

**REAL ECONOMICS IN VIRTUAL WORLDS:
A MASSIVELY MULTIPLAYER ONLINE GAME CASE STUDY,
RUNESCAPE**

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the Academic Faculty

by

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LIST OF SYMBOLS AND ABBREVIATIONS

GDP.....	gross domestic product
GE	grand exchange
GP	gold piece
MMOG.....	massively multiplayer online game
MMORPG.....	massively multiplayer online role-playing game
MTK	“manage thy kingdom” mini game
MUD	multi user dungeon
NPC.....	non-player character
PK	player killing
PvE.....	player versus environment
PvP	player versus player
RMT	real money trade
RWE.....	real world economy
XP	experience points

SUMMARY

This thesis explores economic aspects of virtual worlds by focusing on a specific massively multiplayer online role-playing game, RuneScape. In particular, it examines the similarities and differences between the virtual economics and real world economics, the economic understanding of RuneScape players and the possibility of using virtual worlds as a laboratory for testing economic behavior and theory.

This thesis uses a versatile methodology that includes texts, direct observation, self-reports, and other reports to investigate the research questions. Virtual economics in general and RuneScape in specific are understudied so far and this study fills a gap in the literature.

The unique contributions of this thesis are: a comprehensive survey that reveals player perceptions of economics, a new equation useful for modeling money supply, and a new use of faucet-drain economy in massively multiplayer online games.

The results indicate that virtual economics of RuneScape partially reflects real world economics, player perceptions of virtual and real world economy are surprisingly complex, and virtual worlds can be used to study real world economics. Game developers, players, economists, educators, researchers, and individuals who are interested in massively multiplayer online games and economy in general can benefit from this study.

CHAPTER 1

INTRODUCTION

Daniel Defoe's famous eighteen-century novel *Robinson Crusoe* portrays an English castaway who spends 28 years on a tropical island. Being the only producer and consumer in this remote environment, *Robinson Crusoe* creates a closed economy where trade and currency don't exist. Everyday, he struggles dividing his limited time between coconut harvesting, tool making, and fishing in order to maximize his utility, just like any other economic agent. Since the classical school, many economists, such as, Bastiat (1850, ed.1996), Marx (1867), Marshall (1890, ed. 1920), and Fisher (1930), refer to this one-man economic system in establishing more complex models. In fact, *Robinson Crusoe* is not the only novel that inspires the economists.¹ By describing life and relationships of characters in text-based virtual worlds, novels provide opportunities to observe various aspects of the human behavior, including economic preferences.

Although books are the most traditional way of portraying virtual worlds, technological developments feed society's appetite for story-telling in new formats: comics, cinema, television, and most recently video games. Comics deliver the promise in a compact visual format; cinema and television bring the value of moving images. Video games add

¹ Herman Melville's *Moby Dick* (1851), Mark Twain's *The Adventures of Tom Sawyer* (1876), and Frank Baum's *The Wonderful Wizard of Oz* (1900) are among other novels that are subjected to economic debate.

interactivity. Unlike reading and observing the story of Robinson Crusoe, every action of players changes the course of the story and creates a difference in the virtual world of the game.

The origin of the term “*virtual world*” is unknown. The first computer-generated virtual worlds, called “*multi-user dungeons (MUDs)*,” were text-based. Graphical versions were developed later. According to Bartle (2003), the term, MUD, applies to virtual worlds in general; however, this use is not commonly acknowledged. At first, virtual worlds with computer graphics were referred as “*persistent worlds*.” When the vast numbers of players were attracted to this new environment, the name was changed into “*massively-multiplayer online games (MMOGs)*.” Castronova (2006, p22) prefers to use the term “*synthetic worlds*” which he defines as “*any computer generated physical space, represented graphically in three dimensions that can be experienced by many people at once.*”

Furthermore, Castronova (2001) describes the three common features of the virtual worlds as *interactivity*, *physicality*, and *persistence*. *Interactivity* stands for a concurrent, multiple user input to the interface where one player’s action affects others. *Physicality* refers to a graphical representation of the player (avatar) on a simulated environment that is based on real world rules and dynamics. Finally, *persistence* means the continuity of the virtual world even if players don’t exist at any given time.

Virtual worlds come with different formats. At one end of the spectrum, massively multiplayer online role-playing games (MMORPGs), such as World of Warcraft, are distinguished by their fantasy themes. MMORPGs value skill-oriented character development, often supported with an open-ended, linear or nonlinear narrative. At the other end, Second Life is a collaborative virtual world, where players communicate, explore, and even create some elements of their virtual space. However, *Second Life* “does not have a designated objective, nor traditional game play mechanics or rules.”²

Virtual worlds increase socialization, creativity, and collaboration. Universities use virtual worlds for educational purposes, mainly for distance learning. Companies consider them as new platforms for sales and marketing, and a test field for new product developments. Virtual worlds hold interesting questions for the scholars from all disciplines, including psychology, physics, law, and economics. Physicians and psychologists are interested in physical and mental health issues in virtual worlds, for example, obesity, aggression and excessive usage. For legal scholars, virtual worlds form a new territory for expanding real world law. They examine virtual assets from property ownership perspective, solve issues raised from real money trade, and try to establish avatar rights. Finally, for economists, virtual worlds provide an important laboratory for observing the economic theory and behavior. Economists study virtual worlds either as a closed or an open economic system that interacts with surrounding economies.

² Wikipedia, http://en.wikipedia.org/wiki/Second_Life, Accessed: July 1, 2009

At this point, I want to go back to the first paragraph of this thesis and remind you about Robinson Crusoe. Crusoe builds a one-man economy on an isolated island. Daniel Defoe wouldn't imagine that his lonesome eighteenth-century character would be a subject to an economic debate, later in history. While one-man's economic actions have been so inspirational for three centuries of readers, can you imagine the power of thousands of players creating their unique economy in virtual worlds?

Since the late 1990s virtual worlds have become increasingly complex. Especially MMOGs emerged as a unique genre with significant number of loyal players around the world. As a part of this captivating experience, game developers implement virtual economies reflecting the fundamental principles of real world economies, including some actual practices by governments and private sector organizations. Games are often associated with fantasy and fun, but, ironically, players increasingly push game designers to provide more refined and realistic economic scenarios.

Simpson (1999) lists the five essential roles of the virtual economies as:

- ***Rationing power:*** Newbies in the game can not use the most powerful weapons or wear clothes indicating prestige or power.
- ***Supporting specialization:*** Players must distribute their limited funds and time into carefully chosen goods and skills.
- ***Interaction:*** Virtual economies encourage interaction and collaboration among players.
- ***Providing goals:*** Wealth accumulation is an important goal that can assist or replace other goals.

- **Role-playing:** Merchant and trader roles both exist in games.

The approaches to the virtual economies differ among scholars. One perspective is that economy is just a part of the game design and one of the instruments for achieving general game goals (Simpson, 1999). A second perspective is that virtual economies can be a singular defining feature of the virtual worlds, which distinguish them from other online computer games (Burke, 2002). A third perspective is that game developers create unrealistic economies deliberately, in order to maintain the fun factor (Bloomfield, 2007).

Building in these perspectives, I believe virtual economies have three critical features:

- **Comparability:** Virtual world economies have distinct similarities and differences with real world economies.
- **Reality:** Virtual world economies involve actual, functioning economic systems.
- **Laboratory:** Virtual world economies are places to experiment economic theory and behaviors.

Virtual economies are comparable to real economies: Some features of virtual economies are similar to real world. Players live in a virtual world where they own property and other possessions, trade with other players using currency, manipulate the prices, bank their valuables, and obey the rules of the government. In a typical day, players process tremendous amount of economic data and make economic decisions. On the other hand, some elements of the virtual economies are obviously different from the real world economies, for example, an exclusive market focused on fantasy items, unlimited resource supply, and equal financial opportunities for all players, no matter

what their backgrounds. This juxtaposition provides unique opportunities in learning. For instance, teenagers can understand and apply certain economic concepts in virtual worlds, before experiencing it in the real world.

Virtual economies are real: Screen Digest estimates that online gamers will spend \$2bn on MMOG subscriptions by 2013³—rather a remarkable figure for a virtual environment. In fact, the line between the virtual world and real world disappears in some instances. Although game designers never originally intended virtual items they designed for games to be traded for real currencies, buying and selling of these items produce a figure as high as the gross domestic product (GDP)⁴ of a real country. Lehtiniemi (2007) estimated that the worldwide grand total of the real money trade (RMT)⁵ was about \$2,090M by 2007. This RMT figure surpassed many countries' GDP for 2007, such as Belize, Bhutan, and Maldives (The Worldbank, 2007). Another example is about a famous virtual property purchase. In 2005, gamer Jon Neverdie Jacobs paid \$100,000 for a virtual space-resort⁶ in the MMOG, Project Entropia. Paying \$100,000 for a virtual space may be ridiculous for some people, but others find it as a clever investment strategy. As seen in these examples, virtual economies exceed their boundaries and become real economies.

³ Screen Digest, <http://www.screendigest.com/press/releases/pdf/PR-LifeBeyondWorldOfWarcraft-240309.pdf>, Accessed: April 14, 2009, Subscription MMOGs: Life beyond World of Warcraft

⁴ GDP: the total value of goods and services produced by a country over a given period, usually 1 year.

⁵ RMT: Buying and selling virtual items for real money.

⁶ Marketwire, <http://www.marketwire.com/press-release/Entropia-Universe-770780.html>, Accessed: July 3, 2009

Virtual economies are a laboratory: A virtual economy can be considered as an experimental laboratory. Certain economic theory and behaviors can be tested in this synthetic environment. Unlike the real world, conditions and variables may be more controllable in virtual worlds. Testing economic concepts in the virtual worlds may be more convenient than face-to-face research studies. Virtual economies can be used to understand larger economic phenomena.

1.1. Relevance and Research Questions

I started playing RuneScape as a free user in 2004 while I was taking time after a bachelor's degree in economics, followed by six years of experience as a product and marketing manager in the banking sector. I loved graphics and fantasy world of RuneScape at first sight. Afterward, I learned game dynamics and noticed the rich virtual economy. In 2006, I became a paying member of RuneScape. In 2008, I started my second master's program in Digital Media where I focus on 3D game design. From the beginning, I decided to write my thesis about my two interests: video games and economy.

At first, the biggest issue was finding a unique research question that both met my interests and would contribute to the literature. Since I wanted to focus on video games and economy, I was mainly thinking the question of "If the economic behaviors of people are the main idea, should the platform matter?" However, this question was not sufficient. One day, after hours of trading and haggling in RuneScape virtual market to buy a rune plate body (a valuable armor), I asked myself; "Does trading fantasy items mean that the

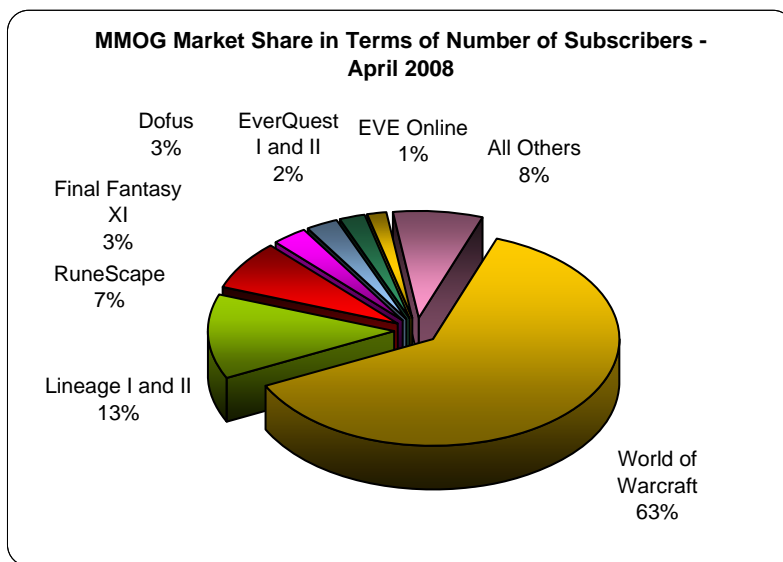
trade occurs in an unrealistic economy?” Having these two questions in mind, I started my initial literature review and found an exciting research paper: Castronova’s “*Virtual Worlds: a First-Hand Account of Market and Society on the Cyberian Frontier*” (2001). Focusing on a well-known MMOG, EverQuest, he explored fundamental economic concepts, such as, trade, market, inflation, wage, and GNP. After reading other handful of articles in this area, I knew that “virtual economics” would be my research topic.

The next question was finding a suitable game of interest. As an avid gamer, I was playing more than one game at that time. I choose RuneScape as my laboratory for five reasons: interaction, variety, audience, impact, and niche.

- **Interaction:** First, I wanted to observe relationships between many economic agents in a market, so I eliminated all single-player games on my list. As a massively multiplayer online game, RuneScape provides a large market with thousands of players.
- **Variety:** RuneScape includes many economic practices, such as, buying and selling, supply and demand, scarcity, government regulations, price fluctuations, exchange market, currency, and bank notes, each of which could eventually be a separate research subject.
- **Audience:** Teenagers, considered as consumers rather than economic providers, are the primary audience of RuneScape. I thought learning about teenagers’ perspective of economy would be interesting.
- **Impact:** Released in 2001, RuneScape has had a substantial market share (see Figure 1.1) among MMORPG competitors. Developers of RuneScape are planning to

increase the market share worldwide. According to Yahoo Top 10 Searches report in 2008, RuneScape was the number one query term in Canada⁷ surpassing the National Hockey League, Canadian government services, and Toronto Stock Exchange and was the number five query term in U.S.⁸ RuneScape is selected as the most popular free MMORPG in the world for 2007 and 2008, with a certificate awarded by Guinness World Records.⁹

- **Niche:** Major competitors—including World of Warcraft, Lineage, and Final Fantasy—have already served as subjects of previous research. RuneScape has seldom been the subject of academic research.



MMOG Names	Release Date
Dofus	2005
World of Warcraft	2004
Everquest II	2004
Eve Online	2003
Final Fantasy XI	2003
Lineage II	2003
RuneScape	2001
Everquest	1999
Lineage	1998

Figure 1.1: MMORPG Market Share and Release Dates
(Source: <http://www.mmogchart.com>, Accessed: May 30, 2008)

⁷ Yahoo, <http://ca.promos.yahoo.com/yearinreview/2008/index.php>, Accessed: June 12, 2009

⁸ Yahoo, <http://buzz.yahoo.com/yearinreview2008/top10/>, Accessed: June 12, 2009

⁹ RuneScape, <http://news.runescape.com/newsitem.ws?id=1386>, Accessed: June 15, 2009

Finally, I defined my superordinate research question as follows: does the virtual economics of RuneScape reflect real world economics? I divide this issue into three subordinate questions:

- What aspects of the virtual economic system are similar and different?
- What is the level of economic understanding inherent in the players of RuneScape?
- Can virtual economies be a laboratory for understanding the real world economics?

1.2. Structure of the Thesis

In this thesis, I explore the economic aspects of virtual worlds by focusing on a specific massively multiplayer online role-playing game (MMORPG) RuneScape. My study is divided into eight chapters: introduction, literature review, methodology, game play in RuneScape, basics of RuneScape economy, application of fundamental principles of economy, survey findings, and conclusion.

Chapter 1 provides a rationale for the study and identifies the research questions, structure of the thesis, and the keywords.

Chapter 2 introduces the related literature in four sections. First, it gives a summary of the history of massively multiplayer online games (MMOG). Second, it presents the major economy-related research in the area of MMOGs, ordered by the year they were published. Third, it mentions about the very limited research studies on RuneScape. Finally, it provides a brief history of the RuneScape game and the game company, Jagex.

Chapter 3 focuses on the methodology and clarifies why this specific methodology is relevant for this thesis.

Chapter 4 explains game playing in the RuneScape world. Starting from the tutorial, it goes on with skills, geography, city life and population, transportation, quests, and, finally, social life and interactivity. This chapter creates a base for readers to understand game playing in MMOGs and, specifically, in RuneScape.

Chapters 5, 6, and 7 present the main contribution of this thesis. Chapter 5 focuses on the basics of the RuneScape economy and discusses selected fundamental and macroeconomic concepts such as currency, banks, trade, prices, profit, income, and expenses. It gives the necessary toolkits to understand the economic behavior in RuneScape.

Chapter 6 gives a detailed analysis and comparison between the real world economy and RuneScape economy by focusing on “economic agents and scarcity”, “supply, demand and elasticity”, and “money supply and government policies.” Along with Chapter 5, Chapter 6 includes the historical evolution of selected economic concepts and presents Jagex’s success in creating these concepts in a virtual world.

Chapter 7 analyzes the results of my survey from more than 100 RuneScape players. It includes the data sampling method, data management strategies, and actual quotations

from players. This survey gives valuable insight as the first academic survey regarding RuneScape economics.

Finally, Chapter 8 summarizes the results, identifies limitations, and suggests further study. It also provides answers to the research questions.

1.3. Keywords

MMOG, MMORPG, virtual worlds, virtual economy, virtual world economics, fundamentals of economics in virtual worlds, RuneScape, RuneScape economics, teenage economic perception, real money trade, relationships between real world and the virtual world.

CHAPTER 2

LITERATURE REVIEW

The history of video games began in the 1970s with coin-operated arcade games.

Commodore and Atari games were a big hit in 1970s and 1980s. The generation of the 1980s automatically assumes that we always had e-mails, YouTube, facebook, text messages, and chat. However, the internet, as we know today, emerged to public life no more than 20 years ago. Prior to those dates, the internet was only used by academic researchers and the military.

The success of arcade games, early video games, and the increasing usage of internet led to predecessors of today's Massively Multiplayer Online Games (MMOGs), Multi User Dungeons (MUDs). At first, MUDs were text-based computer games where *"players can read descriptions of rooms, objects, other players, non-player characters, and actions performed in the virtual world. Players interact with each other and the world by typing commands that resemble a natural language."*¹⁰ The graphical representation of the players and game environment led to 3D iterations. Increasing consumer demand to this new and visually appealing entertainment gave birth to the modern MMOGs. RuneScape,

¹⁰ Wikipedia, <http://en.wikipedia.org/wiki/MUD>, Accessed: May 24, 2009

the subject of this thesis, is classified as a massively multiplayer online role-playing game (MMORPG), a subset of MMOGs.

The central concern of my literature review is to inform the reader about the historical background of MMOGs, previous research in the area of virtual economics and my case study, RuneScape. I present my discussion of the literature in chronological order of the publications. While analyzing the existing research, I include the key issues or contributions from the authors and conclude each study with my evaluation of its importance, relevance, and/or gaps.

The following review of literature is divided into four sections: a brief history of MMOGs, research about MMOG economics, research about RuneScape, and history of RuneScape and the game company, Jagex. Game studies is a relatively new field in social sciences. It has been avoided by many academicians and researchers so far; perhaps they do not want to be associated with games and perceived as frivolous or because no company, agency, or organization would provide funding. MMOGs in general and MMOG economics in particular still constitute a narrow portion of the current literature.

2.1. History of MMOGs

The history of MMOGs can be traced to the 1970s where paper-based classical fantasy role-playing games, such as Dungeons and Dragons, were replicated in a new medium, computer.

Will Crowther developed the first example of a widely played, computer-based adventure game, Colossal Cave Adventure, in 1975. He was a programmer at Bolt, Beranek & Newman, the software company that later created the first version of the internet, ARPANET.¹¹ The Colossal Cave Adventure was a single user game, meaning that players could not interact with each other. However, this adventure game's text-based interface (see Figure 2.1) later inspired the rise of multi-user dungeons (MUDs).

```
PAUSE INIT DONE statement executed
To resume execution, type go. Other input will terminate the job.
go
Execution resumes after PAUSE.
WELCOME TO ADVENTURE!! WOULD YOU LIKE INSTRUCTIONS?

y
SOMEWHERE NEARBY IS COLOSSAL CAVE, WHERE OTHERS HAVE FOUND
FORTUNES IN TREASURE AND GOLD. THOUGH IT IS RUMORED
THAT SOME WHO ENTER ARE NEVER SEEN AGAIN, MAGIC IS SAID
TO WORK IN THE CAVE. I WILL BE YOUR EYES AND HANDS. DIRECT
ME WITH COMMANDS OF 1 OR 2 WORDS.
(ERRORS, SUGGESTIONS, COMPLAINTS TO CROWTHER)
(IF STUCK TYPE HELP FOR SOME HINTS)

YOU ARE STANDING AT THE END OF A ROAD BEFORE A SMALL BRICK
BUILDING . AROUND YOU IS A FOREST. A SMALL
STREAM FLOWS OUT OF THE BUILDING AND DOWN A GULLY.
```

Figure 2.1: Screenshot from the Colossal Cave Adventure (Source: http://en.wikipedia.org/wiki/Colossal_Cave_Adventure, Accessed: April 3, 2008)

In 1978, Roy Trubshaw and Richard Bartle developed the first real MUD, MUD1, an adventure game with multiple players, at Essex University in the UK. Trubshaw later said in an interview with GameSpy website that, *“Even without puzzles and a rubbish parser, the joy of meeting other people and seeing them arrive and leave, whilst just standing*

¹¹ Wikipedia, [http://en.wikipedia.org/wiki/Adventure_\(computer_game\)](http://en.wikipedia.org/wiki/Adventure_(computer_game)), Accessed: May 24, 2009

around was just indescribable."¹² Like Colossal Cave Adventure, MUD1 was also a text-based game.

A mere eight years later, in 1986, LucasFilm created the first graphical multi-user online game, Habitat¹³. In this game, players were represented by graphical avatars in the 2D environment. In the promotional video for Habitat, LucasFilm announced a new era: "*It is the birth of an alliance between powerful beings both here in Habitat, and in human realm, and with the cooperation of the huge mainframe computer in Virginia. Now using their modems and Commodore computers, people from Westport to Walla Walla can join QuantumLink and Lucas Film on the electronic journey unlike any other. Well, that means Habitat, where thousands of avatars each controlled by different human and converged to shape an imaginary society.*" [Transcribed by Tanla Bilir]¹⁴

In Habitat, various events happened simultaneously in a geographical setting that included forests, caves, deserts, and tropical paradises. Avatars shaped their destinies by their action choices. Socializing, game playing, adventuring, and shopping were some of the activities in Habitat, in which LucasFilm defined in its promotional video as a "*real-time, multi-user, graphics-based world simulation*" (see Figure 2.2).

¹² GameSpy, <http://archive.gamespy.com/articles/january01/muds1/index5.shtm>, Accessed: February 23, 2009, The History of MUDs, an interview with Roy Trubshaw and Richard Bartle, by David Cuciz

¹³ Wikipedia, [http://en.wikipedia.org/wiki/Habitat_\(video_game\)](http://en.wikipedia.org/wiki/Habitat_(video_game)), Accessed: May 24, 2009

¹⁴ LucasFilm's Habitat Promotional Video, <http://www.youtube.com/watch?v=VVpulhO3jyc>, Accessed: May 24, 2009



Figure 2.2: A Typical Scene in Habitat, the First Graphical Multi-user Online Game (Source: http://www.gamasutra.com/php-bin/news_index.php?story=21883, Accessed: April 3, 2009)

Although Habitat brought a visual appeal to MMOGs, 2D representation of the game environment and avatars were rather different from the real world experience. Castronova (2002) defined that feeling as “[in 2D spaces,] you could see yourself there; you could not actually be there.”

The next milestone in the history of MMOGs was the introduction of 3D, which provided more life-like, realistic characters. Ten years after the first graphical multi-user online game, Habitat, Archetype Interactive (later acquired by 3DO) developed Meridian 59, the first true 3D-MMOG, in 1996.¹⁵ The term “massively multiplayer” and the acronym “MMOG” also emerged at this time. Meridian 59, which run on 12 servers and allowed 3,000 players simultaneously,¹⁶ came with a 3D view, a small map, a chat view, and an inventory area as shown in Figure 2.3.

