chat box at a rapid rate. "Galadriel shouts: Looking for bind at gate." I see a being with the name Galadriel. Is he talking to me? What is he saying? "Friitz says out of character: brt - omwb." What? No sign of anyone named Friitz. "Ikillu auctions: WTS bone chips." An auction. What should I do? I feel the presence of humanity, but I suddenly feel like a stranger in a very foreign culture. I become afraid of breaking some taboo, of making a fool of myself. Clumsily, I maneuver Alaniel toward the nearest lean-to and hide behind it. No one can see me here.*

On March 16, 1999, Verant Interactive, a holding of Sony, launched an on-line computer game called Everquest on five servers in San Diego, California, USA.[1] With that act the company called into existence a new world named "Norrath" that has become a meeting place, a market place, and even a home, to tens of thousands of people. This paper offers a first-hand look at the people, the customs, and especially the economy of this New World.

Why bother? Isn't Norrath just part of a silly game? Perhaps it is, on an abstract level. But economists believe that it is the practical actions of people, and not abstract arguments, that determine the social value of things. One does not study the labor market because work is holy and ethical; one does it because the conditions of work mean a great deal to a large number of ordinary people. By the same reasoning, economists and other social scientists will become more interested in Norrath and similar virtual worlds as they realize that such places have begun to mean a great deal to large numbers of ordinary people. Almost 1 million people already have active accounts in Virtual Worlds. At a time when many ecommerce concerns are going under, revenues from on-line gaming

will grow to over $1.5 billion in 2004. Some 60,000 people visit Norrath in any given hour, paying for the privilege, around the clock, every day, year-round. Nearly a third of the adults among them – perhaps some 93,000 people out of Norrath's 400,000 person user base – spend more time in Norrath in a typical week than they do working for pay. The exchange rate between Norrath's currency and the US dollar is determined in a highly liquid (if illegal) currency market, and its value exceeds that of the Japanese Yen and the Italian Lira. The creation of dollar-valued items in Norrath occurs at a rate such that Norrath's GNP per capita easily exceeds that of dozens of countries, including India and China. Some 20 percent of Norrath's citizens consider it their place of residence; they just commute to Earth and back. To a large and growing number of people, virtual worlds are an important source of material and emotional well-being.

Virtual worlds may also be the future of ecommerce, and perhaps of the internet itself. The game designers who created thriving places like Norrath have unwittingly discovered a much more attractive way to use the internet: through an avatar. The avatar represents the user in the fantasy 3D world, and avatars apparently come to occupy a special place in the hearts of their creators. The typical user devotes hundreds of hours (and hundreds of dollars, in some cases) to develop the avatar. These ordinary people, who seem to have become bored and frustrated by ordinary web commerce, engage energetically and enthusiastically in avatar-based on-line markets. Few people are willing to go web shopping for tires for their car, but hundreds of thousands are willing to go virtual shopping for shoes for their avatar.

The business potential of this interest in avatar shopping is not lost on everyone. Mindark, a private Swedish company, hopes to use avatar-based shopping to build a

global network monopoly in internet interface. The strategy: start a virtual world in a game of truly massive scale, so that millions can use it at any time. Make the game free. Allow people to use their credit cards to make transactions. Then wait for the society and markets to develop, and invite Earth retailers to open 3D stores in the virtual space. At that point, your Lara Croft lookalike avatar will be able to follow up her tough day of adventuring with a run into the nearby virtual JC Penney -- to buy her owner a new suit, for real money. The commercial potential of the new virtual worlds is impressive, and makes them well worth a first look.

In the past, the discovery of new worlds has often been an epochal event for both the new world and the old. The new world typical has a herald, a hapless explorer who has gotten lost and has wandered aimlessly about in strange territory, but has had the wit and good fortune to write down what he has seen, his impressions of the people, and the exciting dangers he has faced, for an audience far away. In similar fashion, I stumbled haplessly into Norrath in April 2001, and then spent four months wandering around there. It took me about six weeks to get my bearings. I began recording data in May. And I assure you, I faced many dangers, and died many, many times, in order to gather impressions and bring them back for you. In the end I have been able to include only a small fraction of what I have learned, indeed only enough to give a flavor of what is happening. I apologize to anyone reading this who thinks that I have left out something of great importance.

My report is structured as follows. Section II, below, describes the universe of virtual worlds of which Norrath is a member, and gives an overview of the economic and social impact these worlds have already generated. Section III, focusing on Norrath

alone, describes the organization of society and economy and provides some indicators of macroeconomic health, such as the exchange rate, the inflation rate, GNP per capita, and the poverty rate. Finally, Section IV sketches the forseeable near-term future of virtual worlds, with some thoughts on the broader implications of virtual worlds for everyday human life. For those interested in doing research on Norrath, Appendix A offers a list of potential projects that came to mind during my tour. Appendix B describes the weighting method behind the main survey data in the report. Appendix C specifies how GNP figures are calculated. Finally, Appendix D discusses specific economic and policy issues that will be of most interest only to those with a fairly deep involvement in Norrath.

## II. Virtual Worlds

### A. The Market for Virtual Worlds

*Journal entry, 18 April. A new avatar on a different server. Same world, different people. First steps outside the gate of Freeport. Bustling activity all around, but I feel ignored, which is good – my first conversations went poorly as I had trouble speaking the language. Suddenly my chat box lights up with message from a Being named "Deathfist Pawn" to the effect that I will not be allowed to ruin his land. Then: "Deathfist Pawn hits YOU for 2 points of damage." I hear myself grunt in pain. Flustered, I peer out and see no one. "Deathfist Pawn hits YOU for 3 points of damage." He is behind me of course. I learn that you can be attacked here. Why is this person attacking me? What have I done? I guess I have to fight. "Deathfist Pawn hits YOU for 5 points of damage." A sickening gashing sound is heard – my flesh. I fumble for my sword. The chat box reports "You have been slain by Deathfist Pawn." The screen freezes. I am dead.*

A *virtual world* or VW is a computer program with three defining features:

- Interactivity: it exists on one computer but can be accessed remotely (i.e. by an internet connection) and simultaneously by a large number of people, with the command inputs of one person affecting the command results of other people.

- Physicality: people access the program through an interface that simulates a first-person physical environment on their computer screen; the environment is generally ruled by the natural laws of Earth and is characterized by scarcity of resources.

- Persistence: the program continues to run whether anyone is using it or not; it remembers the location of people and things, as well as the ownership of objects. [2]

A VW is the product of combining the graphical 3D environment of games like Tomb Raider with the chat-based social interaction systems developed in the world of Multi-User Domains (MUDs). In Tomb Raider, you run a little person around on your screen and do things; in a VW, other people are running around in the same virtual space as you are, and they can talk to you. VWs can trace their history back to on-line games on the ARPA-Net in the 1980s. The game that started the recent explosion of VWs was Meridian 59, or M59 (Colker, 2001), begun in 1995 by Andrew and Chris Kirmse, two Microsoft interns. They made a town and an open field and let users manipulate the environment by issuing keyboard and mouse commands to a graphical representation of themselves. This virtual persona, now known as an 'avatar,' could be told to walk here and there, pick up a sword, look behind a bush, and hit whatever was there. [3] To make things interesting, you could chat with others, and there were biots in the world: computer-driven beings, also known as mobile objects or MOBS. In essence, biots were either monsters who would attack and kill an avatar on sight, or merchants who would talk to the avatar from a script and buy and sell things.[4] Given the circumstances presented by the objective functions of the biots, the avatar's survival and success depended on its ability to deal with merchants and defend itself from monsters. The avatar could join with other avatars to kill powerful monsters, and loot the corpse to

become the new owner of whatever the monster held. Items could be traded back and forth between avatars. All of these events unfolded on the user's computer screen like a moving picture, and communication went back and forth via text-based messages. When the user left the world and came back hours later, their avatar was returned to the spot they left, still possessing whatever she had held before. M59 made its debut in October 1996 and survived until August 2000, when competitive pressure from much larger VWs forced its closure. At its closing, hundreds of people mourned its loss. They felt that the world had been a significant part of their lives in the few years it had existed. People had made friends there and were loathe to leave.[5]

M59 was quite small by contemporary standards; current VWs can support several thousand users simultaneously on a single server. The first VW on this scale was Ultima Online (UO), launched in Fall 1997. UO is owned by Electronic Arts, a California-based publicly-traded software company with 3,600 employees and $1.3 billion in annual revenues.[6] Its popularity led to the development of other VWs, especially Sony/Verant Interactive's Everquest, launched in Spring 1999 and now the industry leader in terms of subscriptions. Microsoft entered the competition in Spring 2000 with Asheron's Call. Recent major additions have been Anarchy Online, released in June 2001 by Funcom, a 120-employee Norwegian company; World War II Online, by Cornered Rat Software, a small Texas company; and Dark Age of Camelot, by Mythic Entertainment, a small Washington DC company. The first VW *not* based on killing and adventuring will appear in 2002, when Electronic Arts releases The Sims Online.

The market is quite competitive at the moment, but since VWs are human networks, there is reason to believe that only a few VWs will eventually dominate the

market.[7] The tendency to network monopoly is enhanced by the fact that most people seem to be willing to "live" in at most one fantasy world at a time, and switching is costly as it can take weeks to become familiar with a new world.

The growth in the number of VWs has been spurred by a growth in user base and revenues; VWs stand out as one area of internet commerce that actually seems to be profitable. With most software game titles, the user pays a one-time fee to purchase the game. With VW-based games, the user purchases the game software and then pays additional monthly fees (from $10 to $20) to access the VW on an ongoing basis. This revenue stream seems to be stable and growing. While most firms do not publish these figures regularly, there are estimates from March 2001 putting the combined subscriber base for VWs at about 800,000, 360,000 subscribing to Everquest and another 230,000 to UO (Harris, 2001; Zito, 2001). By late summer 2001 the subscriber base to Everquest was said to be over 400,000 (according to off-hand remarks by developers on discussion boards), a growth of over 10 percent in two quarters. And this is for a computer game that is ancient by industry standards, already over two years old. Sony's *monthly* revenues from Everquest are about $3.6 million; revenues from online gaming were $208 million in 2000 and are estimated to grow to $1.7 billion in 2004 (Zito, 2001).[8] A site maintained by VW programmer Patrik Holmsten (hem.passagen.se/ulkis/) estimates that there are currently 18 VWs running and publicly available, with 40 others in development.[9] At a time when many ecommerce ventures are struggling, VWs have become a flourishing sector of the economy.

The business success of VWs derives from their ability to attract customers who are willing to pay an ongoing fee to visit the world, and that requires VWs to offer a form

of entertainment that is persistently more attractive than the competition. As it turns out, VWs seem to be able to offer entertainment that is attractive enough to many people that they sacrifice major portions of their time to it. A survey of Everquest users conducted by Nicholas Yee, an undergraduate psychology major at Haverford College, indicates that the typical user spends about 22 hours per week in the game (Yee, 2001). My own survey of Everquest users (see Section III below) indicates that the median user devotes 4 hours per day and more than 20 hours per week to the game. In Yee's study, many people used the term 'addiction' to describe their own behavior, perceiving their time in the VW as a source of serious conflict with various Earth activities and relationships.[10] If we take the economist's view, however, and see their behavior as rational choice, we must conclude that VWs offer something that is perhaps a bit more than a mere entertainment to which the players have become addicted. Rather, they offer an alternative reality, a different country in which one can live most of one's life if one so chooses. And it so happens that life in a VW is extremely attractive to many people. A competition has arisen between Earth and the virtual worlds, and for many, Earth is the lesser option.

B. An Avatar's Life

*Journal entry, 20 April. I have made my first kills, mostly rats. They did me a great deal of damage and I have been killed several times. I do return to life but it is a pain to go through. Nonetheless, I have to attack the rats. I need money to buy edible food and water, and rat fur, and other similar junk, is about the only thing I can get my hands on that the vendors will pay money for. I was hoping to do more exploring and less work, but a woman named "Soulseekyre" told me that beyond Freeport lie biots so powerful they could kill me instantly. My problem is that I am under-equipped. Soulseekyre was wearing an elaborate suit of armor and she had impressive weapons. I have been basically naked, carrying only a simple club, a caveman in a world of cavaliers. My poverty is oppressive – no amount of rat fur is sufficient to buy even a simple tunic at the ludicrously high prices of the merchant biots. Fortunately I just killed*

*enough rats to gain a "level" of experience, and I seem to have become a much more effective rat killer.*

What features of the virtual worlds give them this competitive edge? An overview of the conditions of existence in VWs will provide some obvious answers. To enter a VW, the user is first connected to the server via the internet. Once the connection is established, the user enters a program that allows them to choose an avatar for themselves. In all of the major VWs, one can spent an extraordinarily long time at this first stage, choosing the appearance of the avatar as well as its abilities. Always wondered what it is like to be tall? Choose a tall avatar. Want to be one of the smart people in society? Make your avatar a brilliant wizard. Need to get out your aggressions? Give your avatar immense strength and a high skill in wielding a mace. Think it would be fun to be a beautiful dark-skinned woman? Go for it. These choices occur under a budget constraint that ensures equality of opportunity in the world: Your mace-wielding ogre will be dumb, and your brilliant wizard will have a glass jaw. At the same time, the budget constraint ensures equality among avatars along dimensions that most people think should not matter for social achievement. In particular, male and female avatars have the same initial budget of skills and attributes. Avatars whose physical characteristics (i.e. skin tone, size) are associated with any benefit in the game must accept some compensating disadvantage. Any inequality in the VW can only be due to one of two things: a) a person's choices when creating the avatar, or b) their subsequent actions in the VW.