¹⁵ Wikipedia, http://en.wikipedia.org/wiki/Meridian_59, Accessed: May 24, 2009

¹⁶ GameSpy, <http://archive.gamespy.com/amdmmog/week1/>, Accessed June 4, 2009



Figure 2.3: A screenshot from Meridian 59 (Source: <http://www.massively.com/gallery/massivelys-visual-history-of-mmorpgs-part-i/727035/>, Accessed: May 2, 2009)

The MMOG world has expanded rapidly. Launched in 1997, Ultima Online was the first MMOG that reached the 100,000 subscribers milestone.¹⁷ Launched in 2004 as an online extension to the Blizzard Entertainment's Warcraft series, World of Warcraft is the most popular MMOG in the world today and has 11.5M monthly subscribers. The title holds 62% of the market share by April 2008.¹⁸ Other major competitors are Lineage (13%), RuneScape (7%), Final Fantasy (3%), and Dofus (3%).

According to the online encyclopedia, Wikipedia, more than 200 titles, which are categorized as massively multiplayer online role-playing games (MMORPG), are on the market as of August 2009.¹⁹ These are just a subsection of MMOGs. The modern MMOGs allow thousands of players to interact simultaneously, usually divided into

¹⁷ Ultima Online, <http://www.uo.com/UOKRpressrelease.html>, Accessed: June 4, 2009

¹⁸ MMOG Chart, <http://www.mmogchart.com/Chart7.html>, Accessed: June 4, 2009

¹⁹ Wikipedia, http://en.wikipedia.org/wiki/List_of_MMORPGs, Accessed: August 1, 2009

smaller subsections, called servers, hosting up to couple of thousands of players at a time. MMOG players generally pay a one-time fee for purchasing the game software and a monthly fee for subscription. Some MMOGs, such as RuneScape, are browser-based, meaning that the game can directly be played from the browser without downloading any software to the players' hard drive. Some MMOGs, including RuneScape, offer a limited free user option in addition to paid membership.

2.2. Research on the Economic Aspects of MMOGs

Since mid-1990s, the researchers and academia have developed an interest in MMOG studies, parallel to the growing number of personal computer usage and MMOG subscriptions.

The majority of the early MMOG literature focused on ethnographic studies and so-called ravages of excessive MMOG playing. Horror stories—for example, antisocialism, collapsed marriages, and neglected children— in daily newspapers shaped the public opinion. As MMOG subject matured, the focus shifted into more serious issues: economics, law, business, taxation of the virtual worlds/items, gambling in the virtual worlds, and real money trade (RMT). During the last five years, several MMOGs— especially Second Life, EverQuest and World of Warcraft (WoW) — have been subjects of various newspaper articles and research studies.

Real money trade is one of the most controversial topics in the area of virtual world studies. A considerable number of scholars focused on this subject so far. Several reasons

are likely: the magnitude of the money involved in this process, the social reflections of this trade, and/or nobody expected the geek male teenager would extend his love relationship with computers to the real world and make serious money out of it. Scholars are interested in social interactions between virtual economies and real world economies, particularly focusing on issues such as vigilant entrepreneurs who discover new ways of earning money, skyrocketing eBay transactions, and “game sweatshops.”

This thesis does not specifically focus on RMT although occasionally references to it. I acknowledge RMT as just a part of the complex relationships between real world economies and virtual economies. My main target is to evaluate the virtual economies as a whole; therefore, the following literature review does not analyze articles particularly related to RMT. Readers who would like to learn about RMT should refer to the following articles:

- Bartle’s (2004) white paper about the virtual property describes five major pitfalls of RMT, touching the issues such as difficulty of determining the actual ownership of the virtual assets, game developers’ responsibility for retaining the virtual item value, breaking the magic circle of the games by commodification, the resentment of low-leveled players towards high-leveled players or organizations in terms of monopolization of the virtual item sale, and intellectual property rights.
- Farmer’s (2004) KidTrade offers children an eBay-free economy in MMOGs by means of a barter-type auctioning system with no currency. Some arguments in this paper are interesting, while others are highly controversial. For example, just because early attempts to create game currencies ended with hyperinflation, suggesting a

virtual economy without money is not practical. It only creates alternative currencies in the long run. Do we really need another stream of shells and tobacco leaves as an exchange medium in economies?

- Yamaguchi's (2004) analysis of virtual currencies as an expansion to the Castronova's utility function model (2001) explains the necessity of RMT, establishes the virtual currency definition, and describes the difference from the real currency. Although Yamaguchi contributes to the literature by expanding the previous models, some of his foundations are not valid anymore. For instance, most of the game developers, like Jagex, move into more controlled economic systems creating in-game auction systems, price controls, and price windows, thus limits the players' involvement in money supply and true market prices.
- Huhh and Park (2005) look critically at the Korean MMOG, Lineage. This game creates a vicious circle of player killing and increasing RMT, followed by virtual inflation. As a result, the fun factor in the game decreases, and the game company applies different tactics to keep subscribers.
- Castronova's (2006) marginal and total cost/benefit analysis of various degrees of RMT concludes that RMT causes negative effects on welfare of the players (decreasing the value of the game) and game developers (increasing the cost of the service).
- Dibbell's (2007) comprehensive NewYork Times magazine article focuses on the Chinese Gold Farmers, a business with an approximately 100,000 employees (each of whom works 12 hours in a day for 30 cents/hour), employee working conditions, life, expectations, and actual quotes from these worker/players.

- Lehdonvirta (2008) categorizes the possible economic integration strategies between the real world and the virtual world for MMOG developers along with four detailed case studies: Habbo Hotel, Ultima Online, EverQuest, and Project Entropia.

The following literature review addresses issues of virtual economics other than RMT. Bloomfield (2007) introduces the term “*metanomics*” as the “*study of the economics of the virtual worlds*” and describes a three-part taxonomy: *immersionist*, *augmentationist*, and *experimentalist*. “*Immersionists study economics of virtual worlds as parallel worlds separated from the real world with their own dynamics and their own inherent interests. Augmentationists explore how real world organizations use and respond to the virtual world economics. Experimentalists use the virtual worlds as laboratories to study real world economics.*” While some articles I examine in my literature review can be categorized in more than one area of Bloomfield’s taxonomy, his approach is a practical start for categorizing different research approaches in virtual world economics. In the works I discuss, Grimm and Mitlöhner (1995), Simpson (1999), Castronova (2001), and Burke (2002) can be categorized as immersionist; Castronova (2002), Lastowka and Hunter (2004), Bloomfield (2007), and Arakji and Lang (2008) as augmentationist; and Nash and Schneyer (2004), Castronova (2008), and De Sousa and Munro (2008) as experimentalist. This taxonomy provides a broader frame for considering the chronological review of critical literature below.

2.2.1. Grimm and Mitlöhner (1995)

In 1995, two professors from Vienna University, Grimm and Mitlöhner explored some economic principles by replicating the real economy in MUDs. This paper is probably the earliest academic attempt for understanding the actions of an economic agent in virtual worlds. In their paper, Grimm and Mitlöhner define the basic concepts of the real economic life, such as, trading, negotiation, pricing, and bounded rationality. Lacking a systematical methodology, this paper primarily introduces some basic economic terms and leaves the development of a virtual world based on their assumptions as the future study.

2.2.2. Simpson (1999)

Simpson's paper about "The In-game Economics of Ultima Online" (1999) is one of the first detailed papers in the literature. Being a research fellow at the MMOG company, Origin, Simpson captures a series of patterns that are essential for designing virtual worlds. These patterns can also be interpreted as internal balances that need to be taken into consideration by the game developers, such as the balance between the *fun and the realism*, *newbies and advanced players*, and the *free economy and the restricted economy*.

- The first balance, the balance between *fun* and *realism*, is so important for designing the virtual worlds. While online game players increasingly demand more realistic simulations of the real world, some aspects of the real world wouldn't simply be copied into the games. If the simulation of real life is applied, for example, players die in dangerous combat; many players would stop playing the game because death commonly happens in online games, especially at the beginning when players are

- inexperienced. Hence, game developers introduced the resurrection concept, in which players can have a new chance of “living” and playing the game, after dying.
- The second balance is between *newbies* and *advanced players*. A continuous flow of newbies enters virtual worlds at any time. In the beginning, the economic features and rules of the game appear to be complex for these new comers. Also, they have a limited amount of wealth and skill that will create a meaningful effect in the game economy. They slowly learn the rules and became effective economic actors in the virtual world, as they gain experience. On the other hand, games must provide a continuous and entertaining economic experience for advanced players as well.
 - The final balance is between the *free economy* and the *planned economy*. While game developers encourage the interaction between players by allowing player vs. player (PvP) trade, they also introduce a series of rules that shape the virtual economy. For example, floor and ceiling prices and trade limits.

Furthermore, Simpson draws a detailed graphic that explains the economic flow in the game, from natural resources to finished goods and from vendors to players. He also includes money drains, all features that take money out of the game economy.

Simpson’s paper is the first example of the economic analysis in virtual worlds for introducing definitions and concepts, and providing a detailed case study. Since Simpson worked on the development process of the Ultima Online, this paper can also be considered as an insider view. He successfully explains the strengths and weaknesses of the game economy, initial design choices, player reactions, and system modifications

based on player feedbacks. He also portrays future development possibilities. Although this paper offers valuable insights to a specific MMOG economics, it is structured more like a design paper and doesn't suggest a methodology. Furthermore, 1999 is still too early in the MMOG market where competition analysis and literature review would be meaningless.

2.2.3. Castronova (2001)

In 2001, an economics professor, Edward Castronova published his seminal article about the "Virtual Worlds: A First-Hand Account of Market and Society on the Cyberian Frontier." Focusing on a specific MMOG, EverQuest, Castronova highlights economic and social impacts of the virtual worlds.

Castronova calculates that the value of EverQuest currency exceeds that of the Japanese yen and the Italian lira and Norrath's (a server in the game) gross national product per capita exceeds that of dozens of countries, including India and China. He also estimates that revenues from online gaming will grow to over \$1.5 billion by 2004. Some of the ethnographic notes from his article are that 20% of Norrath's citizens consider it their place of residence and players spend more time in a week in this virtual world as compared to their actual jobs. Castronova also makes bold statements such as virtual worlds may also be the future of e-commerce, and perhaps of the internet itself. The future will reveal if these predictions prove true.

Although Castronova's article (2001) was not the first paper to focus on virtual world economics, it is probably the most influential one. By summer 2002, the paper rapidly

became the number one economics article in terms of download numbers (20,000) and one of the top ten papers in all subjects in the Social Sciences Research Network (Castronova, 2005). It is still in fifth place among all papers, in the SSRN, as of June 2009.

2.2.4. Castronova (2002)

In 2002, Castronova offered a deeper analysis of the virtual economics in his paper titled “On Virtual Economies.” In his paper, he focuses principally on the affects of the ever-growing virtual economies on the real world economies. With a hypothetical mindset, he forecasts that players keep producing virtual assets and then sell them for real money thus increasing average income in the real world. If this production pattern increases drastically, the real world production decreases, resulting a recession in the real world economies.

Castronova predicts that, in terms of the demographic structure of this employment migration from the real world to the virtual world, two specific types of demographics, the poor and the above-average income people may consider this switch. Poor people can easily transfer their labor to the virtual worlds because they already have a very low income, so they have very little to lose. Above-average income people also can easily switch because they can afford more leisure-time activities. However, they should consider the cost of their time. If this migration continues, the real world goods/services demand and the labor supply decrease, which results in a lower tax collection in the real world.

While these assumptions seem a bit exaggerated based on the current number of the MMOG subscriber base, the prediction of behavioral patterns is very difficult, as Castronova concluded. Governments usually take regulatory actions when the magnitude of a social pattern exceeds a certain level. For example, the taxation and copyright of the virtual assets have already started to be a part of the law literature. I believe that virtual economies will be increasingly influential in the real world economies and claim their permanent places in the economy in the near future.

2.2.5. Burke (2002)

Burke (2002) makes an attempt to classify economic agents (economic decision makers) observed in MMOGs. He creates three distinguished economic groups: *utility-maximizers*, *moral economy faction*, and *exploiters*.

- *Utility-maximizers* are homo economicus of the MMOGs. They maximize their skills or wealth by constantly analyzing risk/reward ratio of the possible actions they can perform in their economic environments. *Utility-maximizers* also serve as leaders or role models for the rest of the game community. The other players who wish to be equally powerful quickly copy their actions.
- The *moral economy faction* is often characterized by role-playing. This group approaches the game as fun and doesn't pay attention to the economic activities. The *moral economy faction* considers the maximizing behavior as work; therefore, they avoid it as much as possible.
- The final economic group, *exploiters*, uses unplanned/undesirable situations in order to create unfair economic advantage in the game. *Exploiters* find game bugs or create macros (small computer programs that perform certain game activities repeatedly

without an actual person involvement) to earn enormous amount of wealth in a short time.

Burke successfully defines the relationships between these three economic agents as well. Sometimes, *exploiters'* tactics are adopted by the *utility-maximizers* and become a common practice that changes the direction of the economic behaviors in the game. The *moral economy faction* often criticizes *exploiters*, as they damage the fun factor more than *utility-maximizers*. Also, maximization is so mainstream that the *moral economy faction* is eventually forced to engage in maximizing. If the *moral economy faction* does not involve in maximizing, then they can not explore the whole game world or can not perform certain quests. While *utility-maximizers* work on strategies that dominate the game economy, *exploiters* turn their focus to the strategies that destroy the game integrity. When a new quest is released, two groups rush into solving it but for different reasons. *Utility maximizers* want to gain the economic reward as much as possible, while the *moral economy faction* seeks for the sweet taste of achievement.

Finally, Burke suggests an exciting solution for managing the future of the MMOG economics. He simply proposes a more player-involved approach to the economics that is similar to the real world. According to Burke, if the game developers implement a limited resources system in the virtual economy and the players become the only economic actors who create new items, open businesses, and run governments, the demand for MMOGs increases. I both agree and disagree with Burke. While the sound of a more liberal economy seems tempting, the complexity and consequences of implementing a

true real world economy should be considered. Many game critics define two different game types as undesirable: very easy or very hard ones. A very complex, almost real economy would probably be on the hard side for the game players who seek the fun factor from games. Therefore, a certain degree of game developer involvement in the game economies seems to continue, at least for the sake of player continuity and game developer's profit.

2.2.6. Lastowka and Hunter (2004)

Two professors of law, Lastowka and Hunter, discuss the interaction between the real world and virtual world laws in their paper "The Laws of the Virtual Worlds" (2004). While their paper naturally analyzes virtual worlds from a legal perspective, their discussion of property rights related to the virtual objects is worth mentioning from an economic perspective.

Lastowka and Hunter define property ownership as a central concept in the virtual worlds. They identify similarities between the real world and the virtual world property ownership, such as *exclusive ownership*, *persistence of rights*, *transfer under conditions of agreement and duress*, and *a currency system to support trade*. While various MMOGs implement slightly different property rules, the virtual world generally mimics real world equivalents. Players may trade their properties in the virtual worlds and sometimes this trade extends to the real world, depending on game company's RMT policy. One big difference between two realms is that scarcity is not an issue in the virtual worlds, where an unlimited resource supply exists.

Lastowka and Hunter also mention players' perception of ownership. Over the years, players develop more and more sentimental bonds with game objects, even if they are not tangible. Especially players who are involved in the virtual item creation process (e.g., designing a virtual cloth for the avatar) or players who use pre-existing game dynamics for virtual item accumulation (i.e., spending many hours working on different game skills to accumulate virtual money) may easily claim the ownership of these goods. Lastowka and Hunter raise an interesting debate about who can be considered the real owner of these virtual worlds. On one hand, players spend hours of labor for designing and accumulating these virtual artifacts; on the other hand, game developers spend their labor for programming and maintaining these virtual worlds. More interestingly, what if the game developer decides to shut down its server and wipe its database. This results in the disappearance of the virtual economy along with the virtual items. Some people may think that since these items are not tangible, no property right may be claimed. I compare players' claims to virtual assets (e.g., a house in Second Life) with other artistic creations. A song may not be a tangible artifact but it is subject to copyright. Just because the virtual items are a newer form of creation is not a sufficient reason for ignoring copyright laws that are more established in the older forms of art. In the other case, where players do not create virtual assets but use the assets that are created by game developers, I have a different approach. In that case, players pay a specific amount of money for playing MMOGs and, therefore, benefit from a service that is provided by game developers. This service is no different from paying \$3 for a cup of coffee at Starbucks. If Starbucks would allow customers to develop their own coffee mix and sell it in their shops, customers who create this special coffee mix would claim ownership of this coffee.

However, that doesn't mean they own coffee machines or the location for selling coffee that is provided by Starbucks. Starbucks can also stop this service at any time. Of course, customers may still continue selling special coffee at other locations, but it wouldn't be the same as selling it under Starbucks brand.

Although virtual property ownership presently is controversially debated, as the online game industry matures, laws and regulations in this area are likely to be developed.

Lastowka and Hunter support this idea by pointing to the shift from the tangible to intangible artifacts in Western property law over the last 200 years and the likelihood of the development of property regulations as an initial area of the virtual world law.

2.2.7. Nash and Schneyer (2004)

Focusing on a popular MMOG, Final Fantasy XI, Nash and Schneyer (2004) make a methodological attempt to understand the nature of the virtual world economics and its difference from the real world economics. Their study gives valuable insights about demographics, supply, price shocks, seasonality in prices, arbitrages, taxes, costs of goods, sector indices, price restrictions, and cultural factors in the economy.

In one of their examples, Nash and Schneyer (2004) explain the emerging RMT markets initiated by the increasing customer demand and the game company's (Sony) resolution in the example of EverQuest. I created Figure 2.4 as a visualization of the ideas from Nash and Schneyer.

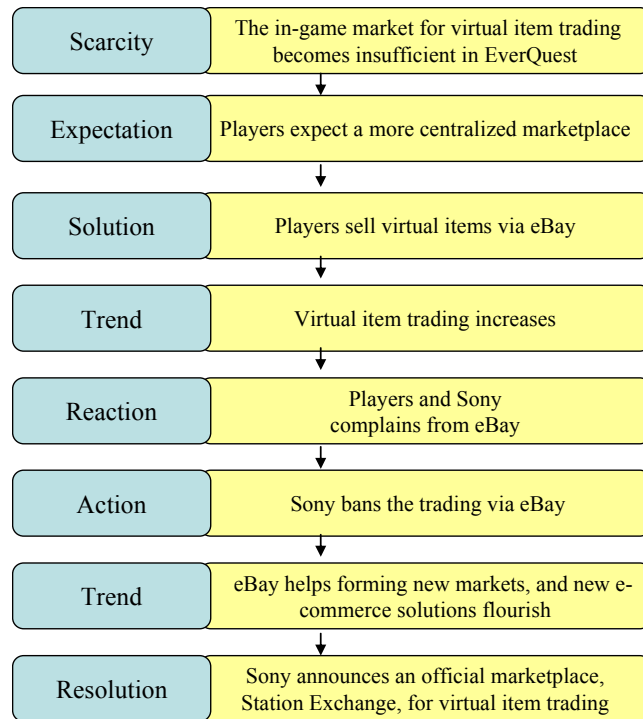


Figure 2.4: An Emerging RMT Market Model Based on Sony’s EverQuest

The data collection method used by Nash and Schneyer is systematic. They acquire in-game data with a series of procedures that include capturing screenshots, convert them into text files with the help of an optical character recognition system, parse data, and send them to a database for analysis. This methodology also offers opportunities for the future economic studies in MMOGs by creating a programmatic base that may be applied to different games by small changes in the parsing code.

2.2.8. Bloomfield (2007)

Bloomfield (2007) draws attention to the fact that the lack of reality observed in most virtual game economies is not a technology restriction but a conscious preference made by game developers either to protect the entertainment factor or to encourage the virtual business. He also mentions that MMOG worlds are not designed to study economics. Therefore, while some economic behaviors are easily observed in the virtual worlds, they

may not be easily compared to real world equivalents. Bloomfield states that, while virtual worlds provide sufficient physical venues for commercial interaction, (e.g., shops, auction markets, and personal trading systems), they have been less efficient in creating complex commercial arrangements such as property rights. The Thomas Simon Lawsuit²⁰ in Second Life sets an infamous example. In 2007, Simon was sentenced to \$525 fine for copying and selling other player's virtual items without permission.

Bloomfield also sees virtual worlds as an opportunity for financial innovation. The flexible environment that is observed in some MMOGs encourages direct user input to the virtual economic system without any restriction, which may later lead new product ideas or marketing strategies in the real world. For example, starting with an initial investment of \$9.95 in 2004, Anshe Chung²¹ became the first real life millionaire of Second Life in two-and-a-half years. Currently, she operates her online virtual real estate and item sale business with 50 real employees based in China and inspires many other players to start their own businesses.

2.2.9. Arakji and Lang (2008)

Arakji and Lang (2008) attempt to build a new framework, Avatar Business Value Analysis (ABVA), for running and evaluating virtual businesses. Focusing on Second Life, they specifically look for a way to assess the business value inside the virtual worlds

²⁰ Virtually Blind, <http://virtuallyblind.com/2007/12/03/kenzo-simon-settlement/>, Accessed: May 26, 2009

²¹ Business Week, http://www.businessweek.com/the_thread/techbeat/archives/2006/11/second_lifes_fi.html, Accessed: May 26, 2009

and try to convert this value to the real world equivalents. They define three distinct customer types: the *avatar* who trades in virtual world and spends virtual or real money, the *internet shopper* who trades in websites and spends real money, and the *physical person* who trades in physical store and spends real money. The ABVA model concerns the economic actions of the first customer type, the avatar. Furthermore, Arakji and Lang draw a decision-tree based on the possible trading actions of the avatar. This tree reveals eight different types of customer behaviour concerning the created business value for the company, ranging from “no benefit” to “brand awareness” and from “the virtual revenue” to “the real revenue.”

Arakji and Lang suggest a cost/benefit analysis method for opening a business in virtual worlds. They simply compare the expected cost of setting/maintaining a virtual business (ECVS) with the expected value that the avatars create (EVVS). In Second Life, ECVS may be the land ownership/renting costs and the salary paid to the real person behind the virtual customer representative. EVVS is calculated by multiplying the virtual world traffic with the Expected Value of an Avatar Contact (EVAC), which is the total monetary outcome consisting of virtual revenue, real revenue, and brand awareness. If EVVS is greater than ECVS, the store makes a profit; thus, maintaining the position (EVVS is greater than ECVS) is in the company’s best interest. Arakji and Lang also add the lifetime value of the customer to their evaluation, mentioning that companies must evaluate the virtual customer segments and determine their business strategies for the customers who create the highest lifetime value.

Moreover, the authors suggest a series of management strategies for virtual world operators and companies within the virtual worlds. Virtual world operators can encourage the overall business by increasing the transparency, allowing/pushing government regulations that establish virtual property, copyright and virtual customer rights, offering product guaranties/integrated business tools, and creating collaboration between virtual world operators. For companies that maintain a business inside the virtual worlds, proven strategies include increasing virtual store entry and purchase rate, solving software issues that irritate customers, offering more unique/fantasy products rather than replicas of real life products, and differentiating their marketing strategy for the unique needs of the online customers.

Overall, based on fundamental principles of business administration, such as, customer definition, segmentation, cost/benefit analysis, customer lifetime value, and possible marketing strategies, this paper seems to be a promising attempt to create an overall business approach to the virtual worlds. Some suggested strategies may be impractical from technical perspectives (collaborating virtual worlds), some may take time (establishment of trust and shifting trade practices from the real world to the virtual worlds), and others may probably be complicated (virtual world laws). However, I believe that, in the not so distant future, customers' spending habits will shift from the real stores to the virtual stores (i.e., they will prefer to compare the goods/services and will shop 24/7 in their homes) and virtual worlds will offer a visually appealing spice to this trend.

2.2.10. Castronova (2008)

In 2008, Castronova focused on a specific economic feature, the *law of demand*²². In his study, he tests if players' economic choices in virtual worlds are different from the real world. He basically creates an economic system in a fantasy-themed virtual world and modifies it for one experimental and one control group using special software provided by Bioware Inc, a videogame company. The only difference between the experimental world and the control world is the price of a specific item, a health potion, is considerably higher in the experimental world compared to the control world. In Castronova's virtual world, players may explore the space, solve quests, and chat with other players. Castronova observes the players' trading preferences over a month and finds that players in the experimental world buy the overpriced item drastically less than the control world players (demand elasticity of -0.43).

While he claims that this result is consistent with the real world equivalent researches, Castronova does not specifically mention the following three factors that may affect the item demand:

- **Re-selling:** Castronova measures the number of demanded health potions by placing a specific number of potions on non-player character (NPC) merchants and then periodically checking the remaining potions. However, he never mentions if players

²² Investopedia, <http://www.investopedia.com/terms/l/lawofdemand.asp>, Accessed: June 9, 2009, Law of demand: All other factors being equal, as the price of a good or service increases, consumer demand for the good or service will decrease and vice versa.

are allowed to re-sell the potions to the NPC merchants that would affect the number of items demanded.

- ***Attention to game instructions:*** If players don't realize that the health potion may cure their health status, they may not demand this item. Castronova never states if he measured players' awareness of the existence and functionality of this test item.
- ***Communication between players:*** If players talk to each other via an in-game chat mechanism during the period of the study and realize that the price for this specific item varies, they may not buy this item where the price is high.

Regarding the first factor, Castronova mentions that the software that is used in this study does not provide a report about how many potions each user purchased. Therefore, Castronova develops the manual count method that is mentioned above. I assume that the software doesn't provide the information that how many potions each user sold to NPCs as well. Castronova accepts that the manual count method may not be the ideal solution but it was the most practical solution given the limited time that the study was funded. While this explanation is sufficient for re-selling factor that I mentioned above, the issues of the *attention to game instructions* and *communication between players* would be easily eliminated by asking the actual player behaviour with a post-survey. Nevertheless this is still a very inspiring study in which the experiment environment is the exact replica of the control environment with the exception of the specific item price that is meant to be measured: such a luxury we can not find in real world experiments.

As Castronova indicated, virtual worlds can be programmed in a way to test certain hypotheses in experiment and control groups, can host many volunteer research subjects, and can be observed over a period of time. I believe that this research proves the important fact that virtual worlds can be a laboratory for serious economic and social research. It is just a matter of time until virtual worlds are accepted as a legitimate environment that mimics real world human behaviour. In fact, virtual worlds will become the new and more practical medium for social science research.

2.3. Research on RuneScape Economics

RuneScape has been understudied so far. Current literature about the game doesn't exceed a few academic or research articles. The existing articles focus on ethnographic studies, information technologies, and economics. Stam and Scialdone (2008) try to understand social interaction in MMORPG communities by comparing RuneScape and Furcadia. Crowe and Bradford (2006) explore RuneScape as a new platform or leisure space where teenagers can establish their identity and participate/expand the youth culture. Nae et al. (2008) use RuneScape as a case study for an efficient data management/server strategy for MMOGs. Finally, De Sousa and Munro (2008), discuss the endowment effect in the RuneScape economy, which is the most relevant subject of interest for this thesis.

2.3.1. De Sousa and Munro (2008)

De Sousa and Munro (2008) use RuneScape as a field for testing a specific economic phenomenon, the endowment effect. The endowment effect can be described as "*people tend to value goods more when they own them than when they do not.*" (Korobkin, 2003)

To measure the endowment effect, De Sousa and Munro conduct two experiments with 90 RuneScape players. In the first experiment, researchers offer two sets of common virtual items to the all players and ask them to indicate these items' worth. Researchers also ask players' trading frequencies. De Sousa and Munro report four findings from this first experiment: the endowment effect can be observed in online games, higher level players tend to show less attachment to their virtual possessions, they have more understanding of the virtual item market, and they are more likely to over-trade.

Since higher level players' tendencies to over-trade may be related to the low-valued items used in the first experiment, De Sousa and Munro decide to conduct a second experiment. In the second experiment, researchers include only high-level players and more valuable items that can be acquired by more labor/time, even for these experienced players. The results from the second experiment show that although high-level players are more cautious of trade when the item price is high, they still have tendency to trade, rather than keep. This result also proves that item value is not the largest reason for overtrading. Years of game play and the level of combat experience are more closely related to their trading behavior.

De Sousa and Munro's results are consistent with the other social research that focuses on the endowment effect. Thus, they claim that virtual worlds can be a valid test field for observing many other economic activities. They also use a statistical methodology (correlation and regression analyses) to support their hypotheses, which is rare in the

young field of online game studies. Their methodology allows other researchers to replicate and compare their findings.

2.4. Brief History of Jagex and RuneScape

In 1998, developer Andrew Gower and his brother Paul Gower started working on a new game. Their first two versions, titled *DeviousMUD*, had isometric graphics and no longer in use. Although these early versions were not shared with large player groups, the designers kept on trying to improve the game. By January 4, 2001, they created a new version that was renamed as *RuneScape*. This version, now called *RuneScape Classic*, is still available for selected players.²³

At the end of 2001, the Gower brothers and Constant Tedder founded Java Games Experts Limited (Jagex Ltd.) to take over the management of RuneScape and other commercial games developed by the brothers. A membership option was added to the game in February 2002 and attracted 5,000 subscribers during the first week. Paying a \$5 monthly fee, members accessed to a larger game map, more quest options and skills. Between 2002 and 2004, additional revisions were made in order to refine the graphical outlook. In 2004, RuneScape 2 was launched with enhanced 3D-realism.²⁴ According to

²³ RuneScape, <http://www.runescape.com/classicapplet/playclassic.ws>, Accessed: June 18, 2009

²⁴ RuneScape, http://www.runescape.com/kbase/viewarticle.ws?article_id=746, Accessed: June 18, 2009

Jagex survey results²⁵ from 11,568 users in September 13, 2004, 72% of the users became members in the first 6 months after playing the game.

By October 25, 2005, the number of active game players reached 3.5 million of which 500,000²⁶ were monthly fee paying members. Given the \$5 monthly fee, 500,000 subscribers generated monthly revenue of \$2,5 million or an annual value of \$30 million. Quite remarkable figures for a company that is only 3 years old!

In 2008, Jagex released FunOrb.com, a mini games portal aimed at the casual gamers. Another big development in the same year was the introduction of RuneScape high definition.²⁷ High definition mode provided more in depth textures, realistic lighting, and shadows, which enhances the overall realism in the game.

RuneScape can be described as a 3D massively multiplayer online role-playing game (MMORPG). More specifically, thousands of players around the world can access the RuneScape website 24/7. Using their username and password, they can login to one of the available game servers and interact with each other and non-player characters in the same game environment simultaneously.

²⁵ RuneScape, <http://www.runescape.com>, Accessed: May 25, 2009, view previous polls link, this link is reachable with username and password.

²⁶ Gaming Blog, <http://www.gamingblog.org/entry/runescape-developers-secure-investment-from-insight-venture-partners/>, Accessed: April 28, 2009

²⁷ RuneScape, <http://news.runescape.com/newsitem.ws?id=1218>, Accessed: May 10, 2008

RuneScape offers both free user and membership options. Although free users are not allowed into most parts of the game (60% of the total content)²⁸, their limited skills, quests and restricted access to the game map still provide a satisfactory experience for the free users.

RuneScape is implemented in Java and does not require file downloads to users' hard drive as do the majority of the other online games. These features bring a steady flow of new users to the game and compel users to become members after a period of free usage time.

By 2009, Jagex employs 400 personnel including 150 customer service representatives.²⁹ With 5.3 million active players per month³⁰ and at least 1 million³¹ paying members, RuneScape is now hosted on over 171 servers in 16 different countries³² (United Kingdom, United States, Canada, Netherlands, Australia, Sweden, Finland, Belgium, Mexico, Brazil, Ireland, Norway, Denmark, New Zealand, France, and India). Jagex is planning to launch another big title, MechScape, later in 2009.

²⁸ Tent on Hammer, <http://www.tentonhammer.com/node/42852>, Accessed: May 18, 2009, Jagex CEO Geoff Iddison's speech at the Leipzig Games Convention (August 2008)

²⁹ Marketwire, <http://www.marketwire.com/press-release/Jagex-Ltd-965788.html>, Accessed: June 7, 2009

³⁰ Gamasutra, http://www.gamasutra.com/php-bin/news_index.php?story=22085, Accessed: Feb 15, 2009

³¹ RuneScape, <http://news.runescape.com/newsitem.ws?id=789>, Accessed: July 22, 2007

³² Runescape Wikia, <http://runescape.wikia.com/wiki/Server>, Accessed: June 29, 2009

2.5. Conclusion

In this chapter, I examined the literature about virtual economics. During the literature review, I followed a hierarchical approach from the generic concepts (MMOGs) to the more specific issues (RuneScape economy). I divided my literature review into four discrete sections each of which is chronically outlined.

First, I summarized the brief history of MMOGs since 1970s and then identified the major developments and the most important games in that area (see Table 2.1).

Table 2.1: History of MMOGs

Year	Name	Significance	Features
1975	Colossal Cave Adventure	First widely played, computer-based adventure game	Text Based, Single User
1978	MUD1	First MUD	Text Based, Multi-player
1986	Habitat	First graphical MMOG	Graphical, Multi-player, 2D
1996	Meridian 59	First 3D MMOG	Graphical, Multi-player, 3D
1997	Ultima Online	First MMOG that reached the 100,000 subscriber milestone	Graphical, Multi-player, Isometric
2001	RuneScape	The most popular free MMOG	Graphical, Multi-player, 3D
2004	World of Warcraft	The most popular MMOG	Graphical, Multi-player, 3D

Second, I reviewed research about the economic aspects of MMOGs, back to mid-1990s, as seen in Table 2.2. Historically, few authors have been interested in virtual economics; however, in 2001, as column 2 shows, Castronova initiated the research stream about virtual economics, and he is still one of the leading scholars in the area. The early research about MMOG economics was generally concerned with virtual item trade for real money. As seen in columns 3 and 4, later studies focused on different aspects of virtual economics, which I classified according to Bloomfield's taxonomy (2007) as

immersionist, augmentationist, and experimentalist. As seen in column 5 of Table 2.2, EverQuest, World of Warcraft, and Second Life are examined in many research studies. While selecting the papers in my literature review, I included in only the most important examples, significant contributions, or controversial discussions relevant to my area of interest (see column 6). Finally, Column 7 shows that direct observation is the most popular methodology so far and other data collection methods were rarely used.

Table 2.2: Research on MMOG Economics

Year	Author	Content	Research Approach	Game	Significance	Methodology
1995	Grimm and Mitlöhner	Economic agent, definition of basic economic principles	Immersionist	MUDs in general	Earliest example I find	Direct observation
1999	Simpson	Design essentials, faucet-drain model, definition of concepts	Immersionist	Ultima Online	Insider view	Direct observation
2001	Castronova	Modeling basic economic concepts: GNP, market, scarcity, supply/demand, trade, wages, and poverty	Immersionist	EverQuest	Highly influential, first methodologic paper, #1 at SSRN	Texts(website), direct observation, self reports (survey)
2002	Castronova	Future of virtual economics, affects of virtual economics on the real world economics	Augmentationist	MMOGs in general	Controversial: increasing virtual economics, decreasing real life GDP	Modeling a utility function based on time/satisfaction
2002	Burke	Economic agent classification, more free-market approach in the economy	Immersionist	Asheron's Call, EverQuest	Controversial: complexity of free-market kills fun	Direct observation
2004	Lastowka and Hunter	Virtual item ownership, property rights, and avatar identity	Augmentationist	MMOGs in general	Comprehensive discussion	Direct observation
2004	Nash	Demographics, supply, price shocks, seasonality in prices, arbitrages, taxes, costs of goods, sector indices, price restrictions, and cultural factors in the economy	Experimentalist	Final Fantasy XI, EverQuest	Methodology is applicable to other MMOG research	Computerized data parsing and analyzing
2007	Bloomfield	Virtual worlds are well-suited to the study of real world business, research and educational goals	Augmentationist	World of Warcraft, Second Life	Establishes the business approach	Direct observation
2008	Arakji and Lang	Avatar Business Value Analysis (ABVA), cost/benefit analysis	Augmentationist	Second Life	Establishes the business administration approach, some suggestions are impractical, time consuming, and complex	Theoretical framework and a computational method
2008	Castronova	Test of the law of demand	Experimentalist	Arden, the game created for the experiment	Virtual worlds can be a laboratory. First attempt in this area	Experimental and control group designed in a virtual world

Third, I noticed that the research about RuneScape economics was scarce. I found only one academic paper in this area (see Table 2.3). While this result limits a comprehensive study regarding RuneScape economics, this thesis fills a gap in the literature.

Table 2.3: Research on RuneScape Economics

Year	Author	Content	Research Approach	Game	Significance	Methodology
2008	DeSousa	Endowment effect (tendency to value more when owned)	Experimentalist	RuneScape	Only economic-related paper about RuneScape. Virtual worlds can be a laboratory	Self reports (survey), statistical analysis

Finally, I presented the history of RuneScape and the game company, Jagex, by covering the major developments in the game since 1998. All four sections of the literature review established a historical background, recapped main contributions and gaps in the literature, and evaluated the relevance of the sources to this thesis. Next chapter discuss the methodology used in this thesis.

CHAPTER 3

METHODOLOGY

The rich history of digital games, detailed discussion of their development, and the relevant research studies establish a foundation for my methodology. Above all, my approach is shaped by the work of Merrigan and Huston. In their book, Merrigan and Huston (2008) explain four different sources in which communication data can originate: (1) existing *texts*; (2) *direct observations* of communication interactions; (3) *self-reports* of communicative behaviors, beliefs, and/or characteristics; and (4) *other-reports* of communicative behaviors, beliefs, and/or characteristics. I use all of these methods in my methodology.

I start this chapter by giving a brief summary of Merrigan and Huston's method. I explain the benefits and the relevance of this method to my research. Later on, I reveal my data collection settings, giving the biggest emphasize on my survey. In this section, I also discuss the advantages and disadvantages of online data collection.

3.1. Methods and Relevance

Merrigan and Huston's first data source, *texts*, includes varying forms of written words. While books, articles, journals, and maps are conventionally being used in the literature

review, chat-room records, e-mail messages, and videos may also be considered as more contemporary alternatives.

In *direct observation*, researchers monitor participants' communication in the environments where those interactions have naturally occurred. Researchers usually record those activities by taking notes, audio-taping, or videotaping. Observational data may include spoken words as well as body language and gestures.

Self-reports of communicative behavior may be collected via survey questions or interviews. This method gives useful clues regarding participant's own perspectives, beliefs, and characteristics about the research material. However, the self-report method also has some weaknesses (e.g., participants' tendency of overrating the good personal qualities and underrating bad personal qualities, and biased or poor memories).

Finally, *other-reports* of communication behavior basically allow participants to report their insights about third persons. Sometimes research participants are not the originators of the research phenomenon, but they are being affected by it. For instance, a forum thread written by a game player that expresses satisfaction about a recent change in the game made by the game company may fall into that category. Other-reports of communication expose valuable information by allowing researchers to compare their own opinion and the participants' opinion about the research phenomenon. I used all four of the data collection methods explained above as following:

- ***Texts:*** I examined previous academic literature about virtual world economics from books, articles, and websites.
- ***Direct observations:*** I observed game dynamics, both as a free user and as a member. While playing the game, I also collected in-game chat conversations and numeric game data.
- ***Self-reports:*** I conducted an online mass survey and various individual interviews with players.
- ***Other-reports:*** I followed-up related forums and fan sites and initiated new forum threads. I collected some data via personal e-mail function of the game forums.

Traditional literature review revealed valuable information in terms of the real world economy, the RuneScape economy, and competitor game economies. Official game news, official and unofficial game websites, forums, blogs, articles, books, major game industry reports, statistics, dictionaries, wikis, and academic papers were invaluable sources of information.

Direct observation of the game and game players was one of the most important data collection methods during my research. I started playing RuneScape as a free user, in 2004. In 2006, I became a paying member. Since members can access the unlimited game map, they have more skills to work with and more quests to solve. The membership option offers players the opportunity to develop a better understanding of the game.

Direct observation has an indisputable benefit to enhance the information in a traditional literature review. Even though, reading books, articles, and other written materials gives an initial perception of virtual worlds and virtual economics, at least three benefits may be observed only from an insider's perspective. First, most of the social and economic changes happen over a period of time. That is, regular game players can both witness the snap-shots of the RuneScape economy as well as have ability to compare different time periods within the game. Also, certain changes in the virtual economies that can be explained by other social changes may only be observed when the researcher is also a player. For example, three years ago (2006), the most popular clothing item in the game was rune armor. The introduction of higher-quality armor, such as dragon sets, caused the rune armor prices to decrease over time and to become easily obtainable by many game players. Although rune armor still provides adequate protection compared to iron and steel armor, it is no longer a popular clothing option and is not in great demand. Second, being a free user gives players an understanding of the RuneScape game, but members simply practice more features incidents, such as construction skill, which allows players to create their own homes and decorate them. Property ownership is a big part of real world economies and is successfully performed in the RuneScape game with some changes that are discussed in later chapters. Third, being a member enables players to collect the actual in-game economic data. I logged into the game regularly over two-year period and collected substantial amounts of numeric data regarding the major economic indicators, such as item prices in general shops, grand exchange, and player vs. player (PvP) trading.

One of the other data collection methods, self-report, was equally important for my thesis. I created an online survey that focuses on player perceptions of the RuneScape economics and consists of 47 questions. The survey was posted online on March 2009 and instantly received attention from game players:

- Almost one third of the participants (137 out of 470) completely answered all questions.
- The majority of the participants were adults. (55%)
- The majority of the respondents were male. (95%)

The answers to the survey questions revealed a deep understanding of game dynamics, and player perceptions of the real world and the virtual economies. One of the interesting results of the survey was answers to the real money trading (RMT) questions. Almost all players who completed the survey indicated that they were not participating in RMT.

This result is not surprising considering that, during 2007, Jagex introduced a series of rules that restricted RMT. In the following weeks, the company banned tens of thousands of accounts that participated in RMT and also encouraged the “abuse report” system that allows players to report other players who illegally participate in RMT. Although RMT is officially forbidden, black-market practices have survived. Survey participants’ answers to RMT questions may be explained in two ways. These players may really not participate in RMT, or they simply may not want to reveal their illegitimate behavior, even though the survey consent form clearly states that their names will be anonymous when this thesis is published.

Other-reports as a data collection method provided additional benefits that supported self-reports and filled some gaps in the research study that could not be completed by other means. During the analysis of the survey results, I observed a skewed gender distribution, in favor of male participants. Early research efforts for finding the MMOG gender distribution generally reported higher number of male participants. Yee (2006) conducted series of surveys in which 2,000 to 4,000 participants responded between the years 2000 and 2003. According to those survey results, even if there were percentage fluctuations in demographics among different games, the number female players generally ranged from 9% to 20%. Yee found it hard to interpret the differences because games were different on many dimensions. The analysis of the RuneScape Economics Survey revealed somewhat fewer female players (5%). What were the reasons for this distribution? In order to answer this and similar questions, I posted new forum threads in many of the game forums. Players stimulated a lively discussion via these threads, and I have found an opportunity to answer my questions. Readers may find more information about the gender imbalance in the “Data Collection Settings” section.

3.2. Data Collection Settings

Merrigan and Huston (2008, p61) explain; “*the data collection settings are the places where observations, self-reports, other-reports, and communicative artifacts are gathered or found.*” During this research study, I collected most of the non-archival data, such as survey results, online. Online data collection brings both advantages and disadvantages to research studies.

3.2.1 Advantages of Online Data Collection

Wood, Griffiths, and Eatough (2004) describe the benefits of online data collection as accessibility, easy administration, cost reduction, increased level of participant honesty, reaching a global pool of participants, reaching socially unskilled individuals, and increasing recruitment possibilities. Wright (2005) adds a faster the data collection process and breaking the time constraints (participants can attend any time) to the benefits of the online data collection. Since the players of the RuneScape game distributed across the world, using an online survey was practical. In that way, participants answered the survey questions or forum threads whenever and wherever it was convenient for them.

Also, official and unofficial game forums gave an easy access to the target research participants. In the forums, players have already continued to discuss some of the issues that I focus in this thesis. Missing information has been addressed by initiating new forum threads. While discussing in these threads, the voluntary participants were not only informative but also helpful. In most instances, they contributed to the research by giving the name of new information sources, (websites, forums, blogs, etc.) and also shared the survey information with their peers.

3.2.2 Disadvantages of Online Data Collection

Couper (2000) explains the *proliferation effect* of the web surveys by comparing it with popular telemarketing practices of 1970s and 1980s. During the recruitment process of my survey, participants had a difficulty of understanding the research concept or believing the authenticity of the research efforts. In many instances, I had to explain the

purpose of my research and details about participant rights in order to convince them that I was neither gathering data for marketing purposes nor pursuing commercial interests supported by an external third party. Providing an official consent form that explains study processes, participant rights, and contact information helped me convince players to participate in the survey. Also, I obtained a written permission from the forum moderators before posting the survey in their forums. In most cases, forum moderators also announced their permission by informing the forum members within the same thread.

Wood et al. (2004) explain one of the biggest handicaps of the online data collection as *validity*, “*the researcher cannot always be sure that people are who they say they are, or that people are answering truthfully.*” I believe that validity may be an issue in almost all self-reported data-collection methods. From one perspective, face-to-face collection methods have superiority to online methods. Demographic data, such as gender and age, are apparent to the researcher in a face-to-face setting. Non-textual data such as body language, facial expressions, and gestures can be collected more accurately when visual contact is involved. However, participants’ answer to the non-demographic research questions may also be more honest in locations where the researcher does not physically exist. Since I was not collecting any physical data, face-to-face data collection was not required.

Couper (2000) compares web-based surveys to a double-edged sword for the survey industry. He explains four major sources of error in surveys as *coverage*, *sampling*,

response, and *measurement* errors. According to Couper, the *coverage error* arises from a mismatch between the target population (set of the population that the researcher wishes to study) and the frame population (set of the population before the selection of the sample). The important issue is the size of the difference between the covered population and the uncovered population in a survey. For example, RuneScape players who did not use the selected forums during my survey period were within the target population (all RuneScape players) but not within the frame of players who read RuneScape forums; thus, they were not aware of my survey and necessarily fall into the uncovered population.

Sampling error appears, since all of the frame population can not be measured. Every selection procedure eliminates some individuals from the picture. As I explained in section 3.1., the survey had an imbalance of male respondents. Based on my observations as a member of RuneScape and on the game forums, I know that female players are present in the game. Their numbers are probably higher than it appears in my survey results, but, they are generally less vocal in the community. When I asked the reasons for this low profile, female players mentioned their main reason was avoiding sexist approaches in the game. Also, females want to be part of groups that are generally dominated by males, and as a result, they impersonate males. The inclusive reasons of this low female representation could be understood via asking some additional questions, but it was beyond the goal of this research study.

The third type of error for surveys can be explained as the *response, or the non-response rate*. Couper mentions that the lack of motivation incentives, technical difficulties, and confidentiality concerns leads to lower response rates in online surveys. I add survey design to these reasons. In some instances, some participants who claimed (in forum threads) to start my survey mentioned that the survey was too long, some questions appeared repetitive, and participants had no option to skip questions. That caused them to quit the survey before answering all of the questions. Also, since their actual avatar (virtual representation of the player in the game) name was being asked at the beginning of the survey, they concerned about their privacy. However, collecting avatar names was an intended choice that allowed me to search for additional data (public information provided by the game designers) from the official game website, such as high scores in skill achievements.