Once the avatar is created, it is deposited at some place in the VW. Because most of the laws of Earth science apply, most of the time, it is quite easy to "become" the avatar as you perceive the world through its eyes. You cannot run through walls; you can

only see where you are looking; if you are at Point A and want to get to point B, you will have to walk your avatar in that direction. If you jump off a roof, you will fall and hurt yourself. When the sun goes down, it gets darker and you will need a light. If you do something over and over, you will get better at it. If you hold things, you might drop them; if you drop them, someone else may pick them up. You can give things to another avatar if you wish. You can hit other avatars and biots. You can kill them if you wish. And they can kill you.

Of course the natural laws of Earth need not apply in a world that exists entirely as software, and much of what defines an avatar's uniqueness is its ability to bend or break some of these laws and not others. Depending on the skills chosen, an avatar might be able to fly, see for miles, hypnotize, heal wounds, teleport themselves, or shoot great flaming fireballs at other avatar's heads. Again a budget constraint applies: those who can heal or hypnotize often have difficulty summoning a fireball worthy of mention. As a result, avatars come to view themselves as specialized agents, much as workers in a developed economy do. The avatar's skills will determine whether the avatar will be a demander or supplier of various goods and services in the VW. Each avatar develops a social role.

Social roles are defined through communication with other avatars. When an avatar is launched into the VW, it is granted a limited ability to communicate with other avatars. The communication is in the form of a clipped written English ("chat").[11] An avatar may approach another avatar, type a message out on the keyboard, and send that message to the other avatar. Depending on the nature of the laws of sound in the VW, an avatar may also be able to overhear the conversations of others, as well as hold

conversations with avatars hundreds of virtual miles away. These communications allow social interactions that are *not* a simulation of human interactions; they *are* human interactions, merely extended into a new forum. As with any human society, it is through communication that the VW society confers status and standing.

As it turns out, the social standing of the avatar has a powerful effect on the entertainment value of the VW. Having specialized in certain skills, an avatar may find the accomplishment of certain goals much easier with the assistance of an avatar who has a complementary skill. For example: When traveling from A to B, the monsters must be killed and so skills in destruction are needed; when traveling from B to C, the monsters must be evaded and so skills in deception are needed; when traveling from A to C, one should form a party consisting of a destroyer and a deceiver, rather than travel alone. An avatar who does not form social relationships on at least an ad hoc basis will generally have a more difficult time doing things in the VW. In some VWs, it is a matter of survival – an avatar acting alone will eventually starve or be killed by a biot.

These social relationships are essential, and they emerge under the same kinds of circumstances as required in Earth societies: two people with complementary abilities or resources have an incentive to engage in mutually beneficial trade. It follows that an avatar must have skills to do and see much in the world. However, developing the avatar's skills takes time; monsters must be killed, axes must be forged, quests must be completed. The result of all this effort, which can take hundreds of hours, is "avatar capital": an enhancement of the avatar's capabilities through training. In most VWs, capital is given by a number called the "level," so that an avatar at level 6 who kills 100

kobolds is given an increase to level 7. With that increase comes an enhancement of the avatar's abilities, which then makes the avatar a more attractive social contact.

In sum, activity in the VW requires social integration, but social integration requires activity: the avatar faces the same sort of social reward systems as are found in Earth society. The leveling and integration system also draws on the basic human tendency to get self-esteem from the opinions of others, and the result is that users are powerfully motivated to increase their avatars' abilities. Like the humans who imbue them, avatars find themselves on something of a treadmill of social success through avatar capital accumulation: they must work to advance, but each advancement raises the aspiration level and spurs them to still greater work (Easterlin, 2001). It is the success and standing of avatar that makes people devote hundreds of hours to virtual worlds, indeed so many hours that one can almost believe that many people do live *there*, wherever it is, and not on Earth.

## C. Scarcity is Fun

*Journal entry, 22 April. I have killed enough rats to have earned the title "Ratslayer of Freeport." But powerful orcs lurk in the beyond, and I need a better mace. To get a better mace, I have to go from Freeport to the hobbit village of Rivervale. If I go on my own, I will be killed by bears. I walk as far as I can safely go, and then make my first ever general appeal for help. Thinking that an Elizabethan tone would be helpful, I shout "Brave adventurers! I seek safe conduct to Rivervale! I can only compensate you with my eternal gratitude!" The woods and fields erupt in guffaws and insults: "ne1 want to hold the newbie's hand?" and "geteth a clueth you n00beth." then i get eaten by a bear.*

The avatar seems so entertaining that it generates hundreds of millions of dollars in annual revenue for gaming companies. Why? Certainly, one can understand why many people would prefer existence in a VW to existence in the "real world." Unlike Earth, in VWs there is real equality of opportunity, as everybody is born penniless and with the

same minimal effectiveness.[12] In a VW, people choose their own abilities, gender, and skin tone instead of having them imposed by accidents of birth. Those who cannot run on Earth can run in a VW. On Earth, reputation sticks to a person; in VWs, an avatar with a bad reputation can be replaced by one who is clean.

Yet VWs are only one of many different ways of constructing an avatar space; other approaches have not had the same commercial success. Before the explosion in VWs, there were a number of virtual reality avatar spaces that offered similar forms of entertainment, for free.[13] Users could create their own avatars and chat with other avatars. They could build rooms and wander about, looking at other people's houses. Some of these user-built avatar spaces became extremely large; Alpha World began as a virtual plain and was built, byte by byte, into a vast city by hundreds of thousands of users (Damer, 2001). There were a number of ways to amuse one's self in these places: one could look around at pretty virtual landscapes, or simply talk to others, or show off your avatar's skills ("Look what happens when I shoot a fireball at my head!"). However, these first generation avatar spaces failed to sustain any interest from private companies; most have folded or are maintained by private contributions (Damer, 2001).

Their failure helps identify the source of the success of VWs, because there really is only one major difference between these avatar spaces and VWs: Scarcity. Nothing was scarce in the avatar space. A user could create as many avatars as desired; all avatars had equal abilities; the user could build without limit, as long as the desire to write code persisted. The activities of one avatar posed no real obstacle and imposed no significant cost on any other avatar's activities.

In a VW, conversely, the user faces scarcity along a number of dimensions. First, not all avatars are the same: the user faces constraints on the creation of avatars and, through leveling, on the development of their abilities. An avatar may die, and death may rob it of some or all of its powers. Second, the avatar is constrained by the physicality of the VW in that a large percentage of important goods and services can only be obtained from other avatars or from biots, always at a price or by risking death. No free lunches. Third, the avatar is constrained by society in the VW, in that social roles are not open to everyone; an avatar must compete against other avatars to fill a role. In a sentence, avatars in avatar spaces could do no work and still do anything that any other avatar could do; avatars in VWs *must* work to do anything interesting at all.

And, somewhat shockingly, scarcity is what makes the VW so fun. The process of developing avatar capital seems to invoke exactly the same risk and reward structures in the brain that are invoked by personal development in real life. The idea is shocking because it seems to suggest that utility and well-being are not the same thing. Utility always rises when constraints are relaxed, yet people seem to prefer a world *with* constraints to a world *without* them.[14] Constraints create the possibility of achievement, and it is the drive to achieve something with the avatar that seems to create an obsessive interest in her well-being. Moreover, since the VWs are inherently social, the achievements are relative: it is not having powerful weapons that really makes a difference in prestige, but in having the most powerful weapons in the world. In a post-industrial society, it is social status, more than anything else, that drives people to work so diligently all their lives. In this respect, VWs are truly a simulacrum of Earth society.

But the rules are different in important ways, making VWs more popular, for many, than both Earth society and the avatar spaces that preceded them. VWs offer the essential human story of challenge, maturity, and success, but played out on a more level playing field. They offer life with an escape clause, because if things go wrong and you cannot walk or talk and everyone hates you, you can just start over. And they give you a freedom that no one has on Earth: the freedom to be whomever you want to be. Already, a large number of people seems willing to pay an ongoing monthly fee to enjoy this privilege, and the numbers are growing. For many, the best world is one with scarcity but perfect equality of opportunity. VWs provide such a world and, as a result, they seem to be growing in importance as a forum of human interaction.

## III. The Norrath Economic Report, 2001

*journal entry, 25 april. after the rivervale fiasco, i feel that my second avatar is socially dead. i could wait for my reputation to improve, but i just feel too stupid. so i started a third avatar, a halfling, basically a midget. i made him a healer. it turns out that healers are in high demand. ive been playing him two nights and people i don't know keep coming up and saying "heal me." im making a little money at it, which is good. and i am learning which biots to kill and how to kill them. ive also learned theres a whole world of trade skills you can learn, baking, tailoring, blacksmithing. to do all these things you need skill, which means you need to train and develop the avatar. meanwhile, im seeing more of the world. i realize i have only seen about 5 percent of it so far. it is big.*

VWs are amusing and profitable, that much is certain. Are they "real" societies in any sense?[15] From an economist's point of view, any distinct territory with a labor force, a gross national product, and a floating exchange rate, has an economy. By this standard, the new virtual worlds are absolutely real.[16] In this section I will document the existence of an economy in Norrath, the VW of the game Everquest. My report on Norrath will cover four areas:

A. Data and methods

B. Population of Norrath

C. Microeconomic conditions in Norrath: the main markets

D. Macroeconomic indicators for Norrath

## A. Data and Methods

*journal entry 25 april. new avatar, new server. ive started to "group," basically team up with other players to kill monsters. my unique effectiveness is to heal, so i spend my time healing warriors so they can go back and fight. it turns out that grouping is essential to advancement, and people can quickly get bad reputations from cheating on the group. it's just a 6-person prisoner's dilemma. so i try to keep playing 'cooperate' even after someone has defected. and, lo, i have had no trouble be re-invited for groups.*

I choose Norrath because its mother game, Everquest, is the industry leader in terms of subscriptions and revenues.[17] My attention was first drawn to this topic by news articles in January 2001 reporting that dollar-denominated trade in Norrathian goods had become so extensive that Sony, the owning corporation, had pressured auction sites like Ebay and Yahoo to forcibly close down any Norrath-related auctions on the site (Sandoval, 2001).[18] Its economy seems as extensive as the other economies, although Ultima Online is also extremely well-developed and has been the subject of media scrutiny as well.[19] However, there are more dollar-based trade and currency transactions involving Norrath than the other VWs.

If there were extensive prior research on these VWs, of course, it would be possible to report about them all. However, it seems that virtually no academic attention has been devoted to VWs to date, judging from a search of 8 major research databases covering public affairs (PAIS), economics (Econlit), humanities (Arts and Humanities Search, Humanities Abstracts), sociology (Sociological Abstracts), communications (ComAbstracts), and mainstream media (Lexis-Nexis). The search covered the words

MMORPG, Everquest, Ultima Online, Asheron's Call, Anarchy Online, Persistent State World, and Persistent Online World. ("Virtual World" was too general and yielded thousands of hits; those I examined were all unrelated to VWs as understood here.) These searches produced 66 hits, all of them newspaper and magazine articles, many of those being tongue-in-cheek "Everquest wrecked my marriage" human interest stories. In the end, the report will focus on Norrath only because there is not enough time to report more broadly on all the virtual economies in existence. I have had experience in the four major economies, however, and I believe that my impressions of Norrath are typical of them all.

The following sections report data of three kinds. First, as a person who has participated directly in Norrath's markets, I will report my own observations. Second, I will make use of publicly-available websites. These consist primarily of official support sites and various fan sites. Last, I will use information from a survey of Norrathians that I conducted via the internet.

I posted the "Norrath Economic Survey" (NES) on my website on August 17, 2001, and sent a message to two popular Everquest bulletin boards announcing the survey's existence and asking for respondents. The survey was open for about 48 hours and yielded 3,619 responses. Since it is not random, this cannot be a representative survey of Norrath's population. However, the direction of bias is fairly easy to identify. The respondents are those who take the time to read fan site discussion boards, and therefore they are more serious Everquest users.[20] It seems likely that the more serious user has been involved with the game for a longer time; therefore, her avatars should be at a higher level. It follows that the survey will be biased in favor of the experiences of high-level avatars. To correct this bias, I conducted population counts on Everquest

servers at various times in order to measure the true distribution of avatars. I then developed weights for the survey data so that the distribution of avatars in the survey accurately reflected the distribution of avatars in Norrath. As expected, the weight for low-level avatars is much higher than for high-level avatars. There is a good reason to believe, however, that the weighted data actually underrepresent the high-level avatars (see Appendix B). As it turns out, the weighting seems to make little difference in the results. See Appendix B for an extended discussion of weighting.[21]

B. The population of Norrath

*journal entry 26 april. i made a killing in misty acorns. you can pick these up from the ground in misty thicket. i was in rivervale one day and some lady was paying 8 pp per acorn. that's a lot of money. she told me it was for halfling armor. ok, whatever. so i started making a habit of picking them up whenever i saw one, then walking into rv and selling them to rich people. they would rather spend that kind of money than wander around looking for acorns. classic economics – my comparative advantage in foraging leads to exchange. and now i can buy a nice hat.*

The overall population of Norrath is distributed on 40 different servers. A user can log on to any server, but an avatar created on Server X must live out its life on that server.[22] The basic geography and biotic population is the same on each server. Thus, the 40 servers represent repeated trials, 40 versions of Norrath with 40 different populations of users and avatars. Moreover, the rules of play differ slightly among servers, allowing some interesting policy impacts to be identified.

In order to get some understanding of the nature of populations on these servers, the Norrath Economic Survey (NES) asks respondents a series of question about their participation in Norrath and Earth society. Table 1 reports some of the results. Perhaps the most striking finding is that a significant fraction, 20 percent, view themselves as

people who "live in" Norrath. A similar fraction, 22 percent, express the desire to spend all of their time there. About 40 percent indicate that if a sufficient wage (self-defined) were available in Norrath, they would quit their economic activity on Earth (work or school, as the case may be) and devote their labor hours to the Norrathian economy. If we take the responses at face value, suppose that 20 percent of the people in Norrath at any one time consider themselves permanent residents. Until August 31, 2001, it was possible to observe overall population counts for Norrath, and these counts indicate that the average population at any given time is 60,381, or about 60,000.[23] This would indicate that12,000 of those present in Norrath at any time consider themselves residents.

Table 2 reports some basic demographic characteristics of respondents to the Norrath Economic Survey. Judging from the means, the typical Norrathian is a well-educated single US man in his 20s, working full time, earning about $20 per hour. A significant fraction of the respondents are students (35 percent).

Interestingly, those who consider themselves residents of Norrath are not radically different from those who do not. The residents do tend to have lower education, fewer work hours, and lower wages, and they are less likely to have major Earth obligations (spouses, children). Like all emigrants, they are more likely to leave for the new world if the old world seems less promising, and if they have few obligations to stay.

Table 3 reports the typical Norrath activity of NES respondents, including an overview of their avatars. Since most people who play Everquest have more than one avatar (the mean is 2.72 avatars per person), these figures are for the "main" avatar, which I take as the avatar with the highest level, which can go as high as level 60. The average respondent devotes a substantial amount of time to Norrath, especially

considering that these figures have been weighted to correct for an over-representation of more-serious players.[24] Norrath consumes more than 4 hours a day for visitors, more than 6 hours for those considering themselves residents. Among*adults* , more than a quarter of the visitors and almost one-half of the residents spend more time in Norrath in a typical week than they do working for pay. A typical avatar is about one year old and has seen almost 800 hours of development. The payoff is that the avatar has achieved 38 levels of experience, well on the way to the maximum of 60. Moreover, the typical avatar has banked thousands of platinum pieces – PP, Norrath's currency – in cash and assembled hundreds of thousands of platinum pieces worth of equipment. If we use the black market exchange rate of about 0.01 dollar per PP (more on this below), these wealth holdings range from $1,800 for visitors to $3,000 for residents. This does not account for the market value of the avatar itself, nor of the value of the other avatars (usually more than one) the person owns. The mean net worth of US families headed by a person younger than 35 years old was $66,000 in 1998, the most recent year for which data are available; the median was only $9,000.[25] It seems that for the typical Norrathian, avatars constitute a non-trivial stock of wealth.

C. Microeconomic conditions in Norrath: the main markets

*journal entry, 27 april. i notice that every time i enter the area called 'east commons,' the chat box lights up with buy and sell offers broadcast over the auction chat channel. the offers stream by so rapidly i can hardly follow them. since i am here to explore markets, and have finally collected a little cash, about 50pp, i respond to someone offering a pair of 'golden efreeti boots' for sale. golden boots - sounds nice. i ask the vendor where he is. 'come to tunnel.' i find 'the tunnel,' a connecting tunnel that effectively skirts the city of freeport. it is filled with perhaps 50 to 100 people, all of them shouting. looks basically like a pit at the chicago board of trade. i find the vendor and ask for a price. its 8,000pp. 'omg,' i say, 'how much money do people have here?' the reply: 'millions. lemme know when u get more pp :).'*

In this section, I will describe Norrath's markets in general terms. Appendix D contains a discussion based on simple supply-and-demand theory; I do not include it here because it requires the reader to be fairly knowledgeable about the details of Norrathian existence. That appendix also has a discussion of local policy issues that are of interest primarily among Norrath's citizens and not the general reader.

There are two modes of buying and selling in Norrath, avatar-to-avatar (a2a) and avatar-to-biot (a2b). The former is much more cumbersome than the latter. In a2b commerce, the avatar can simply walk up to any biot merchant and examine the merchant's wares and buy/sell prices for any length of time. In a2a commerce, avatars on the supply side must constantly shout out what they have, and avatars on the demand side must hear the offer, find the seller, and then haggle over price. It is a bazaar.

Given the much higher transactions costs of a2a trade, it is a wonder that it exists at all. Yet it does exist to some extent, mostly because Norrath's designers encourage it through the prices offered by merchant biots. The typical buy offers of merchant biots are very low and their sell offers are very high. The difference leaves considerable space for an avatar to make money buying and selling a good, despite the difficulties involved in connecting to other avatars.

The biots end up serving two roles in the economy. First, they are the only source of certain important items, such as ore, gems, and spells. Second, merchant biots will buy any good in limitless quantitites, meaning that even if a good has no value in the a2a markets, it can still be turned into cash. As a result, the hunter who takes items from killed monsters can always find a cash outlet for them: if no avatars want them, merchant

biots will always pay something. In this, the merchant biots act effectively as employers, and the pattern of their buy offers set the wage for different activities. Unfortunately, the pattern of these buy offers seem to encourage 'farming' over adventuring, because the special items that require risky adventures do not command a sufficiently high price premium from the biots.[26]

The a2a market is apparently expected to provide the price premia for special items. If special items are scarce, then the a2a market will keep the price high. Unfortunately, another unusual feature of the economy prevents the a2a market from sustaining a price above the biot buy price for very long, and it is this: items do not decay. As a result, the stock of these infinitely-durable goods rises continually as more and more people enter the world and hunt their way to the highest levels. Inevitably, the demand for new items falls, and with it, the a2a price. The general pattern is that a new item commands a significant price in the a2a market for some time, then gradually its price declines until the a2a price is as low as the merchant buy price. At that point, the item is just loot: anyone who gets it just sells it to a biot for the quick cash.

The only reason a2a markets persist at all is that the authorities continue to introduce new items, whose initial scarcity sustains them in the a2a market for a time. Nonetheless, the economy is marked by a steady and ongoing deflation (which will be documented below). The fall in goods prices means a gradual but chronic rise in real wages, and hence a decline in the challenge level of the game. This is taken to be a serious problem by many, but it is not clear that it is, or what can be done given the constraints set by history and by the need to keep the citizens happy.

The structure of a2a commerce leads to an interesting geographical phenomenon involving the formation of markets in space. In Norrath, there is an auction channel devoted to commerce, allowing anyone with goods to sell to broadcast their wares over a very wide region. The broadcast range is not unlimited however. The world is divided into zones and auction chat can only be broadcast within a zone. As a result, shrewd avatars do most selling in zones where demand for their goods is likely to be high. Shrewd buyers travel to zones where the goods they seek are abundant. At the same time, the bazaar-like nature of the haggling requires that trade be concentrated in space.

The result is a pattern of markets in predictable places. In every zone, one will often hear demanders shouting their buy offers for goods that are abundant there. Yet general trade for items from far-flung corners of the world occurs only in a few zones, actually usually in just one zone. Interestingly, the specific zone differs across the 40 different servers on which Norrath exists. It can be easily identified; the NES asks respondents where they would go to sell an item at a fair price, if they had to do so quickly and could travel anywhere in the world. On every server, users overwhelmingly indicate just one zone, although the zone that they indicate is not uniform across servers.[27] The most frequent is the East Commons tunnel (described in the vignette above), on 27 of the 40 servers. Next most frequent is a zone named Greater Faydark (also referred to as "Faymart"), on 9 servers. The city of Freeport, which is very close to the EC tunnel, is the main market on the remaining 4 servers. On 36 of the 40 servers, there is at least 80 percent agreement on the identity of the main market – and this is an open-ended, unstructured question.[28] Appendix A speculates on possible reasons why markets arose in these spots and not others in the vast expanse of the Norrathian world.

Roughly speaking, then, Norrath is characterized by two main markets, an a2b labor market where hunters gain their wages by killing monster biots and selling their loot to merchant biots, and an a2a goods market, existing in all zones but heavily concentrated in just one, where merchants and hunters engage in a cumbersome trade in certain scarce items.

D. Macroeconomic indicators for Norrath

*journal entry, 15 june. i start yet another avatar, this one a tall, beautiful, dark-skinned woman. what the heck, it's becoming more common these days. i wont try to act like a woman, let's just see what happens when i act like me but in a woman's body. well. within 24 hours, i have been repeatedly whistled at, examined, "protected" from biots i could easily kill myself, given rings, and asked to "go on dates in this game." more ominously, i have been having more difficulty getting into groups than usual; there seems to be some question about my understanding of tactics.*

Is the aggregate economic activity of the 40 versions of Norrath worthy of mention? To answer this question, I collected whatever macroeconomic data about the world I could find. The main limitation was the need to protect the independence of the study, and therefore I have made no effort to contact Verant Interactive to obtain in-house data. As a result, all of the information reported here is either available to the public at large through various channels, or has been obtained directly from users through the NES. It is important to stress that the external market for Norrathian goods is underground. Sony has stated that Norrathian items are its intellectual property (Sandoval, 2001). Trading these items for US currency is considered theft.[29] Nonetheless, trade goes on.[30]

*The foreign trade market and exchange rates*. Several dollar-based markets for platinum pieces, avatars, and items exist on web auction sites. Trade occurs as follows. In

the Earth market, two earthlings agree to trade US dollars for some Norrathian item. Earthling A gives Earthling B the money. Then they both create avatars in Norrath and meet at an agreed-upon spot, where Norrathian B gives Norrathian A the item.[31]

Trade in platinum pieces seems to be nothing more than an ordinary foreign exchange market. Trade in goods is a little harder to categorize as either imports or exports; it is a trade where Swedes travel to Germany to buy and sell Swedish goods for Deutschmarks, with all the goods remaining in Sweden. It only happens because the dollar markets offer much lower transactions costs than the Norrath markets. Perhaps the best metaphor for this trade is in terms of tourism exports. In the tourism industry, members of country X use X's currency to obtain goods and services that are created in and remain in country Y. In Norrath's foreign trade markets, Earthlings use US dollars to obtain goods that are created in and remain in Norrath.

Without a broad survey of participants, it is impossible to estimate the gross volume of this trade. However, records at one web site show that on an ordinary weekday (Thursday, September 6, 2001), the total volume of successfully completed auctions (N = 112) was about $9,200.[32] A further $3,700 in currency transactions (N = 32) were conducted. At an annual pace, these figures put the gross exports of goods and currency at more than $5 million, about 3.5 percent of gross annual output (see below). This underestimates the volume of trade, of course, because there are many more avenues of exchange than just this one web site. Some 45 percent of NES respondents indicated that they knew someone who had purchased Norrathian items for US dollars.

The currency market gives direct information about exchange rates. I collected data on 616 auctions, at random, from various sites, over the period from May to

September 2001. This sample represents a small fraction of the universe of ongoing currency auctions. I treated an auction as a valid observation only if it had been completed and there was an obvious winning bid. Across these auctions, the average price of a platinum piece in terms of US dollars was 0.01072, or a little more than a penny. The dollar exchange rates of various currencies are listed in Table 4. Most Norrathians would fix the exchange rate at about 0.0125. The rate was, in fact, 0.0133 in May but had slipped to 0.0098 by September, a decline of over 25 percent in a quarter.

*GNP per capita.* The market for avatars can be used to develop an estimate of Norrath's GNP per capita. From this market, I obtained data on 651 avatar auctions, using the same selection rules and sites as for the currency auctions. Most accounts are auctioned as if they were sales of the main avatar on the account, that being the avatar with the highest level. However, the billing and login structure of Everquest means that a person cannot sell an avatar by itself; to give control of one avatar to another person, you must give them access to your entire account, including all of the other avatars. Nonetheless, the contents of auctions are usually a few basic descriptors about the main avatar, such as her level and type (warrior, wizard, etc.). Most accounts sell for between $500 and $1,000. Since the exchange rates indicate that typical avatars have more than $1,000 in Norrathian wealth, the avatars on the auction market are apparently being sold at a discount. The source of the reduced value is fairly apparent however: one of the most attractive features of life Norrath is the power to choose your avatar's appearance, abilities, and even name. When your purchase a ready-made avatar, that freedom is lost. Moreover, the auctioned avatar already has a well-developed social role on its server, and

it is not apparent whether that is a good role or not. For these reasons, we can take the auction market value as an underestimate of the true dollar value of an avatar.

My strategy is to use the avatar auction market to develop the shadow price of an avatar's level, then use the NES data to determine how many levels Norrathians create in a hour of game time; this yields a measure of gross value creation per hour in terms of dollars. The idea is that the avatar's level generally determines its amount of equipment and platinum pieces as well, so that a user who adds a level to an avatar increases Norrath's stock of avatar capital, equipment, and platinum pieces. When someone buys an avatar on the auction market, they buy the avatar with these bells and whistles. This means that the total value of the added level, including all three sources of value, is priced by the auction market.

There are a number of ways of developing the shadow prices. I describe three methods in Appendix C. Using the most direct method, the auction market puts the shadow price of an avatar level at about $13 per level, and data from the NES show that Norrath's avatars create about $15,000 in avatar capital in an hour. This makes the gross national product of Norrath about $135 million. Per capita, it comes to $2,266. Table 5 shows the gross national product per capita of 171 countries, as measured by the World Bank. Norrath is the 77$^{th}$ richest country in the world, roughly equal to Russia. The table also shows the result of two other methods give a lower GNP per capita, the lowest making Norrath equivalent to Bulgaria. By all measures, Norrath is richer than many important countries, including China and India.