The final type of error, *measurement error*, is defined by Couper as the deviation of the answers of respondents from their true values of measure. Since the online surveys are self-administrated, participants may not ask for any clarification regarding the survey questions they don't understand. Their answers are limited to their interpretation ability and motivation. In order to eliminate this error, I tried to choose the wordings of research questions carefully, provide examples where applicable, and tested the survey questions by conducting a pilot study before the actual study. Also, I used open-ended questions and the "other" option in questions in order to encourage participants.

3.3. Conclusion

Inspired by Merrigan and Huston (2008), I used four different methods in my thesis: *texts*, *direct observations*, *self-reports*, and *other reports*. These four methods complemented each other and helped me to deliver more comprehensive and versatile answers to my research questions.

I established main definitions, learned about previous studies and gaps in the literature during my review of existing *texts*. I learned that virtual economics is by and large an understudied research subject and only a handful of research articles about RuneScape have been published so far. During my literature review, I also found out that most of the existing studies of virtual economics are based on direct observation.

Being a paying member of RuneScape was useful for gaining a first-hand experience of the game, accessing more in-depth information, collecting in-game data, and realizing the changes in time. While *direct observation* brought these advantages, it was subjective and insufficient for understanding player perceptions.

Creating a survey for players revealed their understanding of virtual world economies as well as real world economies as a *self-report*. Based on my survey findings, I had a chance to compare my ideas with other players' ideas. I conducted my survey online. Although online data collection has several known weaknesses (e.g., players' doubts of research authenticity, validity, coverage error, sampling error, response error, and measurement error), the strengths (e.g., accessibility, easy administration, cost reduction,

increased level of player honesty, reaching a global pool of participants, reaching socially unskilled individuals, increasing recruitment, faster data collection, and breaking time constraints) overruled the weaknesses. Since RuneScape is an online game, reaching survey participants online made sense as well. I explain my survey methodology more in depth in Chapter 7.

Finally, I completed various missing information by reading game forums, initiating forum threads, and occasionally using personal e-mail function of forums. With the *other-reports* method, I learned players' ideas about the game features that they can not control but affect them. Since I am a RuneScape player as well, I was able to compare my reaction to the changes in the game, initiated by the game developer, with the other players' reactions.

All these four methods carried my research from a critical study to an interpretive study, reduced bias, and increased objectivity. Overall, I found that the combination of the four methods was the most efficient approach to answer my research questions. The next chapter focuses on the game play in RuneScape.

CHAPTER 4

GAME PLAYING IN RUNESCAPE

RuneScape has been on the market since 2001. The game has undergone two major updates and countless minor updates in the last eight years. The current version of the game has complex features that can be mastered in months. Many game playing features that I explain in this chapter may be familiar to readers who have played MMOGs before. However, if they haven't specifically played RuneScape, they may still find this chapter valuable. I also expect that some readers may have never played an MMOG, but they have an interest in economic relationships in different media. This chapter gives the necessary toolkit to understand the RuneScape game play and prepare all readers for more advanced chapters that focus on RuneScape economy.

In this chapter, I draw a brief picture of the RuneScape world, or *Gielinor*, by summarizing the main characteristics of the game. In particular, I focus on seven features: tutorial, skills, geography, city life and population, transportation, quests, social life and interactivity.

4.1. Tutorial

When I compare the RuneScape world characteristics to the real world, I would say that RuneScape represents medieval life when knights and castles surrounded the world, and

economic activities were mainly labor intensive such as farming, trading, fishing, and smithing.

At the very beginning of the game, players determine their avatar's appearance by selecting gender, skin color, and clothes. This avatar does not need to be aligned with the players' actual appearance, but may represent what they would like to be.

The game starts at the *Tutorial Island* where players learn about the basic game interface, movement options, skills, and interaction. Players may interact with other players or non-player characters (NPCs - avatars that are programmed by the game developers to perform certain tasks/roles in the game). After talking to non-player characters and completing the given tasks, players earn some virtual items including an axe, tinderbox, fishing net, shrimp, bucket, pot, bread, pickaxe, dagger, sword, shield, short-bow, arrows, and numerous runes.³³ The player can view these items from the in-game inventory box at any time.

RuneScape tasks are derived from real life experiences. For example, if players need to eat food, they have to find the food first. At that point, players may fish in a small pond to catch shrimps with a small fishing net. To cook shrimps, they need some kind of fire, so they have to find a hatchet and cut a tree. Logs can be lit using a tinderbox, and shrimp may be cooked over the fire. During the cooking process, players may burn the food, just as in real life. By completing these tasks, players earn skill points (or experience points,

³³ Encarta Dictionary, http://encarta.msn.com/dictionary_/RUNE.html, Accessed: September 12, 2008, Rune: A mysterious symbol, inscription, or incantation, especially one with supposed magical power. Cambridge Advanced Learner's Dictionary, http://dictionary.cambridge.org/define_b.asp?key=69175&dict=CALD, Accessed: September 12, 2008, Rune: Any of the letters of an ancient alphabet cut into stone or wood in the past by the people of northern Europe, or any similar mark with a secret or magic meaning.

XP in short) in several categories: fishing skill (catching shrimp), woodcutting skill (cutting logs), and cooking skill (cooking shrimps on the log fire).

In the later stages of the tutorial, NPC instructors give players a pickaxe for mining. Players retrieve a bronze bar by mining tin and copper ores and smelting them in the furnace. Bronze bar can be hammered on the anvil to make a bronze dagger. These activities give players mining and smithing XP.

In the Tutorial Island, players also learn how to fight. Combat skills are the most important skills for survival in the game. Swords, shields, bows, arrows, and magical spells can be used to defeat enemies. Each type of enemy has different strengths and weaknesses. Finding the correct weapon and using the appropriate attack and defense techniques increase success in combat. Although players may kill NPCs throughout the entire game map, player vs. player (PvP) combat is either allowed in specially designed mini-games (e.g., Duel Arena) or in PvP worlds, which is a recent addition to the game in October 2008. This restriction gives the newbie a chance of survival against experienced players.

After finishing the 30-minute tutorial, players are teleported to the mainland, to the town of Lumbrigde. They keep the items they earned through the tutorial, plus 25 gold pieces (GP) in their bank account. At that point, all of the skills points of the new players are set to level one.

Lumbrigde may seem confusing to the new players. The starting point is the courtyard of Lumbrigde Castle where all of the recently created avatars are summoned, some recently killed experienced users are resurrected and some NPCs are walking around. Most newbies can not distinguish between the real players and NPCs.

After this point, players perform variety of activities, including walking around, observing the neighborhood, interacting with other players and NPCs, starting a quest, focusing on skill-related activities or killing NPCs.

4.2. Skills

Skills are basically a measurement of the avatar's development in most of the video games. Higher skill points indicate increasing abilities of all areas. Avatars that have higher XP can wear more powerful weapons and clothes and gain access to specific areas of the game. They generally have more gold pieces to spend on items.

As of July 2009, RuneScape players may work on 24 different skills in which 15 of them are available for free users and 9 skills are for members-only. Free skills can be listed as attack, strength, defense, range, prayer, magic, runecraft, hitpoints, crafting, mining, smithing, fishing, cooking, firemaking, and woodcutting. Members can develop themselves in all free skills plus agility, herblore, thieving, fletching, slayer, farming, summoning, construction, and hunter. The stats menu (Figure 4.1) shows skill levels that players have attained in each of the skills in the game interface.



Figure 4.1: RuneScape Stats Interface (Source: www.runescape.com, Accessed: June 25, 2009)

While some players systematically work on the skills by spending a great amount of time whenever they login into the game, other players prefer a more casual approach by focusing on the skills when they are required. Regardless of the approach followed by players, the logical structure of the MMORPGs generally forces players to spend some time for leveling. Leveling provides an achievement sense to the player and loyalty to the game. Since MMORPG business model is built on a monthly fee basis, leveling is encouraged by the game design. Figure 4.2 shows the amount of experience required for each level and the percentage increase in experience by each level.

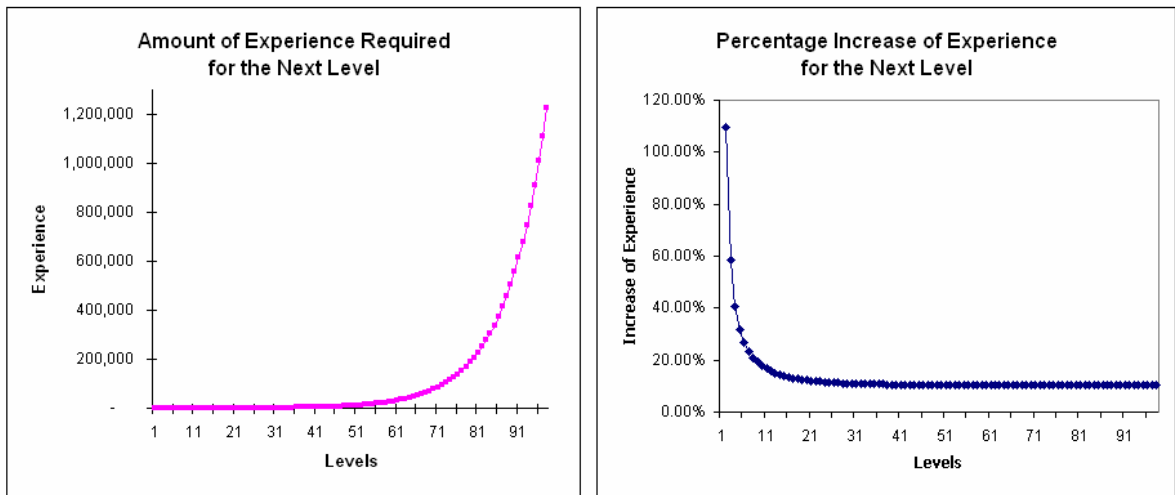


Figure 4.2: Skill Improvement ³⁴

RuneScape players start the game with skill level of 1 and aim to increase this level up to the highest level of 99. Players have to accumulate a certain amount of experience in order to proceed to the next skill level. The amount of experience needed to switch from one level to another exponentially increases as players increase their level as seen in Figure 4.2-left side. For example; the amount of experience needed is 83; 6,471, and 1,228,825 to jump from level 1 to level 2, from level 45 to level 46 and from level 98 to

³⁴ I created these graphs based on skill calculators in Salmoneus website, <http://runescape.salmoneus.net/calculators/>, Accessed: September 18, 2008

level 99, respectively. As Figure 4.2- right side shows, skill increase is relatively easy at the beginning of the game with a decreasing exponential trend through the end of the game.

4.3. Geography

The RuneScape game map (see Figure 4.3) shows several resemblances to the real world, as it is somewhat a deformed version of the world map. *Gielinor* is divided into 10 major regions that are *Feldip Hills* (South America), *Karamja* (Australia), *Kharidian Desert* (Africa), *Kingdom of Asgarnia* (western part of Europe), *Kingdom of Kandarin* (eastern part of North America), *Kingdom of Keldagrím*, *Kingdom of Misthalin* (eastern part of Europe), *Morytania* (Asia), *Tirannwn* (western part of North America), and *Wilderness* (Russia). *Miscellania* (Greenland), *Lunar Isle*, *Fremennik Isles*, *Pirates Cove*, *Waterbirth Island*, *Dragontooth Island*, *Moss Le`Harmless*, *Harmony*, *Crandor*, *Entrana*, *Ape Atoll*, *Void Knights' Post* and *Crash Island* can be considered as the islands on the map. Large seas, rivers and mountains separate regions.



Figure 4.3: RuneScape Concept Map (Source: www.runescape.com, Accessed: June 20, 2009)

The main geographical formation in the RuneScape world is grassy plains. High mountains are rarely seen. *Kharidian* area includes a large desert, northwest part of *Wilderness* is surrounded by ice, and *Karamja Island* shows tropical characteristics.

4.4. City Life and Population

RuneScape regions are populated with many cities. Each city or settlement contains numerous buildings that either are used as residential or as stores by NPCs. Table 4.1 shows a complete list of different building types in RuneScape.

Table 4.1: Building Types in RuneScape

Shopping	Shopping- Accessories	Shopping- Clothes	Agricultural
Axe Shop	Amulet Shop	Chainmail Shop	Brewery
Candle Shop	Archery Shop	Clothes Shop	Farming Shop
Cookery Shop	Gem Shop	Loom	Spice Shop
Crafting Shop	Helmet Shop	Platebody Shop	Vegetable Store
Fishing Shop	Jewelery	Platelegs Shop	Windmill
Fur Trader	Mace Shop	Skirt Shop	
General Store	Scimitar Shop		Industrial
Magic Shop	Shield Shop	Food&Drink	Anvil
Mining Shop	Staff Shop	Cooking Range	Furnace
Silk Trader	Sword Shop	Food Shop	Mining Site
Silver Shop		Kebab Seller	Potters Wheel
	Personal Care	Pub/Bar	Spinning Wheel
Other	Hair Dresser	Water Source	Tannery
Agility Training	Makeover Mage		
Combat Training		Health	Financial
Dungeon	Religious	Apothecary	Bank
	Altar	Herbalist	

Castles, monasteries, fishing spots, bridges, farming areas, and large statues are dispersed around RuneScape just as in the medieval city life in real world. Roads with pedestrian traffic connect cities.

RuneScape population is measured with number of players playing the game at any point in time. Game structure supports 2,000 players in each server and the number of players on every server change from time to time. As of June 2009, Jagex supports 171 servers; therefore, *Gielinor*'s maximum population is equal to 342,000.³⁵

Along with the players, countless NPCs (non-player characters) are found in the game. Some of them are harmless individuals, for instance, shopkeepers, farmers and quest initiators. Some type of NPCs such as chickens may show hostile behavior if players distract them. Other NPCs are programmed as warriors. Skeletons, ghosts and demons attack anybody in their sphere of influence.

4.5. Transportation

RuneScape citizens may enjoy different types of transportation within the game. The most common means of transportation ways are, unsurprisingly, walking and running. Since the free map is a limited portion of the full game map, walking and running are the most preferable way of traveling for free users. Players can travel faster by running; however running drains energy and after a short period of time players should rest in order to restore their energy.

Unlike the real world, teleportation is another way of transportation in *Gielinor*. Gaining certain magical skills and using some set of runes, players travel from anyplace to pre-determined teleport points. Spirit trees and portals also serve as teleportation points.

³⁵ RuneScape, www.runescape.com, Accessed: June 2, 2009

Additionally, specific kinds of rings and amulets allow players who wear them to teleport.

Gnome Airlines, a free transportation service provided by gnomes, serves members after they complete a specific quest. However, their service area does not cover the entire game map. For longer-distance journeys, players may use conveniently located seaports, with a fee. Another interesting method of traveling is using a human-operated cart in *Karamja Island*. After completing a quest and paying some fee to the owner, players can travel on the island by this cart. In the underground *Kingdom of Keldagrím*, players use the rail system that provides transportation to all major dwarf settlements. Finally, probably the most authentic transportation method, the Magic Carpet, is available in the *Kharidian Desert* for the travelers who want to prevent deadly sunrays.

4.6. Quests

Quests can be defined as some pre-programmed tasks, usually accompanied with a narrative story that may be achieved by players who receive a reward at the end. While some quests involve puzzle solving and logic skills, other quests focus on pure skill development.

A typical RuneScape quest starts by talking to a non-player character (NPC) and involves series of duties including finding an item, talking to another NPC, cooking food, or collecting keys. Quest duration may differ from 30 minutes to several days depending on the difficulty of the task. After completing each quest, players are rewarded with money, jewelry, experience points (XP) in skills, access to some previously restricted areas, or

wearing valuable items. By July 2009, 18 free quests and 136 members-only quests serve role-playing enthusiasts within RuneScape.³⁶

4.7. Social Life and Interactivity

RuneScape involves a large amount of interactivity both between players vs. players and between players vs. non-player characters. Players may talk to each other using the in-game text base messaging systems. RuneScape chat interface includes:

- **Public chat:** Open to all users. A public messaging system in which each player can read and respond to the messages initiated by the nearby players.
- **Private chat:** From one player to another, for private messages only.
- **Clan chat:** A private channel for a group of players who belong to the same clan.

Every conversation typed in the keyboard appears as a text message in the chat interface. Text display can be switch on and off, depending on players' preference.

Players can assign "friend" status to other players simply typing their avatar name in a specific area. After establishing friend status, players may send/receive private messages to/from their friends. Also, players may track their friends' availability status. If friends are online at the same server, they appear as a "green spots" on the mini-map. A yellow color indicates online friends who are in different servers and red color is for offline friends. Players can prevent undesired contact from other players by adding their name to the ignore list. If players add someone to the ignore list, the blocked player will not able to talk to that player or send any form of message to her/him.

³⁶ RuneScape, http://www.runescape.com/kbase/viewcategory.ws?cat_id=817, http://www.runescape.com/kbase/viewcategory.ws?cat_id=818, Accessed: July 7, 2009

The assist system is a game feature that grants players a temporary usage of someone else's skill levels. With this system, naive players achieve tasks that they can not normally complete by themselves. Earlier, when naive players wanted to perform a difficult task, such as fletching a powerful bow, they had to transfer the raw materials to a more experienced player. However, this system created many security issues; for example, some experienced players haven't returned the item back even though they were supposed to. With the assist system, items don't leave the inexperienced owner's inventory and the experienced player receives the experience points by helping. This system increases game interactivity since the experienced player can not perform other activities while helping the naive one, except for relaxing and chatting.

Another interactivity option for players is to join a clan. Clans are large player groups that generally share common objectives in the game. They play together; achieve tasks, and quests. RuneScape offers a special communication function for the clan members, clan chat. Clan chat provides an uninterrupted communication platform for its members, also allows strategy exchange in a private environment.

Most of the real social life characteristics may be observed in RuneScape social life including friendship, generosity, love, dislike, willingness to succeed, blandishment, jealousy, and persuasion etc. *"These communications allow social interactions that are not a simulation of human interactions; they are human interactions, merely extended into a new forum"* (Castronova, 2001). Also, many other forms of interactivity exist out of the game environment. Players often become members of the official and unofficial game forums, in which they participate in lively discussions, and share their ideas about the game.

4.8. Conclusion

I introduced the basic features of RuneScape, specifically: tutorial, skills, geography, city life and population, transportation, quests, social life and interactivity in this chapter.

Topped off a bit of fantasy, the medieval life in RuneScape shows both similarities and differences compared to the real world. Social interaction, skill development, transportation, geography, and quests are similar, conceptually. However, real life doesn't start with a tutorial, equal skills and wealth for everybody.

The aim of this chapter was to familiarize the readers, especially the ones who have never played MMOGs, with the RuneScape world. As a result, the economic features of RuneScape introduced in the next chapter would make more sense.

CHAPTER 5

BASICS OF THE RUNESCAPE ECONOMY

While defeating enemies, accomplishing quests, and improving their skills in the medieval world of fantasy, adventurers in RuneScape also engage in economic activities. In this chapter, I take a snapshot of the RuneScape economy, describe the biggest actors and mechanisms that take place in this picture and reveal how the virtual economy works. This chapter evaluates the RuneScape economy internally.

My objective for this chapter is to answer one of my research questions concerning the similarities and differences between virtual economies and real world economies. I explain selected fundamental economic concepts, such as, currency, banks, and trade in RuneScape. I introduce player vs. environment (PvE) trade, player vs. player (PvP) trade, Grand Exchange (GE), item lending, wholesale (bank sale), and the real money trade in the trade section. I also discuss several macroeconomic concepts including production and consumption and some microeconomic concepts, such as, price, profit, income and expense.

5.1. Currency

Before the invention of money, people either donated goods to each other or bartered (exchanging goods/services with other goods/services). Later, people used some goods, such as gold, shells, and barley, as the medium of exchange, which was referred as commodity money. In 600 B.C., the first official currency was minted from silver and gold in western Anatolia, Lydia. In 960, the Song Dynasty in China printed the first

commonly used banknotes. Western societies did not print their first banknotes until more than 700 years later. For example, Stockholm Banco was the first European bank to print paper banknotes in 1661. For a long time, the money supply was linked to the equal amounts of commodities, usually in forms of precious metals, in the reserve. Finally, in the 20th century, governments decided to break the link between banknotes and precious metals, which created fiat money³⁷ (Davies, 2002). Traditionally, money has four main functions in the economy: ³⁸

- **Medium of exchange:** Money is the medium of exchange used by buyers and sellers to swap goods and services.
- **Measure of value:** Money is the common measurement unit that states the comparative value of goods and services.
- **Store of value:** Money stores a value that can be used for future consumption.
- **Standard of deferred payment:** Money is the unit for defining the value of the future payments of current purchases.

Moving from this historical perspective back to RuneScape, I observe that the main exchange unit in RuneScape is simply “coins,” more commonly referred to as “gold pieces” (GPs). All players have to carry reasonable amount of GPs in their inventory box for their daily expenses. Players can carry any amount of GPs in their inventory box.

³⁷ Encarta Dictionary, <http://encarta.msn.com/encnet/refpages/search.aspx?q=fiat+money>, Accessed: July 15, 2009, Fiat Money: Type of currency issued by governments as legal tender, the value of which is based solely on decree or law rather than on actual coin or precious-metal reserves (called specie), and the redemption of which is not guaranteed by the government.

³⁸ Wikipedia, <http://en.wikipedia.org/wiki/Money>, Accessed: June 21, 2009

While GPs are the most common currency in *Gielinor*, alternative trading mediums, such as tokkul, trading sticks, and tickets are also being used in some areas within the game world. Figure 5.1 shows the various types of currency in RuneScape.



Figure 5.1: RuneScape Currency Types (Source: <http://runescape.wikia.com/wiki/Currency>, Accessed: June 25, 2009)

Tokkul, a relatively new currency in RuneScape, can only be used in *TzHaar City* stores that are located underneath the *Karamja Volcano*. To get this currency, players may kill NPC monsters and acquire their drops, may mine ores and sell them to the store, or may beat competitors in the championship and get the reward as Tokkul. Tokkul looks like regular GPs but is made from obsidian and not tradable among players or in the Grand Exchange.

Trading sticks are the official currency of the *Tai Bwo Wannai* jungle village. Players are paid with trading sticks when they help villagers with cleaning the wild jungle and killing poisonous spiders. Players can barter trading sticks from the village store. Finally, players can buy trading sticks from the Grand Exchange or other players with GPs. As of August 1, 2009, the market price for 1 trading stick equals to 6GPs in the Grand Exchange.

Tickets and tokens are obtained by participating in a variety of activities and mini games within RuneScape. Players usually collect the tickets and tokens and buy some items or use it as an experience boost. Since tickets and tokens are used for purchasing experience points, they are not tradable among players. The exception is the archery ticket that can only be used to the purchase archery items. As of August 1, 2009, the market price for 1 archery ticket equals to 12GPs in the Grand Exchange.

While many types of currencies seem to be used in RuneScape, the GPs are the dominant type of currency. Other currencies are either used in a very limited area, in limited amounts, or used only for buying specific items. Players can not exchange GPs with other currencies, except trading sticks and archery tickets. Therefore, for the remainder of this thesis, GPs are referred to as the only RuneScape money or currency for simplicity.

GPs bear characteristics of fiat money. As I explain in the later sections of this thesis, while many banks and gold mines are found in *Gielinor*, no relationship exists between gold resources and the money supply. The game developers by means of programming issue most of the GPs. Additionally, GPs can be created by players with a special magic, alchemy, which places players in a situation of being a money supplier.

When I try to find evidences of the traditional functions of money in RuneScape, GPs seem to represent three of the four characteristics of real money. First, GPs are definitely a commonly accepted and trusted medium of exchange in RuneScape. Second, GPs allow players to measure the value of virtual items and services relative to each other. Third, players store their wealth in the form of GPs, and they can use it for future purchases. On the other hand, GPs can not be used as a means for making deferred payments because RuneScape doesn't offer credits, loans, installment plans or interest rates. All trades are finalized either immediately (PvP or PvE) or, in extreme cases, in a couple of days (Grand Exchange).

5.2. Banks

Located particularly in the big cities, banks are one of the most preferred gathering points among RuneScape residents. Bank of RuneScape has many branches around *Gielinor*. They offer deposits, withdrawals, Grand Exchange collection, and pin setup services. For

security reasons, players use a bank pin system that protects their items from unauthorized access. Bank pin is a 4-digit number and can be obtained by talking to the bankers. Once a pin is set for an account, players have to type these specific numbers on the keyboard in order to access their account.

Bank of RuneScape does not offer any interest rate or loans for its customers. No account maintenance fee or any other type of service fee is applied for their safekeeping services. As seen in Figure 5.2, a typical branch includes many bank booths that are served by bankers. Players interact with bankers by clicking their avatar.



Figure 5.2: Bank of RuneScape, Varrock Main Branch
(Source: www.runescape.com, Accessed: June 25, 2009)

Players may put up to 28 items in their inventory (a bag that players carry all the time). Since their inventory has limited space, players store the rest of their money as well as commodities in the banks as a means of safekeeping. If players die at any point in the game or log off from the server, their belongings in the bank account are saved. When players resurrect at any time, they still can access to the belongings in their bank account.

Bank accounts also offer a limited space (496 slots for members and 68 slots for free users), so players should strategically divide their belongings between their inventory and their bank account. Players sometimes painfully realize that an important item required for a task is forgotten in the bank account. On the contrary, if players walk around with a full inventory, they may miss the chance to obtain valuables that are dropped by an NPC. Players also do not want to risk losing their belongings that are in the inventory by dying in an unexpected attack.

In a typical bank account, belongings such as money, clothes, and weapons are represented with little pictures, as seen in Figure 5.3, left side. If players store more than one of the same kinds of commodity, they accumulate and the number of stored items can be seen right next to the item picture. Players can withdraw or deposit any item as a “note” or an “item.” A note is a piece of paper that shows the picture of the related item and also the number of the items held in the account. For example, players can withdraw five loaves of bread either as an item or as a bread note. If players withdraw it as an item, five loaves of bread occupy five different empty slots in the inventory box. However, if players withdraw it as a note, it occupies only one empty slot in the inventory. Withdrawing an item as a note gives advantage of inventory space for the players, so they can trade large numbers of items easily. All notes can be traded for the item that it carries in any branch of the Bank of RuneScape.



Figure 5.3: A Typical Bank Account and the Inventory of a Player (Source: www.runescape.com, Accessed: June 18, 2009)

RuneScape also offers deposit chests and deposit boxes for safekeeping items. Deposit chests are a small version of a regular bank branch. They are located in places in which players need an immediate access to the bank account without using the full building facility. On the other hand, deposit chests allow only item deposit.

As I have explained so far, banks in RuneScape are a very simplified version of the real world banks. Contrary to their real world equivalents, their functions in the economy do not go further than a central way of safekeeping.

5.3. Trade

Every RuneScape player is a consumer, meaning that they need a variety of virtual items to pursue their virtual life. Players may produce the desired items, or they may simply gather it by trading. Clothes, food, arms, potions, and jewelry are some examples of the commonly traded items. Trading is also one of the best moneymaking activities in RuneScape. A large number of players gain their wealth with arbitrage, which is buying items when prices are low and selling them when prices are high. RuneScape also offers item lending between players as a separate type of trade.

The following section covers different trade techniques in RuneScape. Trading with NPCs, trading with other players, trading in the Grand Exchange, item lending, bank sale, and the real money trade, which is exchanging virtual items for real money, are discussed in this section.

5.3.1. Trading with NPCs (PvE Trade)

NPC trade (player vs. environment trade, or PvE) takes place either in general stores or in specialty shops. In every store, one or two shopkeepers serve all players at the same time. General stores buy/sell all kind of items, whereas specialty shops buy/sell only certain type of items. For example, players can purchase swordfish, shrimp, fishing net, bait, or harpoons from a fishing specialty shop, but not a sword.

Most stores keep two different types of inventory simultaneously—the main stock and the player stock—which are separated by tabs in the interface. The main stock consists of ordinary items, such as pot, jug, and tinderbox, which are supplied by the game code in an unlimited fashion, while player stock only consists of items that are sold to the store by players. Since main stock items are provided infinitely, players can always rely on their supply. That is why items in the main stock are generally more expensive than the player stock. Player stock contents, amounts, and prices vary from one general store to another and even at the same store from time to time, since this number depends on players' buying/selling preferences. Numbers of items in the player stock constantly change, especially in the crowded stores.

Players can make transactions of 1, 5, 10 or 50 units in stores. If they want to buy/sell more, they have to follow the same steps again until the item is out of stock or the shop inventory/their inventory is full. Moreover, the main stock inventory permits transactions with a custom number of units (e.g., x units). General stores can buy an infinite number

of any types of item as long as the store's dialog box has space available. However specialty shops do not accept items that are not related to their specialty.

Players select the "trade" option by right clicking on the shopkeeper or shop assistant NPCs' avatar to initiate trading. Item pictures and number of items that are currently kept in the store can be viewed in a dialog box, as seen in Figure 5.4, left side. When players click on the any item in the store, the item information interface (which includes the item price and usage) pops up (Figure 5.4, middle). Additionally, players see their inventory box next to the store's dialog box. In that way, they make sure of having enough money and empty slots for buying and enough items for selling.



Figure 5.4: Varrock General Store Player Stock, Item Information, and Player Inventory (Source: www.runescape.com, Accessed: June 25, 2009)

Even though an item is not in demand in the PvP market, it may still be traded in the NPC operated stores. This system gives players security: as long as they have items, they can exchange it with cash.

5.3.2. Trading with Other Players (PvP Trade)

Player vs. player (PvP) trade includes all trading activities that are performed between two players without any mediator. In PvP trade, players exchange virtual items either for gold pieces or for other items. Readers may think that bartering³⁹ is an old method of trading, especially in today's highly monetary world; however, barter was very popular in RuneScape, before the introduction of the Grand Exchange.

PvP trade requires more attention compared to the PvE trade. In PvP trade, players might end up with a loss if they don't know the actual market price of that specific item. Profit is generally high if players try to sell a rare item. Otherwise players must sell large number of more common items in order to make equal profits.

Players who want to practice PvP trading usually stand at crowded places such as bank courtyards or public squares and shout, "sell strength ammy 2k!" This means the player is selling "an amulet of strength" for 2,000 gold pieces. Sooner or later a buyer approaches, and the seller sees a "player x wishes to trade with you" message on the general messaging box. If the seller is willing to trade with the other player, they make a right click on the other player's avatar, select the "trade" option and the trading interface appear, as seen in Figure 5.5. In this interface, players see each other's offerings side by side. Players can trade GPs vs. goods or goods vs. goods in this trade. Any item is tradable as long as the parties are happy with the offerings (e.g., a player may be pleased

³⁹ Investopedia, <http://www.investopedia.com/terms/b/barter.asp>, Accessed: April 22, 2009, Bartering: The act of trading goods and services between two or more parties without the use of money. Bartering benefits companies and countries that see a mutual benefit in exchanging goods and services rather than cash, and it also enables those who are lacking "hard currency" to obtain goods and services. Although history of bartering goes back to very early ages, it has dissipated over the years by the invention of money. However, there is still limited practice of bartering observed in today's world.

to trade a mithril chain body in return for 10 lobsters). Players can add or remove items from the trading interface until they are satisfied with the trade conditions. Afterwards, clicking on the “accept” button, players see the final confirmation screen. Pressing the “accept” button again completes the trading process.



Figure 5.5: PvP Trading Screens (Source: http://www.runescape.com/viewarticle.ws?article_id=1998#introduction, Accessed: June 22, 2009)

In December 2007, Jagex introduced a set of rules to prevent real money trade and player scams in trading. Balanced trade (or trading limits) was one of the solutions. Balanced trade suggests that two players that participate in the trade must exchange items that have roughly similar values. Initially, Jagex announced a 3,000GP gap between the buyers’ price and the sellers’ price for every 15 minutes in the game. Later this margin increased so that the trading limit starts at 5,000GP for all players and increases up to 10,000GP for free users and 60,000GP for members for every 15 minutes, depending on the number of quests that players have completed.

The balanced trade update received different reactions from players in 2007. Players who were not interested in large amounts of trade and who did not follow item prices embraced the policy immediately. However, the policy also narrowed the PvP gifts and reduced helping among players. Additionally, it limited the real money trade (RMT) as Jagex intended, since players who sell virtual items for real money can not transfer items to the buyers for nothing. On January 3, 2008, shortly after the announcement of trading

players can do other activities in the game. Most GE orders are realized almost immediately; however, players may have to wait a few minutes or hours for orders to be complete for other items.

GE prices follow simple supply and demand rules. Prices increase if more buyers than sellers are in the market or if players start buying an item for higher than the market price. In contrast, if the market has many sellers but few buyers or players start offering less than the market price for an item, the price of this item decreases.

Players can trade in GE with the following simple principles:

- Players place GPs (if buyer) or items (if seller) in their inventory.
- They go to the GE and click on the clerk avatars.
- As seen in Figure 5.7, upper left, players may place their buying or selling bids on 6 different commodities (2 for free users). This screen gives a summary of the current status of all bids. In this example, the player had 3 ongoing selling bids; one was realized, and two were waiting.
- If players want to buy/sell any item, they click either the “buy” or “sell” button in one of the empty slots. The next screen (Figure 5.7, upper right) shows the item details. This player wants to sell 9 strength potions for 1,428GPs each. In this screen, players can change the quantity and determine the price. Players can place their bids in a price margin. The item details screen opens with the “market price” and also lists minimum (floor) and maximum (ceiling) price, which is usually 5% below and above the market price. If the conditions are reasonable, players click the “confirm offer” button.
- The GE computer system matches available bids automatically. Players never see who met their bids. If the offer is realized, players collect either GPs or the item in the next screen (Figure 5.7, lower left). If they are away from the GE, they can pickup

their winnings from any Bank of RuneScape branch. Players can also review their last five transactions from the transaction history screen (Figure 5.7, lower right).



Figure 5.7: Grand Exchange Selling Interface (Source: www.runescape.com, Accessed: June 14, 2009)

Many serious traders and merchant clans regularly follow up the item prices in RuneScape. The official information source for item prices is the Grand Exchange Item Database (GEID), shown in Figure 5.8.



Figure 5.8: Grand Exchange Item Database and Prices of an Individual Item (Source: www.runescape.com, Accessed: June 14, 2009)

Operated on the RuneScape website, GEID is a simple version of modern stock exchange websites (Figure 5.8, left side). Players may find price rises, price drops, the most traded items, and the most valuable traded items in the first screen. They can search for an item, view currently traded items in the sliding bar, and even read a report on the item of the week. When players click on any item name, they are directed to the item details page (Figure 5.8, right side). This page includes the picture and a brief description of the item, market, floor and ceiling prices, and percentage change in the price from the last 30, 90, and 180 days. It also includes a detailed graphic of the price movements. Apart from GEID, players can speak to trading experts (specific NPCs located in the Grand Exchange) to learn about current market prices of specific goods. The Grand Exchange provides many advantages to the RuneScape trading system.

Advantages of the Grand Exchange (GE)

- **Time saving:** Before the introduction of the GE, players had to wait in the trading area to finalize their trading. Now, players focus on other in-game activities while their bids are being processed in the GE.
- **Labor saving:** Earlier, players had to stay in a crowded area and announce their buying/selling requests by typing on the keyboard over and over again, until the transaction started. The GE eliminates this effort.
- **Convenience:** Before the GE, players had to switch servers and find the physical location of buyers/sellers, if they could not find a specific buyer/seller on their own server. The GE connects all of the servers and creates a central market, where players place their bids in one convenient location.
- **Continuity:** The GE is a 24/7 system, which means the placed bids are met even if players are not online. They can retrieve their winning bids or GPs later, when they are online.
- **Reducing Spam:** In the earlier system, market prices were not easy to follow up. Some novice players were targets of item scamming, which is selling an item for a higher-than-the-usual price or buying an item for a lower-than-the-average price. The GE reduces the amount of spam by implementing market, floor, and ceiling prices.
- **More stable and centralized economy:** Along with trade limits and price margins, Jagex now controls the RuneScape economy more efficiently.
- **More transparent market:** With the GE, players track market prices much more easily than before.
- **Decreased the price inflation:** After the GE, many items become easily available, which resulted in an overall decrease in prices.

While benefits of the GE are considerable, this new central trading system brings some disadvantages as well.

Disadvantages of the Grand Exchange (GE)

- ***Decreasing PvP and PvE Trade:*** After the GE, the use of NPC shops and PvP trade greatly decreased. Most shops, even in crowded cities, became dormant, which gives a ghost-town feeling, therefore, decreasing player immersion.
- ***Decreasing Player Interaction:*** Trade has always been a conversation starter that could lead to friendships in the game. Since the GE matches the offers now, most players stopped interacting with other players.
- ***Clan Manipulation:*** A systematic GE made market manipulators' work so easy that large merchant clans appeared everywhere and started to control prices.
- ***Game Play:*** Before the GE, most players independently acquired raw materials and produced finished products that are required for the skill increase or quests. The GE made item gathering so easy that players started to work less and replaced the labor with money.
- ***Destruction of the Free Economy:*** Ceiling/floor prices and trade limits in the GE restricted players' ability to determine true market prices.

5.3.4. Item Lending

Item lending can be considered an extension of balanced trade. Players may lend their items to other players within this system. The lender may charge some fee or not, depending on the relationship with the borrower. The loaned item is returned to the owner after a certain period of time. Item lending is very similar to rent in the real world. In this way, Jagex eliminates some player complaints that balanced trade reduced the opportunity to help other players.

5.3.5. Bank Sale

Bank sale can be described as a type of wholesale or yard sale. When players end up with lots of surplus items in their inventory, they may initiate a “bank sale” operation in order to get rid of the excess items. Bank sale rules are the same as summarized in “trading with other players” section. The only difference is that sellers offer a set of items from their inventory, and then buyers check and indicate which items they are interested in.

5.3.6. Virtual World Trade vs. Real Money Trade

“In 1999, some Ultima Online players began putting their virtual assets on auction at the popular Internet auction site eBay. The word spread and they received bids from other players. When an auction was completed, the payment was carried out using ordinary means such as credit card or check. The two players then met up in the game and the seller handed the auctioned object to the buyer.” Lehdonvirta, Vili (2005)

Real money trade (RMT) or trading virtual assets in return of real payment methods is a new phenomenon in the history of world trade. MMORPG companies have different approaches to this phenomenon. While some companies are strongly against real money trading, others support it. Some game companies, such as Sony (EverQuest), create auction websites to officially promote RMT. Jagex is one of the opposing parties since they approach this issue from an ethical perspective. The company believes that RMT spoils the game balance and provides an unfair advantage to players who participate in it.⁴⁰ The official RuneScape game rules clearly prohibit the real money trading.⁴¹

⁴⁰ RuneScape, <http://www.runescape.com/kbase/view.ws?guid=diary06>, Accessed: June 29, 2009

⁴¹ RuneScape, http://www.runescape.com/rules/rule_real_world_trading.ws, Accessed: June 29, 2009

Since the subject of “virtual asset trading for real money” is discussed in various papers and articles, I do not cover these issues in this thesis. Readers who would like to learn more information on the RMT may refer to the sources I listed in the literature review of this thesis.

5.4. Price

The RuneScape market prices works very similar to real world economics. As a general rule, if a virtual item is common and easily produced in the RuneScape world, its price is low. On the contrary, the price of rare items and items that require high production skills are high.

The Grand Exchange acts as a price stabilizer in the economy. It applies the floor (minimum) and the ceiling (maximum) prices to the items. If supply and demand for a specific item is equal in the market, this item is traded from the market price, which is in between the floor and ceiling price with approximately 5% margin from each side. If the demand increases, the item price approaches to ceiling price, however, never goes above the ceiling price in the same day. On the contrary, if the supply decreases, the item price approaches the floor price, but never goes below the floor price in the same day. After the floor/ceiling price level is reached, items are traded from these flat prices. The item prices are updated once a day based on the average transaction price of each item during the day. In order to prevent arbitrage between GE and NPC stores, GE item prices never rise above stores’ main stock price or fall below the stores’ buying price. Also, many item prices in the stores are updated from time to time to match GE prices.

Item prices in players’ stock may vary from one general store to another general store as well as within the same general store from time to time. If one general store is short in

some items, players' selling price is higher compared to selling these items to another general store that carries them in more quantities. For example if players sell a pickaxe to the general store in Varrock city and no pickaxe is in the player stock at that time, the pickaxe can be sold for 100GP. If players sell the same pickaxe at the same or another general store when 20 pickaxes are in the player stock, they may sell this pickaxe for 50GP. The same rule is valid for buying. Players always have a price advantage for buying from a store that has more of this specific item in stock. Table 5.1 shows buying prices for bronze med helm as a function of its quantity in stock.

Table 5.1: Bronze Med Helm Buying Prices

# of Items in the General Store	Buying Price from the General Store
1	30
2	29
3	29
4	28
5	27
6	26
7	26
8	25
9	24
10	24

Retrieved: July 1, 2009

When players want to sell an item to general stores, general stores tend to offer lower prices for the items that are sold by specialty shops. For instance, a general store pays 50% cheaper than the specialty shop for sword types that are listed in Table 5.2.

Table 5.2: Comparison of GS and Specialty Shop Prices for Different Type of Swords

Item Name	Player's Selling Price to the General Store	Player's Selling Price to the Speciality Store	General Store vs. Speciality Shop Price
Bronze sword	10	15	50%
Bronze longsword	16	24	50%
Iron sword	36	54	50%
Iron longsword	56	84	50%
Steel sword	130	195	50%
Steel longsword	200	300	50%
Mithril sword	338	507	50%
Mithril longsword	520	780	50%
Adamant sword	832	1,248	50%
Adamant longsword	1,280	1,920	50%

Retrieved: July 1, 2009

Therefore, buying from and selling to specialty shops is better if players have a specific item in mind. However, the specialty shops are not as prevalent as general stores and preferred items may be out of stock in the specialty shops, so most of the trade is executed via other means of trade (e.g., general store, PvP or GE).

While trading, players should also consider the rare items phenomenon in prices. Rare items can be defined as limited number of items that can be acquired from certain places in the game and/or at different times during the year. Jagex generally introduces some rare items during the holiday seasons. After the holiday ends, these items become scarce. Also, players can obtain other rare items by slaying very powerful monsters or finishing a quest. Rare items are sometimes not functional as their high price implies. For example, blue party hats are sold from 301.2 million GP as of July 2, 2009. They do not offer any specific benefit to the players; they are purely ornamental, but, since they are rare, they are highly desirable. Although some rare items are not tradable, tradable ones are sold for very high prices.

5.5. Profit

All types of stores work under the profit principles in RuneScape. As seen in Table 5.3, the buying price of any item is always higher than the selling price, so, stores make a profit between the buying and selling price.

Table 5.3: Store Keeper's Profit (Randomly Selected Items)

Item Name	General Store's Selling Price	General Store's Buying Price	Price Differentiation (General Store's Profit)	Price Differentiation (General Store's Profit %)
Bronze battle axe	46	20	26	130%
Cooked tuna	108	48	60	125%
Emerald amulet	1,148	510	638	125%
Goblin mail	36	16	20	125%
Iron platebody	504	224	280	125%
Ruby	1,738	400	1,338	335%
Shrimps	4	2	2	100%

Retrieved: July 1, 2009

After the introduction of GE, store prices of the selected items are fixed to GE prices in order to prevent players from earning a profit between the GE and shop prices. However, players can still make a profit from either production or mercantile activities.

5.5.1. Production for Profit

*“Production refers to the economic process of converting of inputs into outputs and is a field of study in microeconomics.”*⁴² In RuneScape, production means gathering raw materials, processing them and selling the final products. For example, players can cut trees, collect logs, fletch arrows, and sell them in the market. This section especially focuses on production from the profit-making perspective.

⁴² Wikipedia, http://en.wikipedia.org/wiki/Production_theory_basics, Accessed: June 29, 2009

Most of the final products in the game can be produced by more than one method. Players should analyze the costs of different production techniques, in order to make a profit. Let's use a sapphire ring as an example. Sapphire rings consist of two parts, sapphire and gold. Uncut sapphires can be obtained either by mining or by trading. If players use a chisel (obtainable for 20GP from the GE) on uncut sapphires, they ultimately produce cut sapphires. Uncut sapphires and cut sapphires are also sold in general stores, specialty shops, and GE.

For the gold part of the ring, players have to mine gold ore and smelt it in a furnace. The end product from mining gold is gold bars. However, a pickaxe is required for mining activities, and the cheapest pickaxe (bronze) is sold for 8GP in the GE. By smelting the gold bar in a furnace and combining it with a cut sapphire using a ring mould, players produce a sapphire ring. A ring mould can be purchased for 31GP from the GE. Alternatively, players can buy a gold bar from a store and process it in the furnace to make a ring.

As seen in Table 5.4, players can produce a sapphire ring with eight different production techniques and then sell it to the GE. The GE buys sapphire ring for 780 gold pieces, so players can make profit from producing a sapphire ring in three different ways. The last five production types do not give an advantage to the players since the total production costs are over 780 gold pieces. However, trading with NPCs is only one aspect of the RuneScape trading system. Players can find other players who are willing to buy the sapphire ring for more than the cost of production. Also some players have a tremendous amount of wealth. For these players, paying 1,000GP for a sapphire ring is not a problem.

Table 5.4: Sapphire Ring Production Cost by Different Production Techniques

Costs (GP)								
Requirements for Sapphire Ring (Sell Price=780GP)	Production Type 1	Production Type 2	Production Type 3	Production Type 4	Production Type 5	Production Type 6	Production Type 7	Production Type 8
Uncut sapphire	0	0	0	0	894	0	894	894
Sapphire	0	0	523	523	0	523	0	0
Chisel	20	20	0	0	20	0	20	20
Bronze pickaxe	8	0	8	0	8	0	0	0
Ring mould	31	31	31	31	31	31	31	31
Gold Ore	0	514	0	0	0	514	0	514
Gold Bar	0	0	0	271	0	0	271	0
Total Cost (GP)	59	565	562	825	953	1,068	1,216	1,459

Retrieved: July 1, 2009

- Production Type 1) Gaining uncut sapphire free from mining activity, mining gold ore and smelting it in the furnace
- Production Type 2) Gaining uncut sapphire free from mining activity, buying gold ore from GE and smelting it in the furnace
- Production Type 3) Buying sapphire from GE, mining gold ore and smelting it in the furnace
- Production Type 4) Buying sapphire and gold bar from GE and smelting gold bar in the furnace
- Production Type 5) Buying uncut sapphire from GE, mining gold ore and smelting it in the furnace
- Production Type 6) Buying sapphire from GE, buying gold ore and smelting it in the furnace
- Production Type 7) Buying uncut sapphire and gold bar from GE and smelting gold bar in the furnace
- Production Type 8) Buying uncut sapphire and gold ore from GE and smelting it in the furnace

One of the bizarre aspects of the production is that unlike the real world, raw materials cost more than finished materials in RuneScape. As seen in the sapphire ring example, the uncut sapphire (raw material) costs 894GP, the cut sapphire (semi-manufactured) costs 523GP, and the sapphire ring (final product) costs 780GP. The reason for this odd pricing lies in the logic of the “skilling” and money supply. In the game, if the raw materials cost less than the finished products (just as we see in the real life), no players would bother gathering the raw materials from the nature. They would buy them from the GE, process them, and sell them with higher price, which would result with faster profit making and faster increase in skill points. Since game developers want to prevent a rapid increase in skills and huge profits, they determine raw product prices higher than the final products.

5.5.2. Mercantile for Profit

Merchants are professionals who trade goods that they do not produce themselves, with the purpose of making a profit. In RuneScape, some players use mercantile activities as

their main way of making profit. Since the production is a tedious and time-consuming process, merchants usually do not engage in the production process, especially gathering the raw materials.