*Inflation.* A true price index would require a broad-based survey of avatars to determine what items they had recently purchased, and at what prices. Given that there

are tens of thousands of items, the survey would have to be quite extensive to generate a reasonably large amount of data about all the items in the market basket of typical avatars. In lieu of undertaking such an enterprise, instead I made informal notes of the kinds of items that seemed often traded in the main markets. There are also a number of web sites that publish platinum piece prices of various goods. Using these data, I developed a price index based on a selection of 29 different goods. The goods were chosen to be representative of the different kinds of items (chest armor, boots, helmets, weapons, etc.). Also, I purposely tried to avoid very high-end items and very low-end items. Finally, unlike real world price indices, I could not weight the items' prices by their contribution to the 'market basket,' since I could not determine what the standard bundle of items really is. Therefore, each item is given equal weight. I also record whether an item is looted from biots or crafted by avatars, as well as whether the item is part of the original Everquest game or one of the later expansions of the game ("The Ruins of Kunark" was released in April 2000, "The Scars of Velious" in December 2000.)

Having selected the items, I took price data from one site, Allakhazam's Magical Realm (everquest.allakhazam.com). This site is one of the more popular fan sites and, importantly, the price data are entered by users and then left untouched. [33] Prices are available beginning in December 2000.

Table 6 reports these indices. The overall price index fell from 100 in Q4 2000 to 71 in Q3 2001, a 29 percent deflation in one year. The individual item indices indicate that much of this disinflation was caused by a price collapse in items from the expansions, which lost 59 percent of their value. However, even the old world items experienced a substantial deflation, with their value falling by 17 percent. Note that if

nominal wages (i.e. loot from biots per hour of hunting) remained constant in this period, the deflation represents a rapid rise in the real wage. This is a good thing on Earth, but has led to some dissatisfaction Norrath as the challenge level of the world, and hence its entertainment value, has fallen.

*Nominal wages*. Hourly wages in Norrath are substantially below wages on Earth. We can derive an estimate of the wage in platinum pieces by regressing the total value of an avatar's equipment and cash by the number of hours that avatar has been active. The 3,619 NES respondents gave valid information on 7,397 of their avatars. Regressing the PP value of their holdings on hours of time input yields a coefficient of 319, meaning that the average avatar makes 319 PP per hour. At the market exchange rate of 0.01072 PP per dollar, this amounts to about $3.42 an hour. The average Earth wage for those who work in the NES is $20.74, and among the self-identified residents of Norrath it is $17.57. If we treat the conditions of life in Norrath as a compensating differential, this suggests that for the average Norrath resident, an hour in Norrath produces utility worth $14.15. This figure is more than the fee of $10 per *month* that users pay to access Norrath. Norrathians gain a substantial consumer surplus from the world's existence.

A wage of $3.42 an hour is sufficient to sustain Earth existence for many people. Many users spend upwards of 80 hours per week in Norrath, hours of time input that are not unheard of in Earth professions. In 80 hours, at the average wage, the typical user generates Norrathian cash and goods worth $273.60. In a month, that would be over $1,000, in a year over $12,000. The poverty line for a single person in the United States is $8,794. Economically speaking, there is little reason to question, on feasibility grounds

at least, that those who claim to be living and working in Norrath, and not Earth, may actually be doing just that.

*Poverty and inequality.* Inequality is significant. Certainly, higher level avatars have vastly more wealth than lower-level avatars, but this is intended as part of the structure of the world. It is more striking that significant inequality exists within levels, a fact that seems to trouble many Norrathians. Using avatar wealth holdings, we can calculate two statistics of interest. First, define the poverty rate as the percentage of avatars whose wealth falls below 50 percent of the median wealth in their level. By this measure, about 33 percent of the avatars are poor. If instead we set the poverty line according to the mean wealth, not the median, the poverty rate is 68 percent. Evidently the distribution is extremely long in the upper tail. In any case, the distribution of wealth in Norrath is apparently significantly less equal than its distribution in post-industrial societies on Earth.

## IV. Norrath: Its future and meaning

*journal entry, 20 june. i started a loner, an asocial avatar on a deadly server where all avatars hunt, kill, and loot one another. anyone studying hobbes should come here and have a look at the state of nature.*

Why should economists and other social scientists have an interest in places like Norrath? One reason is that these places provide a fascinating and unique laboratory for research on human society; Appendix A lists a number of research projects that seem to be uniquely feasible in Norrath. The second and more significant is that VWs may soon become one of the most important forums for human interaction, on a level with

telephones. Moreover, in that role, they may induce widespread changes in the organization of Earth society.

Virtual Worlds are flourishing and their growth seems likely to continue. They already represent an area of internet commerce that is booming when other sectors are having difficulty surviving. The attraction of the VW lies in its ability to replicate the physical and economic world of Earth, with slight but significant changes in the rules. These changes – such as granting people the freedom to have whatever appearance and skills they wish – are sufficient to generate a society and a flavour of daily life that is so attractive that many thousands of people apparently consider themselves permanent residents. Tens of thousands of adults now devote more time to VWs than to paid employment. Similar numbers use their Earth money to buy things in VWs. Almost one million seem willing to pay a monthly fee to at least see what VWs are all about. And these numbers are growing.

What does the future look like? The Next Big Thing appears to be Project Entropia, expected to be launched sometime in early 2002. Where Norrath considers the infusion of Earth dollars and Earth markets a problem, Project Entropia embraces them. The game (which is apparently not really a game at all, according to its owners) is being developed by a private Swedish company, Mindark. According to materials on the company website (www.mindark.com), the ultimate goal of the project is a worldwide network monopoly in virtual reality 3D commerce, replacing all existing internet browsers and web interfaces with a single virtual world of millions of users. The "game" will be distributed for free, and access will be free; it is assumed that a seedling VW market and society, along the lines of Norrath, will rapidly emerge. Unlike Norrath,

however, users in Project Entropia will be able to buy things for their avatars using real currency and credit cards, and they will get real cash from the VW by selling loot.

The company hopes that success in the gaming world will be a beachhead to broader commercial success. Free software and free access to the VW will encourage more and more people to come to Project Entropia to socialize with one another, and then to shop with their avatars while they socialize. Network effects will kick in; if you and your friends spend 800 hours developing avatars in Project Entropia, no single person in your group will want to incur a friendless 800-hour start-up cost to switch to a competing world. At some point the Project will encourage brick-and-mortar companies to establish virtual 3D stores in the world, where a person could go to buy a hat for the avatar, and then a hat for themselves. Mindark envisions the emergence of virtual jobs. For example, Walmart might pay a user (in which currency? does it matter?) to use her avatar to sell avatar clothes in the virtual Walmart. By the economics of network monopolies, the Project Entropia VW may become "the internet" for most people: you turn on your computer, wake up your avatar in Project Entropia, and teleport her to some spot where you meet your old college friend's avatar, chat for awhile, then go shopping.

Much argues for the viability of Mindark's strategy, and the company will probably not be alone in this niche for long. Indeed, there is already evidence in existing VWs that the inclusion of Earth-style markets and marketing would be profitable. Microsoft's virtual world of "Dereth" has markets that are clumsier than Norrath's, and Dereth's population is smaller and not as wealthy. That is exactly what development economists would predict. Transactions costs slow down economic growth. It follows that modernized markets would allow a new VW to rapidly eclipse Norrath in population

and wealth, brushing aside its quaint bazaar economy like the anachronism it was designed to be. The future of avatar spaces, and perhaps internet commerce and the internet itself, may belong to highly commercialized VWs.

The impact on Earth society is hard to overestimate. With the development of voice technology, communication in VWs will move from cumbersome chat to telephone-like conversation, thus greatly enhancing the VW as a place of social interaction. Already one can conduct chat-based a2a meetings and classes in places like Norrath, and soon such meetings will not seem much different from actual face-to-face meetings. Telecommuting, which now involves working on the home computer and emailing reports to the boss, will eventually become "going to work" in a virtual office and holding face to face meetings with the avatars of coworkers. Families living thousands of miles apart will meet every day for a few hours in the evening, gathering their avatars around the virtual kitchen table and catching up. And the day of driving to the store may well be over. Earth roads will be empty because, instead of using them, everyone will be sailing across the azure heavens on their flying purple horses, to shimmering virtual Walmarts in the sky.

*journal entry, 14 july. someone just told me that the name of my favorite city, qeynos, is just "sony eq" backwards.*

Appendices

Appendix A. Norrath as a laboratory of human society

*journal entry, 28 May. i started a new avatar, just so i could look at a different continent. this guy is a dwarf. dwarves hate water, now i know why. i took a boat across an ocean. at an island stop, some idiot fellow-traveler provoked a local biot pirate, who came onto the ship and started attacking me. near death, i took my only recourse and jumped off the boat. too bad it had long since left the dock. i watched it sail off into the mist, leaving me desperately paddling about, far at sea, a very lonely dwarf indeed.*

In the course of preparing this report, I was struck by the number of research projects that would be uniquely feasible in Norrath. Here I will list a few.

*Utopia*. What is the ideal society? Philosophers and theologians debate it in the abstract, while politicians, journalists, and social scientists attempt to remold Earth societies in what they presume are good directions. But when business people actually design fee-based societies, we discover in the most popular ones the kind of world that ordinary people want the most. If ordinary people actually wanted a world of equality, peace, relaxation, freedom from want, then Norrath would be an equal, peaceful, relaxing, free world. But the Norrath that makes money is not a cyberpolynesia at all. It is a world of grotesque inequality, of incessant warfare and struggling, a world with bitter wants and unmet needs, where rising real wages make people *complain*. It is much like Earth, except for two elements that are quite utopian and have been impossible to implement here: freedom to start over, and equality of opportunity. It would seem that Utopia is just Earth with an escape clause and a level playing field.

*Social norm studies*. In the NES, 7.7 percent of the respondents are female, but 18.7 percent of the main avatars are female. It turns out that 12.6 percent of males are playing females as their main avatar, while 11.2 percent of females are playing male avatars. That some people switch gender is a well-known fact in Norrath, and it is also

well-known that sex does not have any impact on the avatar's skills and abilities. Nonetheless, it appears that male and female avatars are treated differently. (See two essays on economics and gender in Norrath by Mindy Basi (PhD, Library and Information Sciences, at www.angelfire.com/journal/kwill/).

One could conduct endless studies on the impact of various features of the avatars on the avatar's outcomes and social standing. As a research method, one could have study participants do various specific things with the avatar and then record the avatar's success at accomplishing various tasks. Since social activity involves repeating N-player prisoner's dilemmas with a fluid population, it is an ideal environment for studying cooperation. It would be relatively easy to hold experiments and provide meaningful payoffs, since PP -- which have a great deal of value in Norrath -- can be purchased for only about a penny a piece.

*Market studies.* The world has flourishing central markets in goods. It would be a simple matter to conduct auctions in a number of ways and record their outcomes. Again, the items for sale are really quite valuable to the people there; there is a high likelihood that the auction or experiment would be taken seriously.

*Social conventions*. There are many conventions in Norrath, and variation in them can be directly observed because of the way that the world exists on 40 different servers. This variation can be exploited to allow comparative studies of the emergence of conventions and focal points. For example, there is one main marketplace on each of the 40 servers, and on most, but not all, servers it is located in the East Commons Tunnel. Now it so happens that sometimes Verant will create a new server as a "split" from an old one; the new server is launched and then any avatars on certain old servers may transfer

to thenew server. A brief examination of the server -split patterns reveals that a new server is far more likely to have its market somewhere *besides* the EC tunnel if, and only if, at least one of its mother servers had its market somewhere else. In other words, there is strong evidence of path dependence in the geographical location of the main market.

*Law and economics*. Many of the servers have different rules about who can kill whom and how much loot an avatar can take. The most Hobbesian server, Rallos Zek, does not yet have a sovereign. It also has weak and splintered markets and a low population. Other servers divide the avatars into warring races or continents. One could learn much by tracing the status of markets to legal conditions.

*Poverty*. Norrath is marked by an extremely unequal distribution of wealth. Thus, if the question is "If we could construct any world we wished, in order to make ourselves happy, would we choose one with equality?" the answer from Norrath seems to be a clear NO. Most people in Norrath seem to  believe that the world and its reward system are basically just. Rather, there is some concern about the practice of twinking, by which the wealth of a powerful avatar is used to give a new avatar extraordinary equipment. This reveals that the one ethical norm that dominates social politics in Norrath is not equality of outcomes but equality of opportunity.

*Spontaneous order and endogenous government*. Most servers have an elaborate political order based on guilds of avatars. The guild system regulates access to certain scarce items and imposes punishments on asocial behavior. Guilds can war with one another. An exploration of guild behavior could produce useful insights about the emergence of governing structures.

*Urban location*. Why is the main market in the EC tunnel in most cases? That particular spot is somewhat in the center of Norrath, but it has only one biot merchant, no conveniences (ovens, forges, etc.), no protecting biot guards, and no bank. The nearby city of Freeport has many vendors, a bank, all the major conveniences, and it is a walled city protected by guards. Why not Freeport instead? The main reason would appear to be that a percentage of the avatars in Norrath have a faction identity ('evil') that prevents them from entering Freeport. They can, however, cut around the city by using the tunnel. And it would seem that this is the only reason the tunnel is preferred to the city: it has a slightly greater amount of through traffic. Of course it would take a geographer to give a more solid answer. Still, the distribution of Norrath's population in space, and the endogenous emergence of urban areas that were not designed to be urban, can provide useful research materials for those interested in the economics of location.

These are only a few of many other projects that might lend themselves to an application in Norrath. The primary difficulty for the researcher would be the costs involved in becoming familiar with what is, at first, a very strange world indeed.

## Appendix B. Weights and weighting

*journal entry, 28 may, continued. as i paddle, my stamina dwindles towards zero, at which point i will presumably drown. no sign of land. 'help!' i shout. but no one can help me – too far away, and who could find me in this mist anyway. then, like a miracle, i see land. i paddle over to it. step ashore. then i hear a sound, like giant footsteps…i look around..it IS giant footsteps, a cyclops, and coming my way. does it see me? maybe. then run. but it will catch me. maybe i should turn, face the music, fight. no way. therefore: "HELP!!" this time i am in luck – there's a wizard nearby. 'hang on ill tp u.' a teleport! gods be praised. he arrives and conducts the teleport spell, and in a flash i am back home.*

The Norrath Economic Survey (NES) was conducted by posting notices to internet discussion boards frequented by Everquest players. Thus, the sample is entirely self-selected. However, there is a clear direction of selection, in that those who respond are more likely to be an avid player of the game. Thus, the NES sample contains avatars whose levels will be higher than the levels of avatars in the game's population. While in game, one cannot observe anything about an avatar's users, so correcting for the bias on the basis of user information is not possible. However, it was possible (until August 31, 2001) to observe the distribution of avatars by level on a given server.

I used actual distributions of avatar levels on Everquest servers to assign weights to NES respondents. The weights ensure that the distribution of avatar levels in the NES corresponds to the distribution of levels in the game. It seems likely that the weights reduce (although they may not eliminate) the corresponding bias in the NES towards more avid players.

My method for weighting was as follows. I observed avatars by distribution on two servers, Tarew Marr and Tholuxe Paells, over a 72-hour time period. The first is one of the oldest servers in the game, the second is one of the newest. Since newer servers are likely to have less advanced avatars, the two servers put bounds on the likely range of level distributions. As it turned out, the distributions were surprisingly similar. I broke the distributions down into groups of five levels, so that in the end I had 12 numbers indicating the percentage of Norrath's avatar population having levels from 1 to 5, 6 to 10, 11 to 15, and so on. Call these percentages p1, p2, p3, etc. In the NES sample, the corresponding percentages by level can be labeled q1, q2, q3, and so on. If the NES sample size is N1 and the Norrath population is N2, the weight applied to a level 1 avatar

in the NES was (N2/N1)*(p1/q1). Thus, the weighted percentage of level 1 to 5 avatars in the NES would become p1.

I made these weight calculations for Tarew Marr and Tholuxe Paells separately and then averaged them to derive a single weight.

I then used these avatar weights to derive a person weight for the NES respondents. Each respondent had been asked to indicate what percentage of time he played each of his avatars. I used these percantages to make a weighted average of the weights on each of his avatars. Thus, a person who uses a level 1 avatar frequently and a level 30 avatar less frequently would receive a higher weight. This is because Everquest population has more level 1 avatars than the NES sample.

Table A1 below lists the avatar weights by level. The table reflects that N1, the sample size of the NES is 3,619 and N2, the population of Norrath round the clock, is 60,381. Thus N2/N1 = 16.68, and the weights are distributed around this figure. Interestingly, the biggest deviation of the NES from Norrath is not at the top but at the bottom. Low-level avatars are quite under-represented, but high-level avatars are not heavily over-represented. Instead, it is the mid-level avatars who mostly selected themselves into the NES. Perhaps this reflects the possibility that highest-level avatars know the game so well that they no longer spend time at 'spoiler' web sites.

Table A1. Avatar Weights for the NES sample

| Level | Weight |
|---|---|
| 1 – 5 | 99.72 |
| 6 – 10 | 30.16 |
| 11 – 15 | 22.11 |
| 16 – 20 | 15.41 |
| 21 – 25 | 13.51 |
| 26 – 30 | 12.21 |
| 31 – 35 | 12.38 |
| 36 – 40 | 12.14 |
| 41 – 45 | 11.72 |
| 46 – 50 | 14.52 |
| 51 – 55 | 16.32 |
| 56 - 60 | 17.48 |

Appendix C. Methods of calculating GDP per capita.

*journal entry, september 24. i investigate another server – it happens to be the one where i started my first avatar, alaniel. i havent been back since. so i load him into the world. arriving, i smile to myself -- he is still hiding behind the lean-to at freeport west gate.*

The first method is simplest. A regression of price on level in the auction market yields the following equation:

Price = -319.625 + 13.297*Level

This implies that the shadow price of a level is about $13.30.

The NES asks respondents how much time they have devoted to each avatar. A regression of hours of time for the highest-level avatar (which is always the avatar that is the subject of the auction market) on the avatar's level yields this equation:

Hours = -568.129 + 51.440*Level

This implies that it takes about 51.4 hours to add a level to an avatar on average. The 60,381 users present in Norrath in a given hour are therefore adding about (60381/51.440) = 1,173.81 levels to their avatars in that hour. Each level being valued on

the market at $13.297, we have a gross creation of value that amounts to (1,173.81)*(13.297) = $15,608.15 per hour. Now because the 60,381 average user population is an average over all times of day and all days of the week, it reflects an avatar-building workforce that is present round the clock, all year long. The average, in other words, indicates that there are typically 60,381 people actively building avatar capital at any time of day or night, weekends, holidays, whenever. This goes on all day long, 365 days a year. There are no weekends or vacations in Norrath; 60,381 represents not full-time equivalents but "all-time equivalents." This means that the annual creation of value for this economy is found by taking the hourly creation of value and multiplying by the number of hours in a year, which is 8,766. This makes the gross national product of Norrath equal to about (8766)*(15608.15) = $136.821 million. Dividing by the population of 60,381, we estimate the annual GNP per capita as $2,266.

This is the most straightforward approach but not perhaps the most plausible. An examination of scatterplots of the avatar auction data (see Figure A1) suggests that the simple approach is biased in some significant ways. Mostly, it does not take into account that there is almost no market for avatars below level 20. Second, it ignores the fact that levels above 50 are given a much higher price by the auction market. Third, it ignores that fact that adding levels becomes much harder after level 50, something that is apparent to anyone active in Norrath for any length of time.

To correct for these aspects, first of all, I will assume that avatar-building below 20 adds nothing to the GNP.

Second, the scatterplots suggest that between level 20 and level 50, the dollar value of an avatar rises moderately, and after level 50 it rises more rapidly. A linear

spline regression of prices on levels reveals that the price of an avatar rises by about $5.33 per level between levels 20 and 50, and by about $37.37 per level above level 50. I will use these figures as the shadow prices of adding a level to avatars at the corresponding levels.

As for the creation of levels, what is needed is some measure of how long it takes to add a level to an avatar. This in turn requires a regression of the hours devoted to an avatar on the level the avatar has attained. The NES asks respondent directly how many total hours they have spent on a given avatar, but it is not clear how accurate such responses would be. A typical avatar is more than one year old – how many could accurately estimate how many hours they spent on a given activity over the past year? On the other hand, there is reason to believe that these responses might be extremely accurate. For players of Everquest, it is actually possible to observe exactly how many hours an avatar has been active, simply by typing a command. But we cannot know how many NES respondents did this before entering their responses. (Some were actually confused about whether the question wanted earth hours or Norrath hours, which are much shorter. For many people, Earth's position as sole locus of Reality is really quite unstable.) So perhaps the figures are inaccurate.

In anticipation of such accuracy problems, the NES also asks respondents what percent of their total time they devote to each of their avatars, as well as the month that the avatar was born. It seems fairly likely that both of these responses are more accurate than the gross hours estimate. The NES then asks respondents how many hours they spend in Norrath in a typical week. The total hours per avatar can be measured as total

hours = (months avatar has been alive)*(4 weeks per month)*(X hours in Norrath per week)*(percent of time on this avatar).

It turns out that the direct estimate of hours per avatar average 798 hours in the NES sample, while the indirect method averages 1,443 hours per avatar.

I estimated two spline regressions of hours on levels, estimating the number of hours necessary to add a level between levels 20 and 50 and above level 50, with these two measures of time input. For the direct method, the regression indicated an input of 21 hours per level between 20 and 50, and 152 per level above 50. For the indirect method, the inputs were 31 hours per level between 20 and 50, and 183 hours per level above level 50.

Of the 60,000 avatars present in Norrath at any one time, 27,600 are between 20 and 50, and the remaining 22,200 are above 50. Recall that these figure have been weighted to reflect the fact that the NES over-represents high-level avatars, and that the weighting method probably makes than under-represented. These figures indicate that, in a given hour, the middle group is responsible for 27,600 hours of avatar level creation, and the higher group is responsible for 22,200 hours of avatar level creation.

Using the direct time figures, the middle group produces an aggregate of 27,600/21 = 1,314 levels per hour, valued at $5.33 each. The higher group produces 22,200/152 = 146 levels per hour, valued at $37.37 each. Thus each hour, Norrathians generate 1314*5.33 + 146*37.37 = $12,460 worth of avatar capital. In the course of a year, this is $109 million in new avatar value, about $1,820 per user. This would make Norrath the 84$^{th}$ richest country in the world, equivalent to Tunisia. See table 5.

Using the indirect time figures, the middle group produces an aggregate of 27,600/31 = 890 levels per hour. The higher group produces 22,200/183 = 121 levels per hour. Using the shadow prices of levels, aggregate hourly production is valued at $9,265.47. Annually, this comes to $81 million, or $1,350 per capita. That would make Norrath the 97th richest country in the world - Bulgaria.

Note that all of these figures are based on the avatar auction market, which is based on avatars whose features are already fixed. They are likely to be sold at a discount relative to avatars whose features could be freely chosen.

D. Economic policy issues specific to Norrath

This appendix will describe the principle markets of Norrath in terms of supply and demand and will use an abstract model of their functioning to explain the price and behavioral dynamics discussed in the main body of the paper. Some policy issues will be raised at the end. The abstract modeling is based on some technicalities that will not be easy to understand if you have never had economics. At the same time, the items and practices being discussed will not be easy to understand if you have never been to Norrath. This material is therefore targeted at a fairly unique reader: Norrathians who are comfortable with introductory college-level economic theory.

*Labor market.* The labor market in Norrath is essentially the hunters market. It determines the amount of hunting/farming that goes on, as well as the compensation for an hour's hunting. We will take the relevant quantity in this market as "Hours of hunting level X MOBs by all avatars, during the current month." The relevant price, or wage, will

be "Platinum pieces earned per hour of hunting level X MOBs, during the current month."

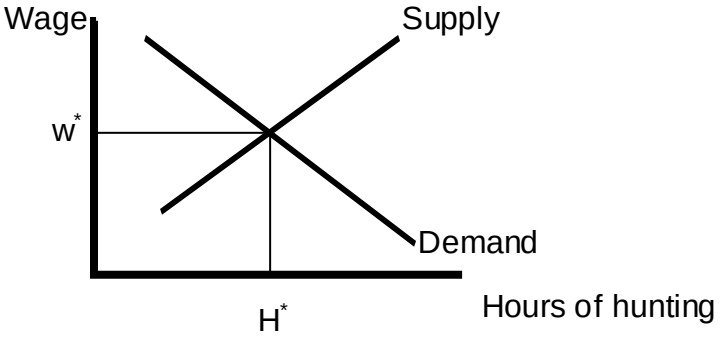
Looking at supply first, avatars differ in the cost of undertaking hunting activity at a given level. The higher the return to hunting, the more hunting hours avatars will undertake. Therefore the supply of hunting hours rises with the wage.

The demand side of the market indicates how much compensation is available for avatars as they work more. Standard economic theory says that an increase in the total number of hours of hunting will a) increase the total amount of loot, but b) will decrease the marginal loot from an additional hour. As more and more avatars hunt MOBs of a given level, they create congestion and crowding, and this lessens the amount of loot that can be gained by hunting for an extra hour. Let H be the total hours of hunting labor for MOBs of a given level. If TP is the total product of hunting labor (the total loot per hour of all avatars combined), and MP is the marginal product of hunting labor (the extra loot for an extra hour of hunting), production theory says that TP rises as H rises, but MP eventually falls as H rises. Now the relevant decision for every avatar, in deciding whether or not to hunt an extra hour, is to compare her opportunity cost of hunting for that extra hour to the compensation she would get. That compensation comes from selling the extra loot she would get to the merchant biots, who, we assume, pay price $R_B$; the real value of those platinum pieces also depends on their purchasing power, which is a function of the overall price level. If the overall price level in Norrath is P, the value of an extra hour's hunting is given by the function

$$D = (R_B/P)*(MP)$$

This compensation is essentially the demand curve in the labor market, and it slopes downward. The market is depicted in Figure S–1.