Merchants may act as individuals or may form large social groups, called mercantile clans, which are discussed in Chapter 6. Individual merchants usually stockpile large numbers of items, wait for prices to rise, and sell them, which results in a profit.

Merchants occasionally hire low-level players for to inexpensively gather raw materials; they process the raw materials and make profit from the finished products.

Merchants have to consider some other game dynamics while they are trying to make profits from their trading. When merchants hold a lot of similar items in their inventory, they do not make the most profit by selling them to the store at once. If they have sufficient time, they may gain more profit by selling these items one by one. For example, if “Store S” has no previous stock of “Item A,” “Merchant M” sells one “Item A” to “Store S” and waits until “Buyer B” purchases it from the store. Then “Merchant M” sells another “Item A” to “Store S.” Since the store holds only one “Item A” in its inventory, the storekeeper has to offer the ceiling price to “Merchant M.” This tactic helps “Merchant M” to maximize the profit from selling “Item A.”

5.6. Income and Expenses

During the tutorial period, players interact with several NPCs who donate different materials to them in the process of teaching game basics. After finishing the Tutorial Island, all players start to the game with roughly the same type and equal number of items in their inventory. If players have dropped or lost items, this number could be less. Occasionally, some players prefer to repeat tutorial steps so they can gain more items.

However, for the newbies, the desire to start the game as soon as possible is generally higher than the desire to earn more items. Most of the newbies do not prefer to spend more time than required in the tutorial section. Instead, they do all tasks just enough to meet the requirements. Thus, when players start the game, they generally have equal opportunity.

Let's assume that all players start the game with same set of items. If they sell all of their items immediately, they earn 251GP from this initial trade. If they want to buy the same items from the general store later, the total cost of these initial items would be 1,161GP (See Table 5.5).

Table 5.5: Initial Item Cash-in and Gaining Prices

No	Item Name	Player's Selling Price to the General Store	Players' Buying Price from the General Store	Price Diffentiation
1	15 mind runes	45	225	400%
2	2 body rune	11	28	155%
3	25 air runes	55	375	582%
4	25 bronze arrows	13	150	1054%
5	4 earth runes	22	64	191%
6	6 water runes	30	96	220%
7	Bronze hatchet	6	14	133%
8	Bronze dagger	4	10	150%
9	Bronze pickaxe	-	8	n/a
10	Bronze sword	10	23	130%
11	Bread	9	32	256%
12	Shrimps	2	4	100%
13	Empty bucket	-	2	n/a
14	Empty pot	-	1	n/a
15	Shortbow	20	45	125%
16	Small fishing net	16	50	213%
17	Tinderbox	-	1	n/a
18	Wooden shield	8	33	313%
Total (GP)		251	1,161	

Retrieved: July 1, 2009

*In order to prevent price bias, all items are bought or sold when there is one item in the shop

In terms of living expenses, one of the biggest expense types in RuneScape is home ownership. Players can buy a house from one of the real estate agents in *Gielinor*. The

basic house costs 5,000GP. Players can add rooms to their house and furnish it as much as they like, using their construction skill. They can even hire a butler and pay a salary to him/her for house keeping services. House improvement requires tremendous amount of GPs. That is why, most of the time, the construction skill is called as the “money sink.” However, in contrast to the real world, players do not pay rent, utility bills, and mortgage for RuneScape houses. Also, players do not need other major properties like a car, computer, television, and telephone in the RuneScape. Accordingly, they don’t have to worry about factors such as bill payments and gas prices in their budgets.

Players still have various expenses. The cost of living generally depends on the items they want to wear, own, and consume. Table 5.6 shows the cost of wearing for two players with different skills levels. The table on the left side includes a rough picture of basic clothing costs for players who have just started the game. They can fully equip their avatars for less than 1,000GP. However, these basic items only station players at the poverty line. The higher the level of achievement for players the more expensive the items they want/need. The table on the right side gives the clothing costs for medium-level players, who can wear rune equipment.

Table 5.6: Clothing Cost

Initial Clothing	Buying Price from the Grand Exchange	Medium-Level Clothing	Buying Price from the Grand Exchange
10 Bronze arrows	60	10 rune arrows	2,370
Leather boots	31	Rune boots	33,246
Cape	28	Team cape	150
Leather gloves	6	Mystic gloves	13,622
Bronze med helm	16	Rune med helm	11,404
Bronze plateleg	66	Rune plateleg	43,189
Brass necklace	13	Games necklace(8)	1,243
Gold ring	372	Ring of duelling(8)	1,637
Wooden shield	33	Rune square shiled	22,936
Bronze platebody	105	Rune platebody	48,514
Shortbow	30	Yew shortbow	402
Total Cost(GP)	760	Total Cost(GP)	178,713

Retrieved: July 1, 2009

Other expenses in RuneScape are quest-related expenses, item repair costs, and various fees, for instance gate-access fees, transportation fees and NPC service fees. I explain these expenses in detail in the Chapter 6, under money drains section.

Players can earn income by several methods:

- Selling items to other players and NPCs
- Killing other players/NPCs and collecting their GPs
- Using theft skills to steal money from NPCs
- Completing quests and getting the reward money
- Using alchemy spells to turn items into GPs
- Acquiring gold pieces from re-spawn locations
- Working for other players and earning salary (Some high-level players tend to hire other players to help them for some time-consuming tasks. In return of this help, they are willing to pay some salary.)
- Selling information to newbies (Some inexperienced players are willing to pay GPs in order to get various kinds of information about unknown places and quests, etc. After the balanced trade rule, selling information for GPs has been very limited.
- Accepting donations from other players (Donation practice is limited after the balanced trade rule)
- Offering a valuable item at loan for a limited time

Contrary to real life, none of incomes and expenses is considered regular. They exist as long as players choose to participate in activities that generate income or require disbursement. RuneScape does not penalize players for not fulfilling their hunger or housing needs. In the game, no people actually starve or die. Players can maintain a decent life with simple clothes. If they don't want to participate in killing activities, they

don't need to buy armor, weapons, or even food. They can perform non-combat skills such as woodcutting, fishing, and farming, sell products acquired by performing these skills, and have a long and peaceful life.

5.7. Conclusion

In this chapter, I focused on the economic features within the RuneScape economy, including the currency system, the role of banks in the economic system, trade methods, price, profit, income, and expenses. Referring to one of my subordinate research questions, I found both similarities and differences in the virtual economy of RuneScape compared to real world economics.

Similarities

- RuneScape's main currency, gold pieces, is fiat money. It is the universally accepted medium of exchange in trade and the unit of measurement for determining the value of virtual goods today and in the future.
- Players can perform variety of trading activities within the game. Players can trade with computer-controlled NPCs as well as with other players. Players can also participate in a larger and more structured exchange system, Grand Exchange. Players can even engage in wholesale trade.
- Virtual item prices in RuneScape are generally determined by aggregate supply and demand in the economy. Rare items are not out of this picture since they can be compared with, for example, artworks in real life. Neither is essential for survival but

is in demand nonetheless. The RuneScape government acts as a price stabilizer in the economy by applying floor and ceiling prices as well as trade limits.

- All stores and players seek profit while performing their trading activities. Players invent alternative production techniques to cover production costs and leave a healthy yield at the end. Players also organize mercantile clans to trade professionally. Mercantile clans can be compared with the guild system mainly observed in middle ages.

Differences

- Although the Bank of RuneScape is similar to real world banks, it functions only as a common way of safekeeping, much like safes in houses and hotels that have combination locks.
- RuneScape is officially a closed economy, meaning that all goods and services that are produced in the virtual economy meant to be consumed within the borders of *Gielinor*. Before 2008, players practiced RMT; however, it is now strictly prohibited by the game developer.
- Players earn income by participating in a variety of activities in the game and spending their GPs for their wants and needs, but these activities are not required for the life or the game playing in RuneScape.

In the next chapter, I discuss several fundamental and macroeconomic concepts from the real world and their reflections in the RuneScape economy.

CHAPTER 6

APPLICATION OF FUNDAMENTAL PRINCIPLES OF THE ECONOMY

Compared to Robinson Crusoe's one-man economic system, RuneScape has a dynamic economy with one million registered citizens (members), nine million tourists (free users), and 342,000 workers (server capacity). Several economic actors including individuals, government, and clans make everyday economic decisions in RuneScape.

In this chapter, I reexamine the RuneScape economy and compare it with the fundamentals of the real world economy. Although many other topics could be discussed, I select three essential macroeconomic concepts for this chapter for a more detailed analysis: economic agents, supply and demand, and money supply. Economic concepts in the real world are interdependent; therefore, referring to more than one concept at a time is common. Economic agents are naturally tied to the scarcity principle. Supply and demand is linked to elasticity. Money supply is affected by unique government policies in the game. Therefore, I mention those concepts as well.

This chapter also introduces two novel contributions of this thesis: a new use of the faucet-drain economy and a new equation, useful for modeling money supply in RuneScape. Previous scholars (Simpson, 1999; Breau, 2002; and Lewis, 2003) established the faucet-drain economy; however, the application to the RuneScape economy is new. Moreover, I haven't found another formula that specifically deals with money supplies in virtual worlds. Even though my formula is based on RuneScape economics, the model can be extended to other MMOGs.

6.1. Economic Agents and Scarcity

Basic economic debate starts with the concept of “*scarcity*,” which is about finding a balance point between limited resources and unlimited human needs. Resources refer to the *money, time, and skills* for an individual; and *capital, natural resources, and labor* for the bigger economic agents such as companies or countries. Since resources in the real world are limited, economic agents must make decisions regarding how to allocate them. For example, under their income conditions, individuals must choose between paying the rent and purchasing an expensive cell phone.

Before continuing to discuss the scarcity principle, I want to foster the concept of the economic agent, or *homo economicus*. Economic agents have been a reference point for explaining economic behaviors since 19th century. Many classical economists (including Smith, Ricardo, and Mill) framed the features of the notion, and later, neoclassic economists formulated and stated the *rational choice theory*. According to the neoclassical theory, an economic agent is an actor who makes rational economic decisions based on a complete knowledge of opportunities and constraints available, in order to obtain the highest possible welfare.

Although largely referred in the economic theory, these assumptions of *homo economicus* are often criticized. Starting in late 1930s, the Keynesian school makes the following claim: “*Homo economicus is an actor with too great of an understanding of macroeconomics and economic forecasting in his decision making. They [Keynesians] stress uncertainty and bounded rationality in the making of economic decisions, rather than relying on the rational man who is fully informed of all circumstances impinging on*

his decisions. They argue that perfect knowledge never exists, which means that all economic activity implies risk."⁴³ After the devastating results of World War I, followed by the Great Depression in which the private sector failed, Keynesian school supported monetary and fiscal policies designated by governments in order to increase demand in the economy and to reduce unemployment and deflation. Governments became the major economic agent and the decision maker in the economy.

Keynesians were not the only group that is skeptical of the freewill of the *homo economicus*. Foley (2002) summarized three other major adversaries: psychology, sociology, and physics. They all appeared against the idea of the rational economic agent at different times during the 20th century. From the psychological standpoint, Foley claimed "*Even cursory examination of the actual behavior of human beings shows glaring and highly replicable deviations from rationality. Real human beings do all sorts of irrational things, and make all sorts of cognitive errors, even in experimental situations much simpler than the capitalist market place.*" From the sociological perspective, Foley summarized that "*a major theme of social theory is the social construction of the subject, who is unimaginable as an entity outside a social and socializing context...Convey the idea of a social determination of human action.*" Finally, Foley gave the perspective from physics; "*The great insight of statistical physics is that the relation between the particles that make up a system (read economic agents) and the aggregate observable behavior of the system (read macroeconomic data) is extremely indirect and subtle. In fact, the aggregate observable behavior of thermodynamic systems is often to a considerable degree independent of the individual behavior of the particles that make it up.*"

⁴³ Wikipedia, http://en.wikipedia.org/wiki/Homo_economicus, Accessed: May 29, 2009

While the Keynesian school adopted interventionism, the Chicago School, lead by Friedman in 1960s, advocated a monetary approach that places the center of the economy in the private sector. Friedman claimed that Keynesian policies push inflation and limits economic growth. He indicated that by increasing the money supply in the economy, the market eventually finds its equilibrium. Friedman believed a natural rate of unemployment in the economy is favorable. Governments' interferences only worsen the conditions because economic agents modify their behaviors to neutralize the effectiveness of the government policies.

After a brief definition of the scarcity principle and the evolution of the economic agent notion in the real world, I focus on RuneScape and define the major economic agents in the game. In the next sections, I describe individuals, government and clans as economic agents in the virtual economy, and explain their approach to scarcity.

6.1.1. Economic Agents and Scarcity in RuneScape

As I mentioned in the previous section, economic agents can be individuals or groups who make economic decisions. The game company, Jagex, is one of the biggest agents in the virtual economy or the government. Before 2007, the government pursued a relatively liberal approach in the RuneScape economy. Apart from the essential decisions that are required to run the game, the existence of the government was almost invisible. Players seemed to be the primary individual economic agents who evaluated their possibilities (combat, skilling, trading, and interacting) and constrains (gold pieces, time, and skills) within the economy in order to maximize their virtual wealth. They abundantly determined the item prices in the market, earned high profits from sales, and generously donated to the other players.

It was a free market, however, not necessarily the ideal one for everybody. Many players suffered from the poor economic decisions they made, based on the limited information about the market. Economic choices were mostly taken by observing other players for a short time. Since each game server maintained a micro economy, players would never know the conditions in other servers, unless they visited each and every one of them, which was time-consuming. However, some players, called merchant clans, turned these flaws into hard, cold cash by performing successful examples of arbitrage (buying from low price and selling from high price for profit) and drove the market in the virtual world.

The number of players and the dimensions of the virtual economy grew so large that it started to spill over into the real world. By 2007, Jagex announced the size of the RMT: *“During 2006, we banned bot and real world trader accounts carrying RuneScape gold and items worth over 200 billion GP. During 2007, so far, we've banned over 525 billion, which has a real world value of over \$2.6 million US—that's an increase of over 250%. At that rate of growth, we'd be looking at banning over 8 trillion GP in 2010 that has a real world value of over \$40 million US. It's an almost unbelievably high number, but it hammers home the sheer size of the problem we are facing and why we have to take action against it.”*⁴⁴ Contrary to some MMOG companies that cherish RMT, Jagex was always against it. According to Jagex, RMT created many problems, for legitimate players and the company. By the end of 2007, Jagex introduced a set of rules that restricted RMT. As I explained in the previous chapter, removal of the unbalanced trade, application of the trade limits, and introduction of the Grand Exchange (GE) brought many advantages and disadvantages to the game. Generally, it created a more transparent economy where individuals have greater ability to reach and evaluate the economic

⁴⁴ RuneScape, <http://www.runescape.com/kbase/view.ws?guid=diary06>, Accessed: October 23, 2008

conditions for a better decision-making. Today, players can go online and check the current and historical price of any item, login to the game and make transactions based on this information. However, these new rules also limited individuals' capacity to act as an economic agent. Many players protested the trade limits and balanced trade, but the government ignored them to protect the general welfare of the community. New rules also empowered merchant clans in the game. Next, I discuss the major economic agents in RuneScape.

6.1.2. Individual Players as an Economic Agent

Just as in the real world, MMOG players act as economic agents who seek the ultimate wellbeing in virtual worlds. The desires and decisions of the individual players create the market, direct item supply and demand, determine item prices, and generate profit. Players also provide the necessary workforce for the considerable portion of the production in the game economy. Economic success in MMOGs is usually time sensitive. Assuming that all other factors are equal, players who spend more time in the game are expected to generate greater amounts of in-game wealth.

In the classical utility function, economic agents try to find their greatest satisfaction by adjusting the composition of the goods/services they consume. Castronova (2003) suggests a unique utility function that is related to time for MMOG players. Considering that MMOG players have jobs and other responsibilities in the real life, the time they spent in the virtual world changes the amount of the time they spent in the real world. For example, if players spend too much time in virtual worlds, they may lose some of their real world income but may increase their overall emotional satisfaction. Rather than seeing the real body as a puppet master of the virtual avatars, Castronova refers the real body as an earthly avatar. Acting as an economic agent, people allocate their time

between their earthly avatar and the virtual avatars, which results with an increase in the net wellbeing.

From the virtual world perspective, all players start the game with almost equal resources and skills. This equality in the game differs from real world practice since resources, which are offered to each person, vary from one country to another and even among the same country's citizens. Similarly, skills are different not only due to our genetic codes but also due to the differences in resources provided to us and to our choices in life. The reason for the popularity of MMORPGs may be the opportunity of choosing and achieving things that we are not given a chance to do in real life. However, even in RuneScape, the equality condition no longer exists as the player starts the actual game following the tutorial process.

For each game playing session, players allocate their time between moneymaking, skill boosting, puzzle solving, and interacting activities. Spending time and effort on selected activities, players gain money, skills, and a social network. What are typical player choices? Earning a considerable amount of money but having no friends, increasing some skills but having no money, or creating a balance between the activities. Nevertheless, making a choice between alternatives always means waiving another alternative. Since players' success depends on the time they spend in the game interface and the activities they do during this time period, after the tutorial process, scarcity rules the RuneScape economy from the individual perspective.

6.1.3. Government as an Economic Agent

Can you think about an economic system without a government? Neoclassical economists' perfect competition never appears in the real life. Hence, governments are indispensable agents of the economy by stabilizing the economy with monetary and fiscal

policies, promoting equality, applying social security, developing welfare and income regulations, and providing public goods and services.

When we look at RuneScape, we do not see the physical existence of the government embodied as big legislative buildings. Even though castles, guards, and jails imply an administration, players do not experience immediate affects of the government, such as taxes. However, game developers still function as the government, one of the biggest economic agents in the real world. As I discussed in the literature review chapter of this thesis (Simpson 1999), game developers should consider balancing internal aspects while maintaining the game economy. Developers balance fun and realism, meet the expectations of both new and experienced players, and apply rules that shape the virtual economy.

In RuneScape, the government shapes the virtual economy by acting as a supplier, controlling the item prices through NPC-operated stores and GE, and forcing the monetary policy. The preceding paragraphs concern the first two regulatory actions of the government, acting as a supplier and controlling the item prices, since the monetary policy is separately discussed in the next section.

In RuneScape, raw resources are supplied by nature, and goods are provided to the market by either NPC-operated stores or players. Government acts as both a supplier and price controller by defining seven features:

- the number of items that players hold when they start the game
- the number of objects that players own in the bank and carry in their inventory
- the minimum skill level and amount of time that players have to spend to gather raw materials and produce finished materials
- the type and features of the products that are produced and traded in the economy

- the amount of time that resources in nature and items in NPC-operated stores are produced or regenerated
- the item prices in the NPC-operated stores
- minimum, maximum, and market prices in GE

If real world dynamics regarding the raw material supply are applied to RuneScape, the game would lose the fun factor. In real world economies, raw materials such as mines, form very slowly, are distributed unevenly in geographic areas, and are maintained /controlled mostly by companies or governments. In order to keep the fun factor and give an equal chance of access to players, the scarcity conditions in nature and NPC-operated stores are determined by the government. Natural resources—for example, ores, fish, and trees—regenerate a few seconds after being depleted by players. Some basic items, such as hammers, buckets, and pots, have infinite supplies in stores' main stock. Regenerating items by java codes, the government maintains a pre-determined amount of stock, which satisfies new and existing player demands. This aberrant way of basic item supply destroys the scarcity principles, as we know in the real world.

However, the scarcity principle is valid for the items that are in the stores' player stock. The players who produce or sell them provide these items. Since players decide the amount and the time of the supply, player stock is not a reliable way of meeting the item demands.

Another factor that affects the scarcity is that virtual items in RuneScape (except very few high-level armories) never expire or perish. Players can use same items without considering the cost of maintenance or depreciation. Although players are not concerned with depreciation, they may still lose some items in combat. As a result, they stock large amounts of the same item in their banks, expecting that they can use them someday.

Since banks do not charge any fee for safekeeping, items are generally stockpiled in bank accounts. These rules eventually lead to item inflation in the game.

In order to stimulate the scarcity rule, the government takes some precautions. The total number of resources in the game decreases when items perish under certain conditions:

- When players die, all of their belongings in the inventory (except the 3 most valuable) vanish entirely from the economy, unless other players collect them in a short time.
- If players quit the game, all of the belongings in their bank and inventory vanish entirely from the game economy.
- Sometimes, players drop items they don't want to carry. If other players do not find these items then such items would disappear as well.
- During the production process, some items are damaged and can not be used anymore (e.g., players may burn fish while cooking)

6.1.4. Clans as an Economic Agent

As I briefly defined in Chapters 4 and 5, clans are large player groups who share common objectives in the game. They play together, achieve tasks, and go on quests together.

Many clans also maintain websites, forums, and use voice-chat outside the game environment. Clans generally form a hierarchical structure in which the top management announces the clan's objectives, and all members work to achieve them. Although many motives can be found for creating a clan, merchant clans are the most-related social groups within the context of this thesis.

A merchant clan is a group of players who work for the economical benefits for their members. They claim that players accumulate greater wealth in a short time by joining a merchant clan, as opposed to engaging in individual mercantile activities.

Large merchant clans usually have ability to manipulate market prices. After the introduction of the clan chat system and Grand Exchange (GE), a golden age started for merchant clans because the clan chat system makes clan communication easier. Also, GE increases the transparency of the market with the daily data feeds and visual graphics.

The automatic price mechanism of GE works in favor of the merchant clans. The common mercantile tactic starts when all clan members buy large amounts of an item that is determined by the clan management. Since GE mechanism does not distinguish between real demand for virtual items and manipulative actions (stockpiling of virtual items even if there is no real demand), the price of the specific item starts to rise the following day. A buying frenzy may continue for hours and sometimes for days, and the top management of the clan carefully observes the market during this time frame. When the targeted profit is reached, clan management announces a sale.

Figure 6.1 shows an example of the price movements for a manipulated item, the rune boot. The red arrows show the bull market where the rune boot price rises stimulated by merchant clans. The green arrows show the bear market where the rune boot price falls due to the large sell offs. Numbers 1, 3, and 5 show the levels of support where rune boot price levels do not fall below. Numbers 2, 4, and 6 indicate the levels of resistance where the rune boot price levels do not rise above.



Figure 6.1: Price Manipulation by Merchant Clans
 (Source: www.runescape.com, Accessed: June 15, 2009)

Merchant clans are small but very effective economic agents; they are often criticized for damaging the RuneScape economy. According to opponents they create an artificial economy, can not deliver their profit promise to all members, and generate more benefit to their management.

- *Artificial economy:* Merchant clans create artificial supply/demand/price shocks that negatively affect daily trades of regular players who are not clan members. Just because merchants buy some items for the sake of profit, regular players who really need these items for their consumption buy them from higher than the market price. Also, regular players sell the items for lower-than-the-market price because of the huge number of supply in the market. Assuming that the total money supply in the economy is the same in a short time period, clan members' profit means regular players' loss.
- *Failing Promise:* Some clan members can not buy or sell suggested items on time. For example, when the clan's sell order is issued; every clan member starts to sell the suggested item but that doesn't mean enough buyers exist in the market, so the price

starts to drop. Sometimes prices fall so fast that selling the items results in a net loss for the clan members.

- *Uneven Profit Distribution in the Clan:* Some players believe that clan management drives other clan members in a way that the clan management actually realizes the profit long before the common announcement to the members. Clan management buys/sells large amounts of the selected item, right before the public clan announcement; therefore, clan members enter to a market where the lion's share is already taken.

As of June 2009, players announced in the official RuneScape forum that Jagex blocked the accounts that belong to the top management of two largest merchant clans. This news started a rage among the advocates of the merchant clans who believe that they do not break the official game rules. According to them, merchant clans are the largest actors of the free market and their actions are no different from the individual merchants, which are buying low and selling high. They believe that they produce a sustainable growth in the economy. They also confess that even if mercantile activity creates a wealthy class in the society, their actions do not cause inflation of item prices.