S - 1. Labor Market

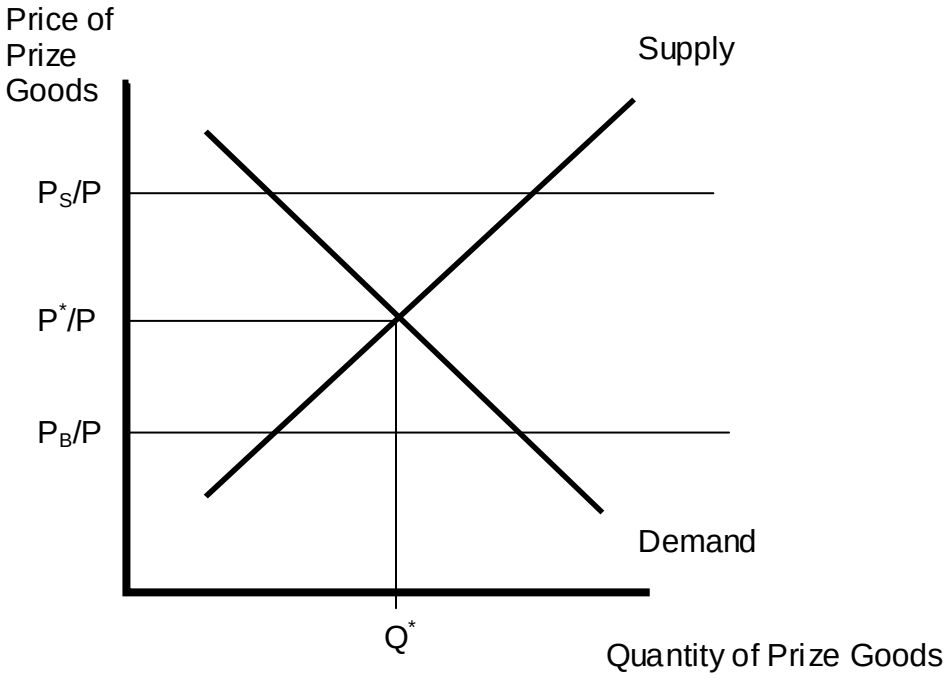



In this market, the equilibrium hours of hunting is given by $H^*$. The equilibrium compensation is $w^*$, which is equal to $(R_B/P)*(MP \text{ at } H^*)$. For the rest of the analysis we will hold the supply curve as fixed. The demand curve can shift, however. For example, if merchant biots pay more for the loot provided by these MOBs, then $R_B$ rises, meaning that demand shifts to the right. Both hunting and wages increase. If, however, all merchant biots pay more for all goods, then the general price level P rises, and demand shifts to the left. Both hunting and wages decrease.

*Goods markets.* As for goods, it will be useful to consider two kinds of goods; I will call them 'prizes' and 'loot' for reasons that will become apparent. First, consider an amazing magic helmet that has just been discovered. On its first day, the helmet counts as a prize good: demand is heavy, and avatars will pay much more than any merchant biot's buy price (call this $P_B$) in order to have the helmet. Still, the higher the price, the fewer avatars will want the helmet, so its demand is downward sloping. The supply of the

helmet is dictated by the willingness of avatars to hunt the MOBs who drop it. From the labor market, we know that hunting hours rise with the level of compensation. Therefore, if the price of a good rises, there will be more hunting of its MOBs and therefore a greater supply of the good in the market. Therefore supply slopes upward. And finally, since this good is in demand by avatars, we know that the market equilibrium price is above the price that merchant biots will pay to buy the good. That price, in terms of real purchasing power, would be $P_B/P$. Also, since avatars rarely end up buying prize items from merchants, we can also assume that the market equilibrium price is below the merchant sell price, $P_S$ (which in real terms is $P_S/P$) . The situation is shown in S-2 below.

S - 2 Prize Market



The prize market determines an equilibrium price ($P^*/P$) and quantity ($Q^*$) of the good. The market is entirely in the hands of avatars. Merchant biots play no role because they are offering to buy at a price below the market equilibrium, and offering to sell at a price above it.

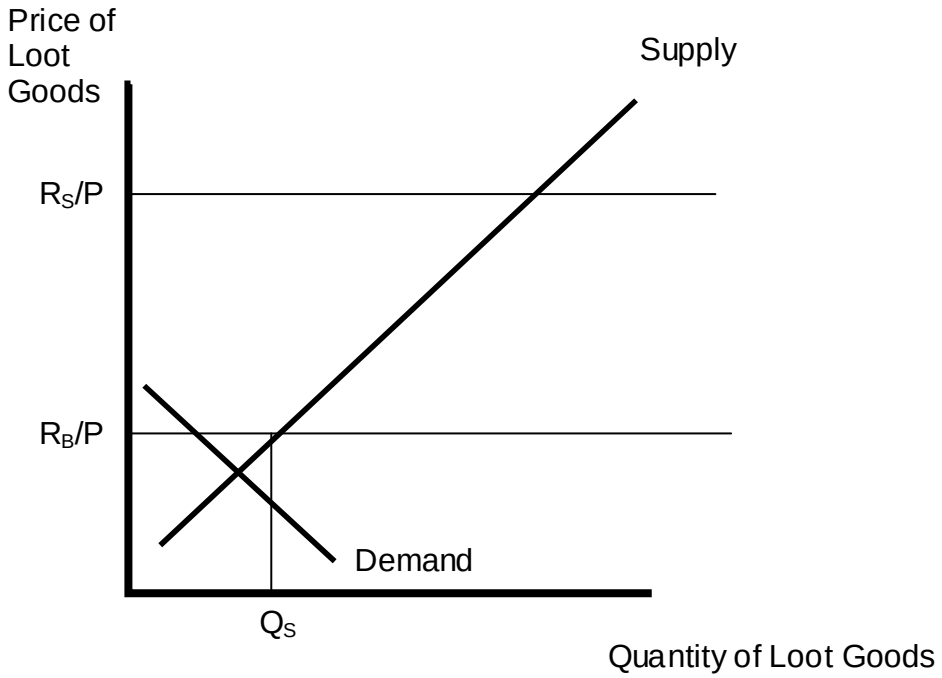
Note that these markets are defined within periods of time, so that $Q^*$ is the quantity of helmets bought and sold this month. In Norrath, these items never decay, and, unless their owner retires or destroys them, the items never leave the economy. This means that, over time, the demand for new helmets -- ones newly looted this month -- falls. As demand falls, the price of the helmets declines. Eventually, the price in the avatar market is close to or even below the price that biot merchants will pay.

At that point the prize item becomes a loot item: a good that avatars sell immediately to the nearest biot merchant for cash. They do this because the good has low or no value in the avatar market and is not worth the trouble of selling there. Therefore they are willing to accept the biot merchant price ($R_B$) even though it is quite low. The loot market looks like Figure S-3.

In the loot market, the real purchasing power of the merchant biot buy price $R_B/P$ determines the quantity that avatars hunt for, loot, and sell ($Q_S$). Generally, there is no a2a market for loot.

Anyone who has observed the launch of a server is aware that, for a certain time, there is an active market for patchwork armor. That market eventually collapses as demand for the cheap armor falls. Eventually, patchwork items become loot; if one ever acquires it, one simply sells it to the next merchant. Indeed, the permanent nature of goods in Norrath assures that every item will eventually become loot. The only way this

S - 3 Loot Market




would not happen is if a) enough new low-level avatars keep entering the server so that demand for newly-looted items remains, or b) higher-level avatars regularly retire or destroy their goods. Either phenomenon keeps the demand for new goods from sliding. However, recent experience in Norrath is that demand cannot be sustained in this fashion.

Thus, the general trend has been for goods prices to fall as prize goods become loot. When they become loot, the goods' prices stabilize. Returning to the labor market, we have that $P_B$ remains constant through time while the general price level, P, constantly falls. The effect is to shift demand rightward, which results in higher hourly compensation and an increase in hunting hours. The increase in hunting has well-known side effects in Norrath: an increase in crowding at spawn points, an increase in kill-stealing, and a tilt in the loot balance in favor of the higher-level avatars who can shoulder lower-level avatars away from good spots. Also, once the merchant biot prices become *the* price of goods, the market tends to strongly encourage farming over hunting. This is because the biot merchant prices do not put enough value on magic items. When

Split Paw Gloves can be sold to a merchant for the same amount as a cracked staff, avatar incentives are strongly tilted in favor of farming the cracked staff instead of hunting the Split Paw Gloves.

*Policy problems*. These dynamics in the Norrath economy are taken as troublesome by many. There are three basic problems:

First, Norrath must be entertaining. To be entertaining, it must be challenging. To be challenging, valuable items must be hard to get. A general decline in prize item prices makes it easier to get valuable items. Ultimately, it waters down the Norrath experience.

Second, Norrath must be fair, in the sense that avatars who make similar efforts and take similar risks at similar levels should get similar rewards. A general decline in prize item prices means that later-arriving cohorts of avatars get higher rewards for their efforts than early-arriving avatars.

Third, Norrath must provide avatars with interesting activities and give them the proper incentives to undertake them. When loot and magic items can be sold for about the same amount to biot merchants, the merchant economy is signaling to players that farming is more lucrative than adventuring. They respond in a rational way to that incentive and spend more time camping easy spawn points instead of hunting down dangerous MOBs. This degrades the hunting experience for all. With low prize item prices, many avatars will decide that, rather than attack risky and dangerous MOBs to obtain an item, it would be easier to simply farm lower-level MOBS and get enough cash to go buy it. If, conversely, prize items were extremely expensive, hunting the dangerous MOB for the prize would seem more attractive than farming the weak MOB for money.

*Policy discussion*. Over the long run, a general decline in prices creates problems for the entertainment value of Norrath. Declining prices means declining challenges and a shift toward farming, and two recent VWs (Anarchy Online and WWII Online) have struggled because avatars have too quickly run out of challenging things to do.

The direct policy recommendation would be to find some way to keep prize item prices high. One way would be to keep demand high. On discussion boards, various ways of creating 'sinks' of items have been proposed, such as item decay. This would essentially force avatars to renew their stocks of prize items from time to time, and would keep the demand higher. But it is unlikely that users will be happy with any system that makes them lose their prize items; any of the proposed systems seem tedious or unfair. And the sink would have to function on an ongoing basis at very high volumes to have any effect.

Other proposals involve making more items simply untradeable. This seems to go against the authorities' stated desire to encourage functioning and lively avatar markets.

Another option is to keep offering expansions and new items, so that at any time there will be a large number of prize items whose prices are still determined in the avatar markets. This creates something of an arms race, however. To be of interest to the avatar market, new items must be better than old items. Old prize items will continually trickle down the levels, enhancing the power of lower level avatars relative to the MOBs they face. To keep the challenge level equal, those MOBs would have to be enhanced in power. As the authorities gradually increase the power of avatars, the power of MOBS has to go up. This process can continue without end, in principle. Yet it requires a great deal of developer time to invent and code new items and new MOBs.

The authorities have undertaken some policies to address some of the symptoms of the price decline, notably the trivial loot code. This prevents high-level avatars from looting low-level MOBs; it ends farming by brute force. It certainly does encourage avatars to take risks and attack MOBs at their own level, and that is a good thing. But again, the policy attacks a symptom, not a cause.

The core problem of price decline will probably have to be addressed at some point, though it is not clear right now what to do. Ongoing discussions about it may very well lead to valuable policy proposals.

*Other policy issues: Twinking*. A final policy issue worth discussing involves "twinking," whereby users with high-level avatars transfer vast wealth to low-level characters they have created. This is perceived as unfair; it allows the rich level 1 avatar to avoid many of the struggles and difficulties of starting out that the poor ones face. One answer would be to not allow users to have more than one character on a server, and Verant seems to be implementing that rule on all new servers. The problem is deeper than this, however, because twinking can also be done simply by purchasing thousands of PP for the character directly from dollar auction markets. Indeed, the existence of the avatar auction markets makes it possible for two level 60 avatars to be controlled by users with radically different amounts of time input to the avatar, and this is perceived as grossly unfair. In effect, it transfers the circumstances of Earth to the world of Norrath. This seems to be a very important problem, since the value of Norrath as an alternative world depends to a large extent on its ability to allow users opportunities to succed in ways that they do not have on Earth. Norrath must allow some re-writing of the rules of Earth in order to be viable.

It is not clear how the authorities might end the phenomenon of twinking. They seem intent on limiting the number of avatars per server, which is a good policy in that it would at least eliminate twinking between one user's avatars. Yet it would not stop twinking from Earth markets. The severest challenge to future quality of life in Norrath would thus appear to be the probable continuing influx of Earth-based marketing and commerce into Norrath's pleasant and fun bazaar economy. Perhaps the only feasible strategy involves preventing material gift-giving, since every Earth-to-Norrath transaction involves a transaction that looks like a material gift in Norrath. One avatar gets something from another, for absolutely nothing. One approach might be to simply prevent such trade: all exchanges must involve items of roughly equal value on both sides. (The rules on dropping items would have to be changed too, since that would be another way to trade.) Another approach would be to have avatars of a certain level strictly limited in what they can have; the low-level avatar who uses a high-level item will soon break it, and the one with a great store of wealth will soon lose much of it. In effect this imposes level-based upper limits on the wealth of avatars. A second advantage of this policy is that it would reduce the severe within-level inequality that now dominates the social world.

In any case, twinking from Earth is a phenomenon that invites Earth-based markets and commerce into Norrath, and this can only degrade the world's entertainment value over time. Again, it is not clear what can or should be done, but ongoing discussions are certainly warranted.

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Table 1. Participation in Norrath and Earth Society

| Question | Agree or Strongly Agree | Disagree or Strongly Disagree | Don't Know/NA |
|---|---|---|---|
| I live outside Norrath but I travel there regularly | 84 | 12 | 4 |
| I live in Norrath but I travel outside of it regularly | 20 | 74 | 6 |
| I wish I could spend more time in Norrath than I do now. | 58 | 34 | 8 |
| If I could make enough money selling things from Norrath, I would quit my current job or school and make my money there instead | 39 | 57 | 4 |
| If I could, I would spend all of my time in Norrath | 22 | 74 | 4 |

N = 3,353 to 3,365. Source: NES 2001. The data are weighted so that the distribution of avatar levels in the data is comparable to the distribution of avatar levels in Norrath.

Table 2. Population Characteristics

| Characteristics | All Respondents | Residents[a] | Visitors[a] |
|---|---|---|---|
| Age (years) | 24.3 | 22.4 | 24.8 |
| Female (%) | 7.8 | 10.1 | 7.2 |
| Region: US (%) | 81.3 | 82.4 | 81.1 |
| Region: Canada (%) | 6.6 | 7.5 | 6.4 |
| Region: Western/Southern Europe (%) | 8.9 | 7.1 | 9.4 |
| Number of adults in HH | 2.1 | 2.1 | 2.1 |
| Married or cohabiting (%) | 22.8 | 15.9 | 24.5 |
| Single (%) | 60.0 | 68.0 | 58.1 |
| Have children to care for daily (%) | 15.0 | 11.4 | 15.9 |
| Education: less than High School (%) | 12.4 | 19.4 | 10.6 |
| Education: High School degree only (%) | 35.6 | 41.7 | 34.1 |
| Education: College degree or more (%) | 31.0 | 18.6 | 34.1 |
| Employment status: Working full time (%) | 53.4 | 41.5 | 56.4 |
| Employment status: Student, working (%) | 19.4 | 22.3 | 18.6 |
| Employment status: Student, not working (%) | 15.6 | 21.1 | 14.3 |
| Weekly work hours[b] | 39.0 | 36.5 | 39.5 |
| Monthly earnings ($)[b] | 3,154.12 | 2,621.85 | 3,268.96 |
| Hourly wage ($)[c] | 20.74 | 17.57 | 21.42 |

Source: NES 2001. N = 3,619. The smallest cell count is 401, for resident hourly wage. The data are weighted so that the distribution of avatar levels in the data is comparable to the distribution of avatar levels in Norrath.

Notes:

[a] Residents agree or strongly agree that they "live in Norrath and travel outside of it regularly" – see Table 1. Visitors are all others.

[b] Work hours less than 5 per week were set to 'missing.' Earnings less than $5 per month or more than $100,000 per month were also set to 'missing.' Thus, these are averages among those who work for pay, excluding those earning more than $1.2 million per year. Monthly earnings are after tax ("take home pay"). Non-US respondents converted earnings to $US using prevalent exchange rates. Many respondents refused to answer the income question on grounds of privacy. Still, there were 2,853 valid responses to the question, a 79 percent response rate.

[c] The hourly wage divides monthly earnings by four times weekly hours.

Table 3. Norrath Characteristics

| Norrath Characteristics | All Respondents | Residents[d] | Visitors[d] |
|---|---|---|---|
| Hours in Norrath over the past 24 hours | 4.5 | 5.4 | 4.24 |
| Hours in Norrath in a typical 24-hour period | 4.7 | 6.0 | 4.43 |
| Hours in Norrath in the past 7 days | 26.3 | 32.5 | 24.8 |
| Hours in Norrath in a typical 7-day period | 28.9 | 36.1 | 27.1 |
| Percent of the adult respondents devoting more hours in a typical week to Norrath than to work[a] | 31.5 | 44.7 | 28.9 |
| Main avatar[b]: Age (months) | 12.6 | 12.3 | 12.7 |
| Main avatar[b]: Level | 38.3 | 38.4 | 38.3 |
| Main avatar[b]: Hours devoted to | 792.0 | 797.6 | 790.6 |
| Main avatar[b]: Cash holdings (PP)[c] | 7,678 | 5,413 | 8,232 |
| Main avatar[b]: Value of equipment (PP)[c] | 199,088 | 293,296 | 176,066 |

Source: NES 2001. N ranges from 2,809 (adult respondents only) to 3,467 (whole sample). The smallest cell count is 451, for residents in row 5. The data are weighted so that the distribution of avatar levels in the data is comparable to the distribution of avatar levels in Norrath.

Notes:

[a] Adults are those older than 18. The percentage is calculated for the adult population only.

[b] The main avatar is the avatar with the highest level. In case of a tie, the older avatar is taken. Levels can be as low as 1 and as high as 60.

[c] "PP" are "platinum pieces," the currency of Norrath. Respondents can observe their avatar's cash in a bank. As for equipment, they estimated the value of the equipment in Norrath markets. Many had difficulty with this, because some extremely valuable items cannot be traded. Still, both of these questions had 3,467 valid responses, a 96 percent response rate.

[d] Residents agree or strongly agree that they "live in Norrath and travel outside of it regularly" – see Table 1. Visitors are all others.

Table 4. Exchange Rates Against the Dollar, Summer 2001
Earth currencies observed on July 31

| Country and Currency | Exchange Rate |
|---|---|
| Swedish Krona | 0.09282 |
| Indian Rupee | 0.02122 |
| *Norrathian Platinum Piece* | *0.01072* |
| Japanese Yen | 0.00800 |
| Spanish Peseta | 0.00527 |
| Korean Won | 0.00077 |
| Italian Lira | 0.00045 |

Source: moneycentral.msn.com

Table 5. Gross National Product Per Capita, Various Countries
1995

| Country | GNP per capita | Country | GNP per capita | Country | GNP per capita | Country | GNP per capita |
|---|---|---|---|---|---|---|---|
| Luxembourg | 43680 | Seychelles | 6460 | Jamaica | 1680 | Pakistan | 500 |
| Switzerland | 41350 | St. Kitts and Nevis | 5460 | Jordan | 1600 | Mauritania | 450 |
| Japan | 39720 | Uruguay | 5210 | Algeria | 1590 | Comoros | 440 |
| Denmark | 31810 | Oman | 4940 | El Salvador | 1570 | Azerbaijan | 410 |
| Norway | 31500 | Czech Republic | 4420 | Romania | 1410 | Bhutan | 390 |
| United States | 28150 | Hungary | 4140 | Ecuador | 1400 | Equatorial Guinea | 390 |
| Germany | 27920 | Malaysia | 4010 | Guatemala | 1400 | Ghana | 370 |
| Austria | 26930 | Chile | 4000 | Dominican Republic | 1390 | India | 370 |
| Belgium | 25520 | Trinidad and Tobago | 3870 | Swaziland | 1380 | Lao PDR | 370 |
| Netherlands | 25360 | Gabon | 3850 | Bulgaria | 1370 | Nicaragua | 360 |
| Sweden | 25180 | Mexico | 3800 | ***NORRATH III*** | 1350 | Benin | 350 |
| France | 24700 | South Africa | 3740 | Kazakhstan | 1280 | Central African Republic | 350 |
| Iceland | 24650 | Brazil | 3690 | Vanuatu | 1250 | Gambia, The | 350 |
| Brunei | 24400 | St. Lucia | 3570 | Iran, Islamic Rep. | 1220 | Sao Tome | 340 |
| Hong Kong | 23120 | Mauritius | 3420 | Cape Verde | 1210 | Zambia | 340 |
| Singapore | 23060 | Botswana | 3360 | Syrian Arab Republic | 1210 | Bangladesh | 330 |
| Finland | 21050 | Costa Rica | 3350 | Papua New Guinea | 1150 | Mongolia | 330 |
| Kuwait | 20200 | Slovak Republic | 3110 | Samoa | 1130 | Togo | 310 |
| Canada | 19880 | Croatia | 3100 | Morocco | 1120 | Haiti | 300 |
| Australia | 19790 | Venezuela, RB | 3070 | Philippines | 1040 | Yemen, Rep. | 270 |
| UAE | 19340 | Estonia | 3010 | Indonesia | 1000 | Kenya | 260 |
| United Kingdom | 19120 | Panama | 2940 | Egypt, Arab Rep. | 990 | Cambodia | 250 |
| Italy | 19090 | Dominica | 2910 | Kiribati | 960 | Mali | 250 |
| New Caledonia | 17790 | Grenada | 2840 | Ukraine | 950 | Uganda | 250 |
| French Polynesia | 17560 | Turkey | 2810 | Maldives | 920 | Vietnam | 250 |
| Macao, China | 16640 | Poland | 2770 | Suriname | 880 | Angola | 240 |
| Ireland | 16630 | Thailand | 2760 | Bolivia | 870 | Madagascar | 240 |
| Qatar | 15570 | Belize | 2630 | Uzbekistan | 870 | Burkina Faso | 220 |
| Israel | 14960 | Lebanon | 2590 | Solomon Islands | 840 | Guinea-Bissau | 220 |
| Spain | 14370 | Fiji | 2410 | Moldova | 820 | Chad | 210 |
| New Zealand | 14240 | St. Vincent | 2320 | Kyrgyz Republic | 710 | Nepal | 210 |
| Bahamas, The | 11700 | ***NORRATH I*** | 2260 | Armenia | 700 | Nigeria | 210 |
| Cyprus | 11520 | Russian Federation | 2250 | Sri Lanka | 700 | Niger | 190 |
| Greece | 10900 | Latvia | 2160 | Lesotho | 690 | Rwanda | 190 |
| Korea, Rep. | 10250 | Namibia | 2160 | Albania | 660 | Eritrea | 180 |
| Portugal | 10070 | Peru | 2060 | Cameroon | 660 | Sierra Leone | 180 |
| Bahrain | 8660 | Micronesia | 2010 | Cote d'Ivoire | 650 | Malawi | 160 |
| Malta | 8400 | Colombia | 2000 | Honduras | 650 | Tanzania | 160 |
| Slovenia | 8300 | Belarus | 1980 | Guyana | 630 | Burundi | 150 |
| Puerto Rico | 7650 | ***NORRATH II*** | 1820 | Zimbabwe | 630 | Mozambique | 140 |
| Argentina | 7380 | Tunisia | 1820 | Guinea | 560 | Congo, Dem. Rep. | 130 |
| Antigua | 7250 | Paraguay | 1790 | Senegal | 550 | Ethiopia | 110 |
| Saudi Arabia | 7180 | Tonga | 1760 | China | 520 | | |
| Barbados | 6850 | Lithuania | 1690 | Congo, Rep. | 510 | | |