6.2. Supply, Demand, and Elasticity

One of the most common concepts of the economy is supply and demand. *“Demand is the amount of a product people are willing to buy at a certain price. The law of demand states that, if all other factors remain equal, the higher the price of a good, the less people demand that good. Supply demonstrates the quantities that will be sold at a certain price. Unlike the law of demand, the law of supply suggests that the higher the price, the higher the quantity supplied. When supply and demand are equal (e.g., where the graphical representation of supply function and demand function intersect) the*

economy is said to be at equilibrium. At this point, the allocation of goods is at its most efficient state because the amount of goods being supplied is exactly the same as the amount of goods being demanded.”⁴⁵

Figure 6.2 demonstrates the supply and demand for a specific item is related to the given price and quantity conditions. When producers supply more item to the market, quantity (also demand) increases from $S1=10$ to $S2=20$, and the price of the specific item decreases from 1,500 to 1,250.

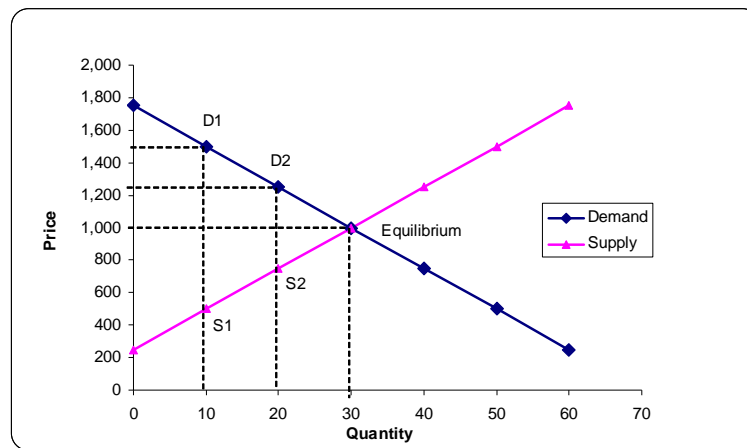


Figure 6.2: Demand and Supply

Item supply and demand in RuneScape generally follows the law of supply and the law of demand. Similar to real world economics, inelasticity of the basic item demand, elasticity of the valuable item demand, and demand shocks are observed in RuneScape. A game-specific factor that affects the aggregate supply and demand is the new player effect.

⁴⁵ Investopedia, www.investopedia.com/university/economics/economics3.asp, Accessed: May 18, 2009

6.2.1. Inelasticity of the Basic Item Demand

*“Elasticity refers the degree to which individuals (consumers/producers) change their demand/supply in response to price or income changes. A good or service is considered to be highly elastic if a slight change in price leads to a sharp change in the quantity demanded or supplied.”*⁴⁶ Some items in RuneScape are always in demand, for instance, buckets, chisels, and tinderboxes. These items meet players’ basic needs, are used in many tasks, and are produced relatively easily. Both new players and experienced players always demand these types of products; therefore, stores and players consistently supply these products to the market. The prices of the basic items are affordable, and changes in the price don’t affect the demand significantly. Therefore, these items are the perfect example of inelastic demand.

6.2.2. Elasticity of the Valuable Item Demand

Apart from the basic items, supply and demand for other items is usually determined by skills. The skill system is tied to some strict rules that are established by the government. Certain items can not be worn /used until the specific level of skill is achieved, even if they have been purchased before. For example, all players start the game with the least effective/powerful armors (e.g., bronze sword) and may wear more powerful armors as their skills increase. The demand for valuable items is elastic with differing degrees, based on their *utility* (functionality), *availability of replacement goods* (if the lobster and the monkfish heal players equally, an increase in monkfish prices makes players switch to the lower-priced lobster), and *players’ wealth*.

⁴⁶ Investopedia, www.investopedia.com/university/economics/economics4.asp, Accessed: May 18, 2009

6.2.3. Demand Shocks

Demand shock can be described as a sudden change in demand, due to an unexpected event in the economy. A typical example of demand shocks in real life is observed after natural disasters. After a massive earthquake, the demand for drinking water, medical supplies, food, and shelter increases for a limited time.

The RuneScape economy is also subject to demand shocks, just as the real world economy. In some cases, such as introduction of a new quest or skill, the demand for selected items suddenly increases. This condition fuels the black-market. Players, who have these items in their inventory, ask high prices and gain high profits. For example, before January 2008, raw chicken was one of the least demanded types of food in RuneScape; due to raw chicken's low power of healing, it was cheap. When the summoning skill was introduced in January 2008, raw chicken was announced as one of the requirements for increasing summoning skill from level 4 to 10. Therefore, the price for raw chicken quickly increased. Afterwards, players discovered this increase in price and supplied more raw chicken to the market. Now, raw chicken prices are stabilized again.

As seen in this example, the affects of the demand shocks do not last long. Sooner or later, other players realize the high profit and direct their efforts to produce/provide the related item to the market. As a result, the supply increases until it meets an equilibrium point with the demand, reducing the price of that particular item.

6.2.4. New Player Effect

Under the skill restriction systems of MMOGs, supply and demand for the less functional items are expected to decrease in time. However, no single rule can be applied to movement of supply and demand. When Jagex launched RuneScape in 2001, bronze

items were in high demand because all players started the game at the lowest possible skill levels. As players' skills gradually increased, demand for bronze items was decreased and bronze item prices in the PvP market reduced accordingly. Because of the constant new player flow, bronze items are still in demand at affordable prices; however, their desirability span is short.

6.2.5. Suggestions for a More Realistic Supply and Demand

Many MMOGs, including RuneScape, are subject to an increasing item supply in time. Items produced in the skilling process are usually more than the existing item demand in the economy. Players consume some of the items that they produce during the skilling process, keep some of the items for their future use, but, they still end up with many surplus items. Players also demand better weapons, better clothes, and better food as their XPs gradually increase. They sell the surplus items in their inventory, even if no real demand exists in the market. These conditions create item and price inflation. I suggest six solutions to solve the problem of ever-growing item supply in RuneScape.

- ***Players as the only raw material providers:*** Currently, all finished products supplied in NPC-owned stores are created by the game code. The raw material input during the production process is invisible in NPC-owned stores. The government may change this system by allowing players as the only raw material providers. If players want to buy a product, they should bring the raw materials to the NPC-crafters along with gold pieces (GPs).
- ***Tax:*** Government may implement some kind of excise tax, based on the item supply and demand. A higher percentage of tax may be applied to more popular items, which can curb excess demand.
- ***Item decay:*** As observed in the competitor game, Ultima Online, every item in RuneScape may turn into either a consumable or perishable. Items that are not maintained for a long time may be destroyed.

- ***No by-product during skilling:*** Currently, when players practice game skills (e.g., crafting, woodcutting, fishing), they observe an increase in their XP, and the created products appear in their inventory. I suggest production skills to be tied only to an XP increase. In other words, NPC-shopkeepers and nature can be the only final product providers. In that way, players are forced to buy no more final products than they need. This system is actually very close to contemporary economies, since most people do not actually produce items they consume, but buy them from stores.
- ***Sale cap in stores:*** Number of items in each NPC-store may be determined with a cap. If this cap is reached, players can travel to another store to sell their items.
- ***Limited bank storage:*** The number of slots in the bank accounts may be decreased. Currently, members can store up to 496 slots, and free users can store up to 68 slots in their bank account. Each slot can hold an unlimited number of the same item. This storage capacity encourages players to stockpile. If the number of slots and their limits are decreased, players become more selective, and they keep more functional items in their bank. They either sell or drop unnecessary items, which eventually decreases the item inflation. However, this system may create a more liquid economy and may increase the gold pieces in circulation. In order to curb that appeal, banks may charge some fee for storage.

6.3. Money Supply and Government Policies

In real world, governments control the money supply in the economy by applying the monetary and fiscal policies. Implemented by the central bank, monetary policy determines the aggregate supply and demand; and spending, saving, and loaning conditions of the money. Monetary policy tools are *open-market operations* (buying and selling of securities), *reserve requirements* (the amount of money that banks are required to keep in the central bank), and the *discount rate* (the price of the loan or the interest rate

that banks are charged when they borrow from the central bank). In fiscal policy, government revenues and expenditures are used to control the money supply. Government revenues refer to *taxes*; government expenditures refer to *public services*, such as education, health, infrastructure, etc.

In the real world, the effectiveness of the monetary policy is measured by the changes in different money types. While their definitions change slightly from one country to another, M0, M1, M2, and M3 are the most common definitions of the money. “*M0 includes any liquid or cash assets held within a central bank and the amount of physical currency circulating in the economy. M0 is the most liquid measure of the money supply. It only includes cash or assets that could quickly be converted into currency. M1 contains all physical money such as coins and currency; it also includes demand deposits, which are checking accounts, and negotiable order of withdrawal (NOW) accounts. M1 is a very liquid measure of the money supply, as it contains cash and assets that can quickly be converted to currency. M2 includes M1 in addition to all time-related deposits, savings deposits, and non-institutional money-market funds. As the broadest measure of money; M3 includes M2 as well as all large time deposits, institutional money-market funds, short-term repurchase agreements, along with other larger liquid assets.*”⁴⁷

6.3.1. Faucet-Drain Economy

Most monetary and fiscal policy tools are either irrelevant or too complex to be implemented in the MMOGs. MMOGs are not designed as economic simulation games, so they don't specifically focus on creating a one-by-one replica of real world economies. The money supply and demand conditions in MMOGs are usually determined by a

⁴⁷ Investopedia, www.investopedia.com/terms/m/m0.asp, www.investopedia.com/terms/m/m1.asp, www.investopedia.com/terms/m/m2.asp, www.investopedia.com/terms/m/m3.asp, Accessed: June 22, 2009

system called faucet-drain economy (Simpson, 1999; Breau, 2002; Lewis, 2003). The faucet-drain economy is inspired by the working principles of a sink. In the faucet-drain economy of the game, faucets increase the money supply and drains decrease the money supply. The main dilemma with this system is balancing between faucets and drains. If faucets supply too much money, inflation damages the game economy, causing virtual item prices to increase. On the other hand, if the drains take too much money out of the game economy, players do not find enough money to consume virtual items, and the game lose the fun factor (Simpson, 1999).

A good example of inflation in virtual economies is Sony's EverQuest, which was subject to inflation many times in its history, most noticeably in 2002 and 2005. In 2002, some players used macro programs to automate certain activities in the game resulting in a huge increase in the game money. The game company suspended many accounts that participated in this scam.⁴⁸ In 2005, one month after Sony Online Entertainment (SOE) launched Station Exchange, some players counterfeited the game currency to sell it in this new RMT system. SOE again tracked the duped currency and removed it from the system.⁴⁹ Inflation creates many problems in virtual economies, just as in the real economies. For example, as rich players start to obtain everything very easily, they lose their interest in the game and eventually quit the game. Poor (or new) players have difficulty adapting to the economy and gain wealth in the game, so they quit as well. Deflation is also problematic in virtual economies. Castronova (2001) explains the deflation in Norrath (EverQuest): *"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,*

⁴⁸ BBC News, <http://news.bbc.co.uk/2/hi/technology/2345933.stm>, Accessed: June 03, 2009

⁴⁹ ZDNet, http://news.zdnet.com/2100-1040_22-144176.html, Accessed: June 03, 2009

which lost 59 percent of their value. Note that if nominal wages (e.g., 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 in Norrath as the challenge level of the world, and hence its entertainment value, has fallen.”

Based on my observations as a member of RuneScape, I created a graphical representation (Figure 6.3) of the faucet-drain economy that the government uses to control the money supply in the game. In the upper part of the figure, I list the six features that increase money supply and in the lower part I list eight features that decrease the money supply in RuneScape.

During my analysis of RuneScape economy, I learned that the first six faucets are interrelated with the first six drains. As seen in the first box at the upper part of Figure 6.3, when players sell virtual items to NPC storekeepers, they earn certain a number of GPs, which increases the money supply in the game (PvE Trade-Selling). On the other hand, when players purchase virtual items from NPCs, they pay a certain number of GPs to them, which decrease the money supply in the game (PvE Trade-Buying). Balancing the money supply in MMOGs is a big issue for game developers. MMOG game playing is based on skill improvement. Both new and experienced players continuously produce virtual items, either for their own consumption or for sale. NPC storekeepers buy all products regardless of the actual consumer demand in the market. As I explain in more detail in the next section, activities like killing, thieving, and alchemy consistently increase the money supply. The faucets representing the money supply always pour more into the game economy than the drains take out of the game economy. After meeting the initial poverty needs with basic clothes and equipment, players can play the game for a long time without spending any GPs on virtual items. They can, instead, produce just

enough for their consumption in the game. As a result, money faucets create more money than players require, so game developers invent new drains such as equipment repair and transportation fees in order to balance the money supply in the game.

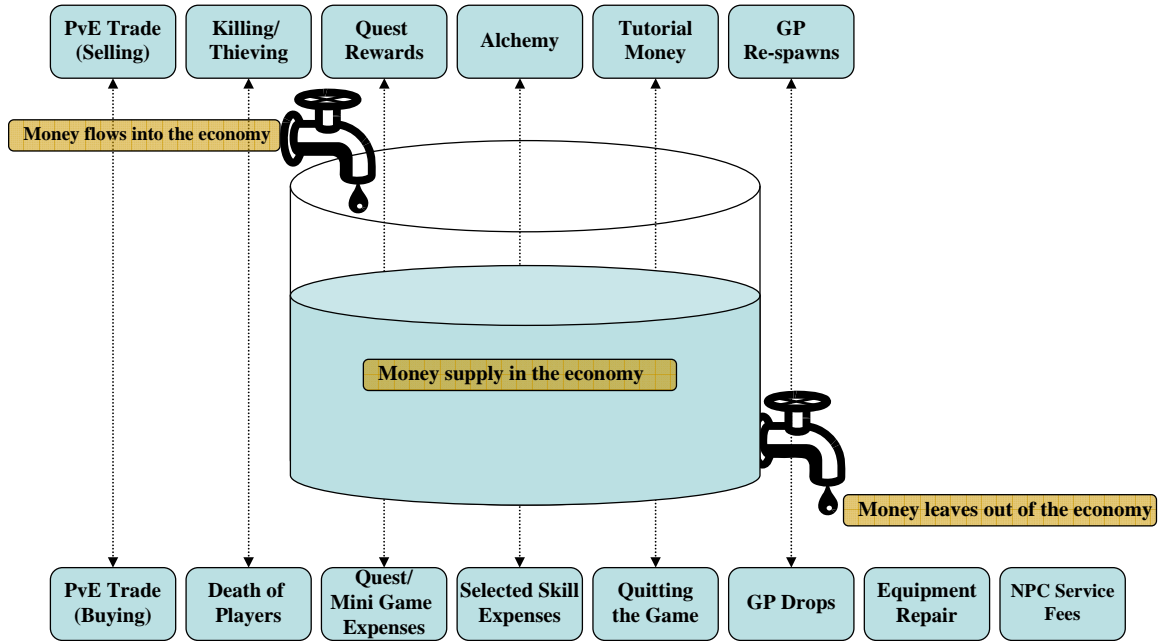


Figure 6.3: RuneScape Faucet-Drain Economy

In the next section, I explain faucets and drains and, finally, I suggest some solutions to absorb the excess money in RuneScape.

6.3.2. Formulating Money Supply

In this section, I provide an equation for estimating money supply in RuneScape. To my knowledge, it is the first economic equation that addresses the money supply in MMOGs. When I reviewed the literature, I found only two articles that mention money supply in MMOGs. Although Breau (2002) and Lewis (2003) defined some factors that affect money supply, their explanations were not detailed.

As I explained in Chapter 5, the main exchange medium in RuneScape is GPs. A certain amount of physical currency is always in circulation in players' inventory and in NPCs' pockets. The bank of RuneScape's function is limited to safekeeping, and RuneScape doesn't have a central bank as we see in the real world. However, NPC-owned stores function as branches of a real world central bank or as branches of the Federal Reserve Bank since NPC-owned stores are the biggest sources of money supply. The amount of money created in NPC-owned stores and the currency in circulation constitute M0 money supply in RuneScape. Also, GPs that are kept in the players' bank account bear characteristics of the demand deposit (M1), since they never earn interest. Therefore, while M0 and M1 type money supplies are found in the game, M2 and M3 aggregates are irrelevant to the RuneScape money supply.

M0 type of money supply originates from six different sources in RuneScape: PvE trade (selling), killing/thieving, quests, alchemy, tutorial money, and gold re-spawns. Some of these sources are briefly mentioned earlier in Chapter 5 as income generating activities in the game. However, not all income-generating activities contribute to the increase in money supply in the game. For example, player vs. player trading and GE trading are not ways to increase the money supply because the money exchanged in these activities should be earned by one of the following methods.

- ***PvE Trade (Selling):*** Selling items to the NPC-operated stores create one of the main sources of the money supply. General stores buy all items and specialty stores buy selected items in unlimited amount and pay with gold pieces (GPs). Although stores' buying price decrease by the item quantity, they still buy from the floor price, *“meaning that even if a good has no value in the a2a [PvP] markets; it can still be turned into cash”* (Castronova, 2001). The monetary amount of the actual PvE trade

is very hard to estimate. Some players actively trade in the NPC-owned stores, while other players trade as long as it is necessary.

- ***Killing/Thieving:*** NPC killing or thieving is one of the biggest money supply sources in the game. Players may continuously kill or rob NPCs and get their GPs, resulting with an increase in the total amount of money in circulation. However, the total number of killed or robbed NPCs and their total holdings are very hard to estimate, as they are automatically summoned few seconds after their death and their drops are random.
- ***Quest Rewards:*** Players can complete quests and earn reward money. Since the game does not allow restarting the finished quests, players can get these awards once. Thus, the quest effect on the money supply may be considered as stable.
- ***Alchemy:*** Players with at least 21 magic levels can use alchemy spells to change regular items into GPs. While counterfeiting is illegal in the real world, it is not illegal in RuneScape. Alchemy spell puts players into role of a money supplier; therefore, the total amount of money supply goes out of the government control. Estimating the number of players who can perform alchemy spells and frequency of the alchemy practice is difficult, so the alchemy affect on the money supply can not be easily determined.
- ***Tutorial Money:*** All players earn 25 gold pieces during the tutorial process. Tutorial money is another reliable source of money supply in the game.
- ***Gold Piece Re-spawns:*** In certain locations in the game, GPs appear out of thin air. Players can collect those GPs all day, if they want to. However, the amount of money re-spawned is very small and does not constitute of a big portion of the money supply.

The approximate size of M0 and M1 money supply in RuneScape can be formulated as below. I name this the *M0 Money Supply Basic Formula*, which is concerned with the most liquid assets or cash in the virtual economy.

$$M0 = PvE + K + Q + A + T + R + G$$

M0 Money Supply Basic Formula Key

PvE = player vs. environment trading

K = killing and thieving

Q = quest rewards

A = alchemy

T = tutorial money

G = gold piece re-spawns

While calculating M0 money supply, I simplify the process by considering possible factors that affect the currency in circulation in a single day. Readers should note that this calculation is preliminary and conservative. Many variables in this formula are very difficult to estimate.

Understanding the variables that comprise the *M0 Money Supply Basic Formula* can help game developers, players, economists, educators, and researchers decipher the complexities of the virtual money supply. Part of this understanding comes from recognition that each variable in the *M0 Money Supply Basic Formula* is from a combination of other variables. This necessarily leads to my development of the *M0 Money Supply Expanded Formula*:

$$M0 = (PvE_n \times PvE_t \times PvE_a) + (K_n \times K_t \times K_a) + [(Q_{Fn} \times Q_{Fa}) + (Q_{Mn} \times Q_{Ma})] + (A_n \times A_t \times A_a) + (T_n \times T_a) + (G_n \times G_t \times G_a)$$

The first variable in the *M0 Money Supply Basic Formula* (hereafter referred to as M0-Basic) is player vs. environment trading (PvE). In elaborating PvE for the *M0 Money Supply Expanded Formula* (hereafter referred to as M0-Expanded), I found three factors

that comprise PvE: (1) the number of active players who trade in a day - PvE_n , (2) the number of transactions through NPC stores in a day - PvE_t , and (3) the average transaction amount - PvE_a .

The second variable in M0- Basic, killing/thieving is elaborated for M0-Expanded with three variables: (1) number of NPCs encountered in a day - K_n , (2) the average number of attacks in a day - K_t , and (3) average NPC drops from killing/thieving - K_a .

Approximately 615 different NPC species with more than one instance are distributed through Gielinor.⁵⁰ When players kill NPCs, they re-spawn usually in few seconds.

Similarly, when players rob NPCs, new gold pieces become available in NPCs' pockets in few seconds. The total amount of NPC drops as GPs are random and therefore very hard to determine.

The third variable in M0- Basic, quest rewards is divided into two subsections: free quests' rewards and member-quests' rewards. In an ordinary day, certain percentage of the free users and members focus on solving quests. They can finish one or more than one quest in a day and claim portions of the total available reward money. Hence, for M0-Expanded, the money supply from quest rewards includes initially the sum of two variables. The first variable is the product of (1a) the number of free users engaged in quests in a day - Q_{Fn} and (1b) the average amount of free quest rewards gained in a day - Q_{Fa} . The second variable is the product of (2a) number of members engaged in quests in a day - Q_{Mn} and (2b) the average amount of member quest rewards gained in a day - Q_{Ma} .

⁵⁰ RuneScape Wikia, <http://runescape.wikia.com/wiki/Bestiary>, Accessed: June 30, 2009

The fourth variable in M0- Basic is alchemy. To move this basic formula into M0-Expanded involves the product of three variables: (1) the number of players with at least level 21 magic - A_n , (2) the number of alchemy spells cast in a day - A_t , and (3) the average net money created per spell - A_a . Alchemy spells cost money. In order to increase the money supply with alchemy, players should cover the rune costs that are required to perform the alchemy spell.

The fifth variable in M0-Basic, tutorial money, involves a product of two variables: (1) the number of new player acquisitions in a day - T_n and (2) initial donation to each player - T_a , which is 25GP. This is probably the most reliable source of money supply in the game.

Finally, the sixth variable in M0-Basic, gold piece re-spawns, consists of the product of three variables: (1) number of active players who collect GPs from re-spawn locations - G_n , (2) average number of re-spawns in a day - G_t , and (3) average amount of coins - G_a . GP re-spawns are considered the least effective variable in the total money supply because, re-spawn locations are rare, and amount of gold is not substantial.

Just as I propose basic and expanded formulas for the M0 money supply, I also propose basic and expanded formulas for the M1 money supply, which includes all M0 as well as demand deposits of GPs in players' bank accounts (B).

$$M1 = M0 + B$$

<p><i>M1 Money Supply Basic Formula Key</i> M0 = liquid assets or cash B = gold pieces in players' bank accounts</p>

Calculating the number of GPs in players' bank accounts requires that a distinction be made between free users and members. In RuneScape, members can practice additional skills, access more quests, and collect/equip more items, features that are not available to free users. As a result, members usually accumulate more wealth than free users.

An expanded formula for M1, the total demand deposit in the virtual economy, can be calculated as the sum of (1) M0 and two additional variables. The first variable is the product of two variables: (2a) the number of free users - B_{Fn} and (2b) the average amount of GPs in free users' bank account - B_{Fa} . The second variable is again the product of two variables (3a) number of members - B_{Mn} and (3b) the average amount of GPs in members' bank account - B_{Ma} . Including these detailed variables makes the *M1 Money Supply Expanded Formula* more complete:

$$M1 = M0 + [(B_{Fn} \times B_{Fa}) + (B_{Mn} \times B_{Ma})]$$

6.3.3. Money Drains

Eight distinct factors—PvE trade (buying), death of players, quests and mini-game expenses, selected skill expenses, quitting the game, GP drops, equipment repair, and NPC service fees—remove money from the RuneScape economy.