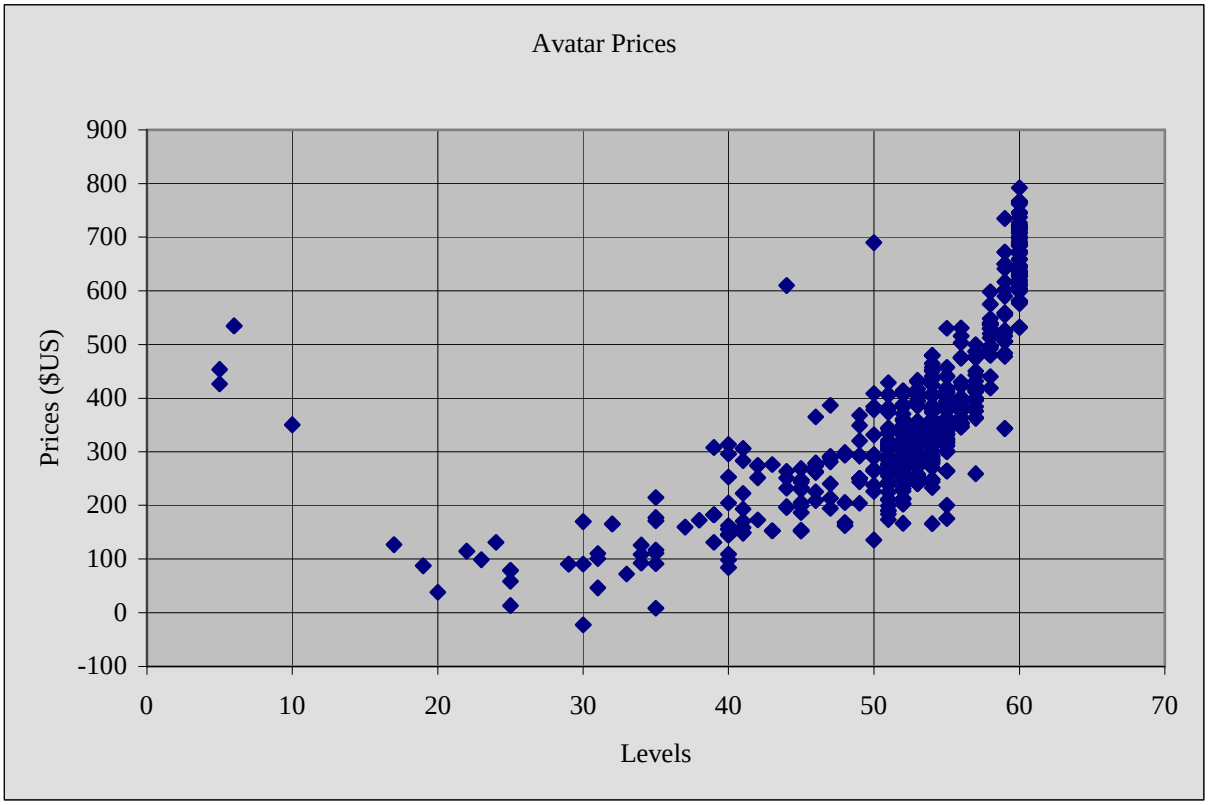
Source: World Bank

Table 6. Price Indices For Norrathian Items

| **INDICES** | Q4 2000 | Q1 2001 | Q2 2001 | Q3 2001 |
|---|---|---|---|---|
| Armor - Arms - Gatorscale Sleeves | 100.00 | 69.25 | 88.12 | 53.04 |
| Armor - Back - Kunzar Cloak (Kunark) | 100.00 | 83.53 | 57.61 | 43.06 |
| Armor - Chest - Robe of the Oracle | 100.00 | 103.38 | 64.51 | 47.12 |
| Armor - Ear - Forest Loop Earring (Kunark) | 100.00 | 77.05 | 50.66 | 35.66 |
| Armor - Ear - Orc Fang Earring (Velious) | 100.00 | 28.75 | 13.38 | 12.09 |
| Armor - Face - Silver Ruby Veil (crafted) | 100.00 | 89.30 | 84.32 | 87.25 |
| Armor - Feet - Dwarven Work Boots | 100.00 | 85.96 | 70.20 | 52.19 |
| Armor - Fingers - Jagged Band | 100.00 | 79.03 | 80.98 | 74.70 |
| Armor - Fingers - Platinum Jasper Ring (crafted) | 100.00 | 86.26 | 81.17 | 75.91 |
| Armor - Hands - Dark Mail Gauntlets | 100.00 | 44.78 | 49.21 | 70.33 |
| Armor - Head - Executioner's Hood | 100.00 | 107.11 | 61.78 | 78.07 |
| Armor - Legs - Gatorscale Leggings | 100.00 | 91.96 | 84.54 | 71.34 |
| Armor - Neck - Black Iron Medallion | 100.00 | 141.37 | 158.20 | 173.61 |
| Armor - Shield - Charred Guardian Shield | 100.00 | 112.50 | 96.59 | 103.85 |
| Armor - Shoulders - Drolvarg Mantle (Kunark) | 100.00 | 91.94 | 59.78 | 51.81 |
| Armor - Waist - Braided Cinch Cord | 100.00 | 58.21 | 70.98 | 71.79 |
| Armor - Wrist - Runed Mithril Bracer | 100.00 | 80.51 | 66.63 | 49.36 |
| Armor - Wrist - Chipped Bone Bracelet | 100.00 | 80.00 | 79.38 | 63.07 |
| Weapon - 1HB - Enamelled Black Mace | 100.00 | 81.34 | 57.99 | 47.90 |
| Weapon - 2HB - Runed Totem Staff | 100.00 | 106.77 | 120.31 | 126.95 |
| Weapon - 1HS - Short Sword of the Ykesha | 100.00 | 97.00 | 55.76 | 42.51 |
| Weapon - 2HS - Runic Carver (Kunark) | 100.00 | 140.00 | 143.64 | 73.65 |
| Weapon - Bow - Trueshot Longbow | 100.00 | 169.41 | 161.32 | 172.83 |
| Weapon - Piercing - Harpoon of the Depths (Kunark) | 100.00 | 85.50 | 60.38 | 28.80 |
| Miscellaneous Items - Sarnak Ceremonial Dagger (Kunark) | 100.00 | 80.00 | 107.50 | 42.05 |
| Miscellaneous Items - Stein of Moggok | 100.00 | 121.73 | 120.37 | 106.71 |
| Miscellaneous Items - Fine Plate Breastplate (crafted) | 100.00 | 91.73 | 97.76 | 97.34 |
| Miscellaneous Items - Fine Plate Vambraces (crafted) | 100.00 | 71.38 | 82.34 | 71.38 |
| Miscellaneous Items - Cone of the Mystics (Kunark) | 100.00 | 50.00 | 54.17 | 39.58 |
| | | | | |
| Overall Item Index - Weights each item equally | 100.00 | 89.85 | 82.05 | 71.17 |
| Loot Index - Items not made by avatars | 100.00 | 90.68 | 81.36 | 69.28 |
| Old World Index - Items before Kunark and Velious | 100.00 | 93.76 | 87.26 | 82.73 |
| New World Index - Items from Kunark and Velious | 100.00 | 79.60 | 68.39 | 40.84 |
| Craftwork Index – Items crafted by avatars | 100.00 | 84.67 | 86.40 | 82.97 |
| Old World Loot Index - Looted old world items only | 100.00 | 95.90 | 87.46 | 82.67 |

Source: Price data from Allakhazam's Magical Realm price database (everquest.allakhazam.com). Prices are entered by users and are in no sense "official." Obviously frivilous prices were ignored. Each item has at least five legitimate price entries in each quarter.

Figure A1. Predicted Avatar Prices by Level




Source: N = 639. Data from completed web auctions. Prices are the fitted values of regressions of winning bid price on the main avatar level up to the 6th power, plus dummy variables for the avatar's class (warrior, wizard, etc.) and server.

## Notes

[1] I date Norrath's birth by Everquest's public launch date. A few of the servers were used as beta tests of the game for months before the public launch. Some of the citizens of Norrath have been living there continuously since beta.

[2] 'Virtual World' is a term used by the creators of the game *Ultima Online*, though they seem to prefer 'persistent state world' instead (www.uo.com). Neither is a universally accepted term. Perhaps the most frequently used term is 'MMORPG,' which means 'massively multi-player on-line role-playing game,' apt since VWs were born and have grown primarily as game environments. However, virtual worlds probably have a future that extends beyond this role. Moreover, MMORPG is impossible to pronounce. Other terms include 'MM persistent universe,' with 'MM' meaning 'massively-multiplayer;' also, there is Holmsten's term, 'persistent online world.' 'Virtual worlds' captures the essence of these terms in fewer words, with fewer syllables and a shorter acronym; by Occam's Razor, it is the better choice. J.R.R. Tolkien, perhaps the cultural and intellectual father of these worlds, used the term 'Secondary World' to describe his fantasy universe (Tolkien, 1939). What might amaze Tolkien is how completely un-secondary his fantasy worlds have become. I would argue that virtual worlds are neither fantasy (constructions of the mind) nor reality (impositions of nature). They are Artistry: mental constructs expressed by their creators in whatever media the physical world allows. At the 20th annual Ars Electronica Festival, a Golden Nica was given to Team chman for their development of the game Banja (Kettman, 2001). The award apparently horrified many purists of electronic arts. Yet anyone who has wandered in worlds like Norrath has experienced the art of other people at an unprecedentedly deep psychological and social level. You are not looking at a painting. You are *in it.* And it is not a painting at all, but an immersive scenary that induces you and thousands of other people to play parts in what becomes an evolving and unending collective drama.

[3] This usage of the term was coined in 1985 by Chip Morningstar, a user of the first avatar environment (Damer, 2001). According to Encarta: *Avatar* [Sanskrit]: **1. incarnation of Hindu deity:** an incarnation of a Hindu deity in human or animal form, especially one of the incarnations of Vishnu such as Rama and Krishna. **2. embodiment of something:** somebody who embodies, personifies, or is the manifestation of an idea or concept. **3. image of person in virtual reality:** a movable three-dimensional image that can be used to represent somebody in cyberspace, for example, an Internet user.

[4] A "biot" is a biological bot. A "bot" is a shortening of the term robot and refers to code in multi-user domains that performs some function; a bot may be programmed to say "hello, this is the economics 201 chat room" to whomever enters the chat; in a VW, a standard bot is the door that opens and closes when double-clicked. A biological bot is a bot with the features of a biological life form: it generally looks and acts like an avatar, but it is being commanded not by a person but by coded instructions. New visitors to a VW often have difficulty at first determining which beings are avatars and which are biots.

[5] As a VW, however, Meridian 59 is not dead. Black market versions are currently maintained in Germany, South Korea, and Russia.

[6] There is often very little public information about the subscriber base of the different VWs. Everquest's base was public information until August 31, 2001, when Verant stopped publishing the data. The official reasons for the decision were openly strategic: why help competitors by releasing data on the customer base? UO has said that it has 230,000 users in 120 countries (Harris, 2001). Everquest is said to have over 400,000 users.

[7] On internet and network economics, see Varian and Shapiro (1998) and a symposium on the subject in the *Journal of Economic Perspectives* (Katz and Shapiro, 1994; Besen and Farrell, 1994; Liebowitz and Margolis, 1994).

[8] Games are big business. According to the Game Developer's Conference (www.gdconf.com/aboutus/), game industry revenues have exceeded box office revenues since 1999.

[9] Holmsten has some claim to expertise, being the lead programmer for Project Entropia, a game that appears to be the next generation in VWs.

[10] Anecdotal evidence abounds that time in VWs puts significant strain on life in Earth (see "Everquest Creates a Trail of Cyberwidows," Salkowski, 2001; "Father Guilty in Death of Son," Karp, 2001). I have spoken to several people who claim to have terminated relationships because of their partner's devotion of time to VWs. At the same time, there are people who get married in ceremonies in VWs. And when a real person dies, sometimes his avatar is given a funeral.

[11] Given that people are trying to speak by writing in real time, chatspeak is infused with extensive abbreviations and there is little punctuation. "omwb – brt" means "I am on my way back, and I will be right there." Voice interfaces are in development.
[12] Unfortunately the equality of opportunity is beginning to erode as import and export markets for VW goods and currency have evolved. It has become possible to start a new avatar and use US currency to instantly endow it with vast virtual riches and expensive equipment.
[13] The first virtual reality avatar environments had apparently been designed as early as 1985 (Damer, 2001). In Spring 1995, Worlds Chat became the first internet-based avatar environment.
[14] VWs are worlds that are *designed* to be appealing. Their features tell us much about what the ideal society really looks like, in the minds of ordinary people. It is evident that the ideal society to ordinary people is very different from the ideal society as described by Great Thinkers. More on this in Appendix A.
[15] According to the 11th U.S. Circuit Court in Atlanta, virtual places are geographically distinct from Earth places. In the "Voyeur Dorm" case, the court ruled that zoning laws of the city of Tampa do not apply to activities taking place in a Tampa home but broadcast on the internet. The internet activity is not considered part of the public space of Tampa; it occurs in its own "virtual space" (Kaplan, 2001).
[16] Norrath has another feature that is common in healthy Earth economies: get rich quick schemes. At some sites, there are auctions urging you to pay $200 to obtain materials that will supposedly teach you how to make $100,000 a year by gleaning and selling Norrath items. And then there's "Khalidorr's Guide to Uber Platinum," for only $12, delivering five ways to make over 1,000 platinum pieces per hour.
[17] Among its fans: Curt Schilling, baseball player; Jacques Villeneuve, race car driver; and Edward Castronova, obscure economist.
[18] My impression is that the ban has had little impact on trading. Sony, effectively the government of Norrath, is fighting a war of trade restrictions that no government has ever won.
[19] Elizabeth Kolbert (2001) gives a fascinating overview of the economy of UO. That world has apparently experienced its share of hyperinflations, hoarding, land shortages, and mass protest. The in-game economy of UO seems more developed also; avatars in UO have more opportunities to simply be merchants and craftmakers, whereas in Everquest there is a much heavier emphasis on hunting. (See www.geocities.com/faramir_uo/ for some thoughts on UO's economy by Scott Salmon, a long-time player.) Avatars in UO can build and own houses, and it is possible to buy and sell these houses online at Ebay (Electronic Arts has not tried to suppress dollar-based trading of UO items). The one feature that weakens UO as a competitor to games like Everquest is its visual perspective, which is 3rd person, not 1st. In UO, you see your avatar doing things; in Everquest, you see things happen thourgh the eyes of your avatar. Nonetheless, the UO economy is so rich that it is well worthy of a study of its own.
[20] Lest there be any doubt about the "seriousness" of the entire enterprise here, I can report that of the over 3,000 responses to the NES, only one was identifiably frivolous. When I publicized the survey, I received dozens of emails, making various economic policy suggestions and commending me for undertaking the project. The reader who doubts the real economic value of items created in the Norrath economy, and hence the utility concerns of the people who spend time there, is invited to go to Norrath, steal something, and observe reactions.
[21] Yee's study (Yee, 2001) also used an internet survey. According to his report, the demographics of his sample seem representative of the game's population data, which he has obtained from Verant. I have not made an effort to obtain official data from Verant, preferring instead to protect the independence of the report and its conclusions.
[22] Recently, Verant has allowed some character transfers across servers, for a fee. The refugee avatar loses all of her cash and equipment, however. To date, avatar transfer has not had a noticeable impact on the world.
[23] I took population counts at various times from May to August 2001, then regressed the count on the time of the day and day of the week. The fitted value of this regression at the mean hour (assigning 1/4 to each of four six-hour spans) and day (assigning 1/7 to each day) is 60,381. In essence this is the average population after removing cyclical weekly and hourly fluctuations. The raw average over my observations is 56,682 (N = 48).
[24] The figures in Tables 1-3 are not seriously affected by weights in any case.
[25] See www.census.gov/prod/2001pubs/statab/sec14.pdf. 91 percent of the respondents to the NES are 35 or younger.

[26] Since monsters often spawn at the same place in the world over and over, an avatar can simply wait nearby and kill the monster every time it reappears. Aptly, this practice is referred to not as hunting but as farming. The problem with merchant biot prices is that they offer only a little more money for very useful magic items than they do for useless loot items.
[27] Many respondents took this to be an obvious and, ultimately, stupid question. A typical response was "EC Tunnel – duh." Of course they overlooked the fact that the next respondent, playing on a different server, was responding "Greater Faydark – duh." One infers that the main market zone is a very powerfully established focal point on the servers, in that *everyone* knows that is where you go to sell. More on this in the appendix.
[28] The other four servers are player-killer servers, where, because of the frequency of murder and robbery, property rights are feeble. Predictably, markets on these servers are poorly developed.
[29] To protect the innocent, I have not recorded the identities of any individuals involved in such activities, and I will not reveal the sources of these data. My direct survey of users, the NES, did not obtain any information regarding the user's participation in black markets. The interested reader should have little difficulty, as I did, in finding open markets for Norrathian goods.
[30] See Patrizio, 2001.
[31] The meeting place is typically shady, such as an abandoned building. This is a black market, after all.
[32] The standards for judging an auction as "successfully completed" were as follows. If there was more than one bid, I assumed the auction had generated a transaction. If there were no bids, I assumed it had not. If there was only one bid, I assumed it reflected a transaction only if the auction was listed as a "Buy It Now" or a "First Bid Wins" auction. Of course, the researcher cannot know whether a transaction actually took place. NES survey data and anecdotal evidence suggest that real transactions occur. The author personally knows someone who bought an item at auction and successfully collected it moments later in Norrath.
[33] On most price-reporting sites, the admins go to great lengths to purge the data of 'incorrect' old prices. For this exercise, however, the old prices are of most interest.