- ***PvE Trade (Buying):*** Trading with NPCs is certainly the most important money drain in the game. Unlike players, NPCs can not use GPs they acquire as a result of their trade. Hence, all money they gained goes out of the economy.
- ***Death of Players:*** When players die in a combat, they lose all but three of the most valuable items they carry, including money. The saved items usually are armor or weapons.

- ***Quests and Mini-game Expenses:*** During quests, players occasionally pay a certain amount of money to NPCs in order to learn specific information, or they have to spend certain GPs for purchasing the equipment needed for quests.
- ***Selected Skill Expenses:*** Selected skills, such as construction and summoning are designed as money drains in the game. Most of the equipment or raw material used in these skills can not be produced by the players, so they have to buy them from NPCs.
- ***Quitting the Game:*** When players quit the game, all money in their possession and in their bank accounts vanishes from the virtual economy.
- ***GP Drops:*** Sometimes players purposefully drop or leave the money on the ground. Those GPs would vanish if other players do not pick them up.
- ***Equipment Repair:*** Most items in RuneScape are highly durable. Very few items wear out and need to be repaired—for example; Runecrafting Guild repairs rune pouches for 9,000GP.
- ***NPC Service Fees:*** Players pay fees for services offered by NPCs, including transportation, gate access, and potion making (e.g., *Al-Kharid* city entrance fee: 10GP, *Karamja Island* boat transportation fee: 240GP, Witch Aggie’s potion making fee: 5GP).

Money drains in RuneScape occur irregularly, and the amount of money drained is random as well. Formulating the money drains is less precise and involves many assumptions that may not be easily proven. Consequently, money drains formula may be subject to a future study.

6.3.4. Suggestions for Absorbing the Excess Money Supply

Many features can be applied to MMOGs to absorb the excess money from virtual economies. However, virtual economies became increasingly complex with every new rule introduced. Also, players usually don’t want to lose their vested rights or wealth by

the application of new rules. The primary target of MMOG developers is not providing a dull economy for players but keeping the economy as one of the engaging features in the game. I provide the following suggestions to absorb excess money supply in RuneScape, while keeping the fun factor intact:

- **Tax:** Government may apply various taxes such as “value-added tax” based on trade.
- **Grand Exchange Fees:** Since the GE offers many advantages over PvP and PvE trading; a GE listing fee or a GE transaction fee may be introduced.
- **Banking Service Fee:** Players may be charged transaction fees, storage fees, and account maintenance fees for the items they keep in their bank accounts.
- **Extended Item Repair Fee:** Game developers may add durability feature to all items and players may pay fees to repair them.
- **Decreasing Return in Alchemy:** Consecutive application of an alchemy spell may provide a decreasing return rather than the current flat return.

6.4. Conclusion

In this chapter, I analyzed three macroeconomic concepts in RuneScape economy and compared them with the real world practices. I started with the economic agents and scarcity, moved to supply and demand along with elasticity and demand shocks, and last, I mentioned the money supply and related government policies in the game.

First, I described three major economic agents in RuneScape economy as individuals, governments, and clans. While their degree of efficiency in the economy varies, I believe that the RuneScape economy is directed by the individuals, framed by the government, and manipulated by the powerful organized-groups. This structure is no different from the real world economies.

As a general rule, the amount of wealth that players accumulate is limited to the players' moneymaking and saving abilities. Because of these conditions, players have to make choices between buying certain items and saving them for the future. Most of the time, players try to allocate their wealth between many desired items in order to maximize their benefit, just as in the real world.

The government applies rules that affect the item supply and prices. It also regulates the scarcity principle up to a certain point. However, one of the basic principles in the real world, item decay, seldom applied in RuneScape. This choice creates item inflation in RuneScape. Burke (2002) explains the importance of the decay in the economy by comparing Ultima Online with other games: *“Ultima Online also has a crucial dynamic missing in the other two games: items, whether looted from monsters or manufactured by players, decay over time, and need to be repaired and then eventually replaced. In the other two games, objects are infinitely durable, and so infinitely accumulate if kept on the person of the characters. As a result, in Asheron’s Call, players often designate one or more of their five allotted characters as a “mule”, whose only function is to store objects of potential value in its personal inventory.”*

Mercantile clans manipulate the economy for profit. Although small in size, they are effective in the economy. Results of their economic choices not only influence themselves but also influence other economic agents in the game.

Second, I found that item demand and supply and their elasticity work as the real world economics in RuneScape. The aggregate item demand decreases when item prices increases and vice versa. The prices of basic items are inelastic, meaning that players' demand does not change greatly even if the prices of these items increase. An in-game example is chisel that is required for crafting activities and is produced only by NPCs. A

real world example is drinking water. Although it is not scarce in supply in many places around the world, when it is scarce, many people pay any price to get it.

Prices of valuable items are perfectly elastic in RuneScape. Many valuable armor and weapons can be substituted with other armor and weapons; therefore, players tolerate a limited increase in their price. If the price for a specific weapon increases significantly, players switch to the alternatives as long as alternatives provide similar functions. The real world example would be the demand for a specific car brand. Assuming that all other features remain similar, if Honda Accord's price increases, consumers would choose to buy Toyota Camry.

Demand shocks also affect RuneScape economy by creating unexpected demand to specific items for a limited period of time, just as it is observed in real world. RuneScape demand shocks generally happen after the game developer's announcement of a new skill or quest and lasts until the players meet the increasing demand.

One of the unique factors that affect RuneScape supply and demand is the new player effect. Due to the skill improvement system and skill restrictions, new players are always forced to demand the least effective items in the game. Even if they own or can afford powerful weapons, they can not use them unless they reach a certain level. However, in real life, people always demand and use the best goods and services that their money can buy. Real life does not force consumption rules based on individuals' skills or the time they spent in a specific community. As long as the monetary price is paid, every goods and services are available to anyone.

Finally, I realized that RuneScape money supply works differently compared to real life. Because of the fact that real world government policies, which regulate money supply in

the economy, can not be applied to MMOGs, game developers introduced the faucet-drain economy in order to balance money supply and demand in the game. I created a graphic for explaining the faucet-drain economy for RuneScape. I defined all money faucets and drains in the game and suggested number of solutions for absorbing the excess money supply. I also created a new formula for estimating the money supply in RuneScape. This formula can be applied to other MMOGs as well.

CHAPTER 7

FINDINGS OF THE RUNESCAPE ECONOMICS SURVEY

Between March 29 and May 10 of 2009, I conducted a survey as a part of my thesis, using the online SurveyMonkey tool. Although 470 people began the survey, only 142 of them (30%) completed all of the questions. The only criterion for participation was being a RuneScape player. Participants did not receive any compensation for their contribution.

I recruited survey participants by making announcements on various unofficial game forums. They followed a link to the online survey where they first read the consent or assent form, depending on the self-reported age. The purpose of the survey, procedures, risks and benefits were explained in the consent/assent form. The 47-question survey took approximately 25 minutes to complete. The questions are in Appendix A.

The main objective of the survey is to gain a better understanding concerning one of my subordinate research questions: What is the level of economic understanding inherent in the players of RuneScape? This chapter also explores facts related to one of my other subordinate research questions: What aspects of the virtual economic system are similar and different? This survey appears to be the first survey and statistical analysis as a part of an academic thesis exploring RuneScape.

This chapter starts with the data sampling method, and then extends to different data management strategies for an assortment of survey questions. Furthermore, it includes the

results from five main sections of the survey: demographics, game play, economic activities, frequency of economic activities, and real money trade.

7.1. Data Sampling Method

I used a non-random convenience sampling method to select the survey participants because a complete pool of the target population (RuneScape players) was not available. Player information is kept by the game company and is considered private. On the other hand, the main recruitment channels, game forums, do not provide robust member demographics, since completing this information is usually optional for forum members during the registration process. Even when forum members provide this information, due to privacy requirements, it is restricted from third parties in most cases. Also, the accuracy of the demographics in forum records is questionable, since all information is based on self-reports.

Furthermore, my survey link was publicly available in the forum. Any person who visited the related forum thread would reach the link and answer the survey, regardless of her/his affiliation with the selected forums. Wright (2005) mentions the “lurkers” effect, *“individuals who read posts but do not send messages may complete an online survey even though they are not visible to the rest of the community.”*

Consequently, I accept the fact that the survey sample may not represent the actual RuneScape population. However, the survey results still give valuable insights about a portion of the population.

7.2. Data Management

I divided my survey into five subsections: demographics, game play, economics, economic activity frequencies, and real money trade. Since the expected responses to the survey questions required different data management strategies, I used four types of questions within these subsections.

- I used Likert-style scale questions for measuring frequencies for the selected economic activities (20 questions).
- Whenever I want a detailed answer from participants, I used open-ended questions (17 questions). As I discussed earlier in Chapter 3, this decision probably reduced the overall response rate but also increased the detail of the responses.
- I designed multiple-choice questions for learning about the participation frequencies for real money trade (4 questions).
- I collected nominal and interval data with single textboxes (6 questions).

Survey responses did not reveal any individuals who completed the survey more than once. I eliminated five of the 142 participants' answers, because their answers conflicted with known facts about the game or exaggerated (e.g., reporting over 400 months of game play, even though the game has been available only since 2001 or reporting owning over 200 accounts in the game).

Demographics and Game Play Questions: I used interval data that I gathered from age, account ownership duration, weekly play duration, number of accounts, and average level questions directly as reported by participants. I also converted nominal data (gender) into numeric equivalents (i.e., male: 1, female: 2, other: 3).

Economy Perception and Real Money Trade Questions: I started my data analysis by reading the open-ended questions to identify patterns of economic activity. I assigned different numbers to every unique economic activity and created a coding scheme. I used this coding scheme to identify players’ economic activities, preferences, and opinions in each response. I grouped activities that are mentioned by only 1 or 2 people under the “other” category; however, sometimes a singular response was so interesting that I coded this unique information as a new category. I coded non-responses, irrelevant answers, and the answer “no idea” (or its equivalents) as separately, but then conflated them into a single category labeled “missing data” for the SPSS analysis. I provided multiple choices (including the “other” option) for questions that concern frequencies or the amount of money involved in real money trade.

Economic Activity Frequency Questions: Players answered Likert-style scale questions (questions 18 to 37) by selecting the frequency of the economic activities they performed in the game, as seen in Table 7.1.

Table 7.1: Selected Economic Activity Frequencies

Assigned Number	Frequency
1	Never
2	Rarely (less than once a month in a year)
3	Monthly(once a month)
4	Bi-weekly(2 times a month)
5	Weekly (4 times a month)
6	Daily (once a day)
7	Frequently (more than once a day)

7.3. Participant Demographics

The analysis of the RuneScape Economics Survey considers 137 responses. The first section of the survey concerns basic demographics such as age, gender, and geographic location of the players.

7.3.1. Age

The respondents' age range was between 13 and 46. Majority of the participants (55%) were 18 or older (n=137, mode= 19). Although occupations weren't asked, ages have been grouped in five categories that may give an idea about players' stage in life.

Individuals between ages 13-14 were coded as middle school, 15-17 as high school, 18-22 as college, 23-29 as young adult, 30-39 as adult-30s, and 40+ as adult-40s, respectively. A further age separation was made, considering the ages 13-17 as teenagers (n=62, mean=16) and 18+ as adults (n=75, mean=21).

Compared to other MMOGs, RuneScape has much younger players. The majority of the game players consist of teenagers and young-adults (see Figure 7.1). Simple graphics, easy-to-understand game rules, the free user option (as opposed to member-only games that requires a credit card), and browser-based playability may be reasons for the high number of young audience in RuneScape.

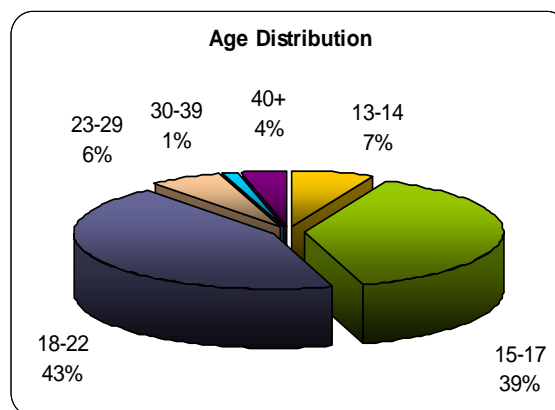


Figure 7.1: Age Distribution of Survey Respondents

7.3.2. Gender

The stereotypical video/computer game player is labeled as an antisocial male teenager. The Entertainment Software Association⁵¹ periodically reports demographics in the video/computer game industry. A comparison between the 2005 and 2008 reports showed a slight increase in percentage of male players from 50% to 55%. Also the online game gender distribution remained same within these three years, in which 56% of the online game players were male and 44% of them were female. Therefore, we can still say that the gender stereotype is true for the video/computer/online game players. However, the gap between the genders is not large.

Survey participants included 130 male and 5 female and two participants preferred to report the gender as “other.” As I discussed in the methodology section earlier, the number of female participants was fewer than expected as shown as Figure 7.2. This result limited the analysis of this survey in a way that would make gender comparison of the survey results unimportant.

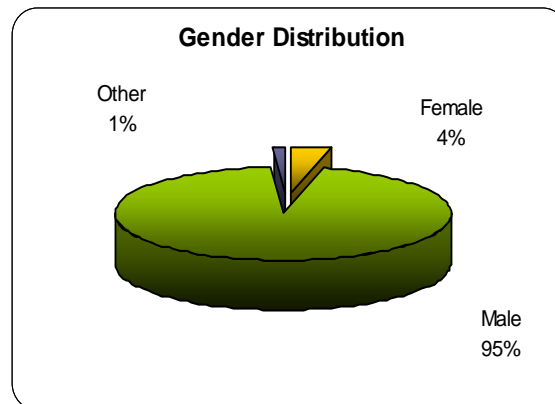


Figure 7.2: Gender Distribution of Survey Respondents

⁵¹ ESA, http://www.theesa.com/facts/pdfs/ESA_EF_2008.pdf, Accessed: February 15, 2009, Essential Facts about the Computer and Video Game Industry Report, TNTG, <http://www.tntg.org/documents/gamefacts.pdf>, Accessed: February 15, 2009, Essential Facts about the Computer and Video Game Industry Report

7.3.3. Geographies

In terms of geographic location, 21 countries were represented; the top three were the US, UK, and Canada, respectively. US participants constituted 51% of the total surveyed population, as seen in the Figure 7.3. Within the US, 28 different states were represented. California and New York tied as states with the highest number of participants. Michigan, North Carolina, and Ohio tied for having the second highest number of participants. Texas and Washington tied in the third place.

Even though the Jagex is based in the UK, the game is also popular in many other countries. Geographic difference is not expected to be a major influence in terms of players' economic preferences in the game.

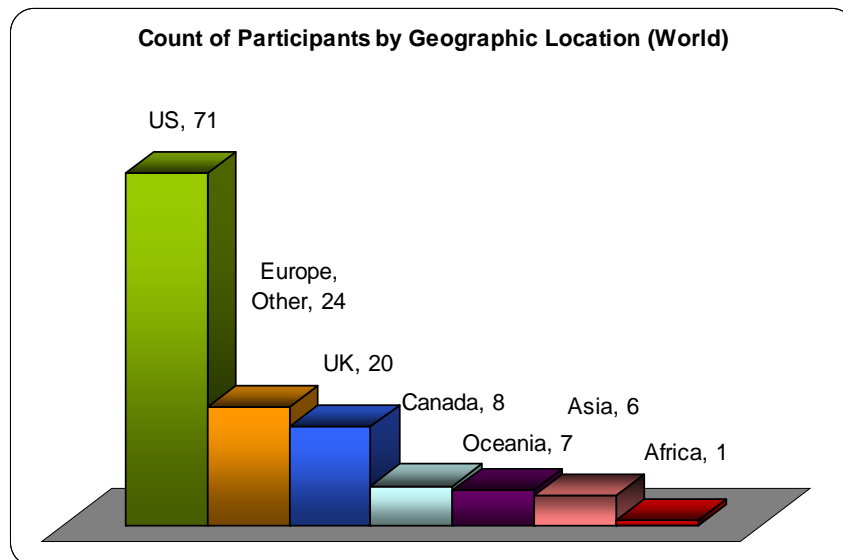


Figure 7.3: Survey Respondents by Geographic Locations

7.4. Game Play

The second part of the survey asks players questions about the account ownership duration, weekly play duration, account levels, and number of avatars, all of which may be affected by density of play and experience in game play.

7.4.1. Account Ownership Duration

Figure 7.4 shows that the majority of the participants (64%) have been playing the game for 36 months to 60 months (n=134, mode=60 months, mean=49 months).

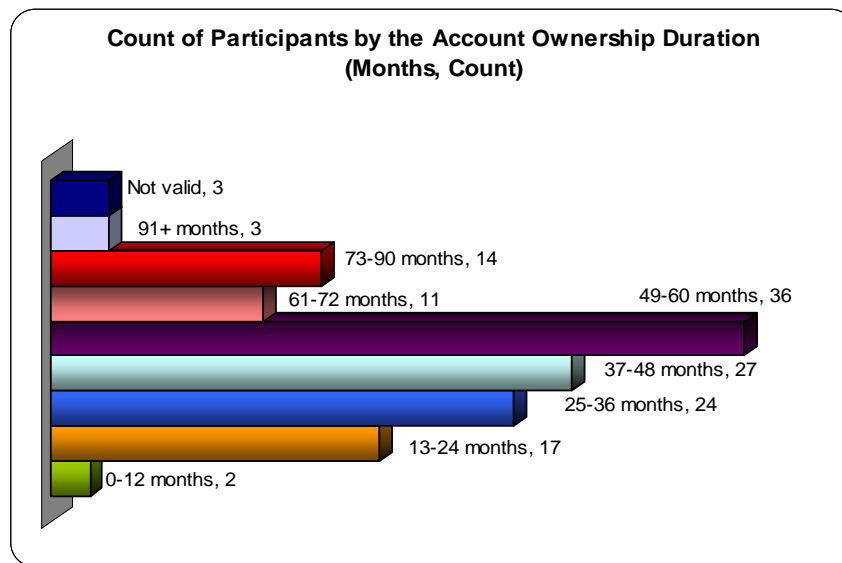


Figure 7.4: Account Ownership Duration

Generally, longer account ownership duration means a more experienced avatar because time is required for practicing game skills, including skills with economic impact.

Analysis of the survey results confirmed this assumption with a significant correlation between the average skill level and account ownership duration ($r=0.381$, $p<0.01$).

However, two players who own accounts for the same time period may have different experiences (or skill points) depending on their playing style, such as aggressive vs. casual.

7.4.2. Weekly Play Duration

One of the interesting results from the survey was the number of hours that players spent on the game. Players reported their play duration between 1 and 66 hours in a week.

Figure 7.5 shows that 39% of the respondents played the game between 20 and 40 hours

a week, which is equivalent to a part-time work. Approximately 9% of the individuals spent 40 hours or more in a week playing the game, which is the equivalent of a full-time work. The percentage of full-time players in my survey is in line with Yee's results (2006) from the "MMORPG Demographics, Motivations and Experiences" survey. Specifically, Yee found that 9% of his survey population plays online games 40 hours or more each week. The only differences between my survey and Yee's survey are about the survey duration and sample size. Yee's survey was conducted over a longer time period (3 years) and had a greater number of participants (5,530).

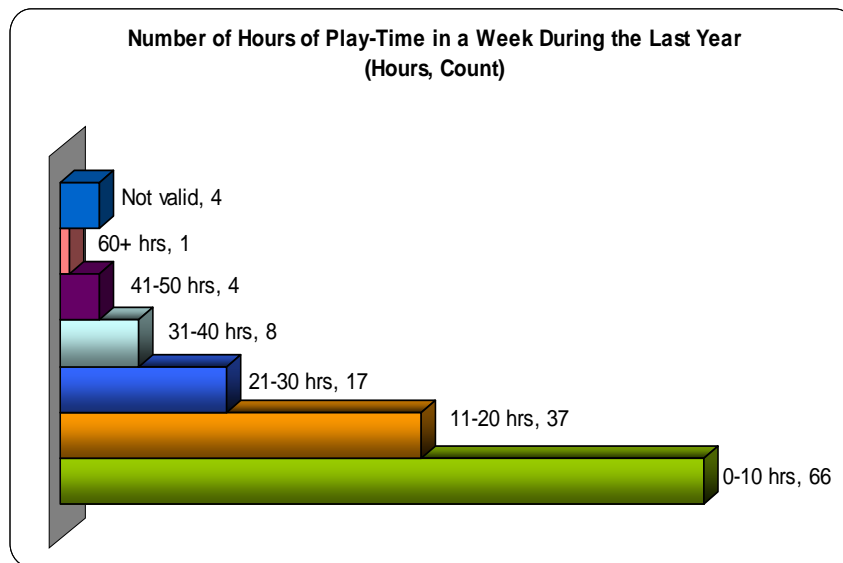


Figure 7.5: Weekly Playtime

Analysis of the duration questions (Q4 and Q6) in this survey revealed that the number of hours played in a week and the age of the players are not correlated ($r=0.021$, $p=0.810$.) Moreover, age of the players has a low correlation with the total play duration ($r=0.155$, $p=0.07$). In other words, since the magnitude of correlation is small, age is considered unimportant in devoting a specific time to the game in general. Older players may spend as much time as younger players.

7.4.3. Account Levels

Account level refers to a numeric representation of combination of game skills that developed over time. Players' level may affect their economic preferences in the game, for example, the higher the players' level the more economic activities they may practice. Therefore, I grouped survey participants based on their average levels. The average level is calculated by dividing the total level with the number of skills. The game developers consider levels 3-55 as low-level, 56-90 as medium-level, and 91+ as high-level characters. In the survey, 69% of the participants were categorized as the medium-level game players (see Figure 7.6). From my own experience as a member of RuneScape, 1 year is needed to reach to level 50, if a player spends approximately 15 hours within the game each week.

According to the survey results, the account level and the age of the players are correlated moderately with a magnitude of 0.389 ($p < .01$), meaning that older the player the higher the level to some extent. This may also mean that older players are more avid players. This result is inline with Pearce's (2008) study, where she found "*baby boomers (people born between 1946 and 1964) represent an active and well-informed niche market with extensive game play experience.*"

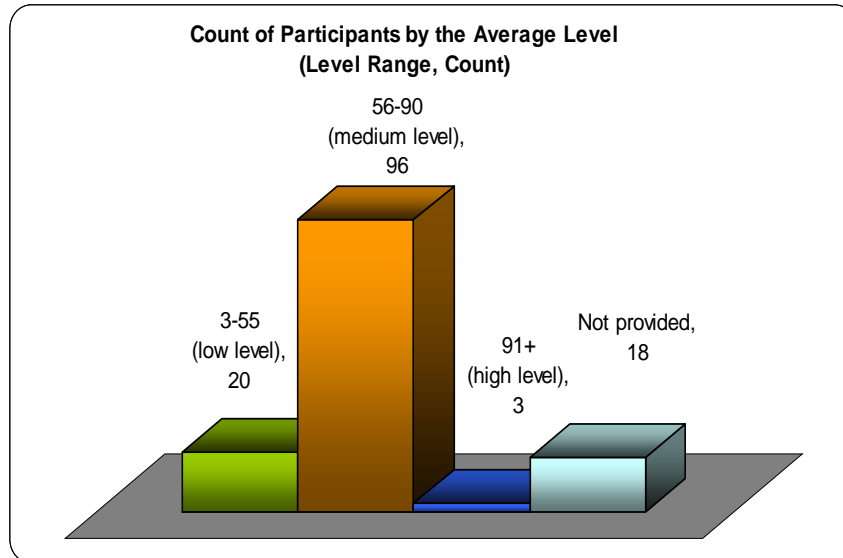


Figure 7.6: Account Levels

7.4.4. Number of Avatars

Every account is associated with one avatar within the game. Players may open many accounts and, therefore, may be represented by more than one avatar in the game. Most of the players prefer to use one avatar in MMOGs, because success is measured by having a highly skilled avatar, and the amount of time devoted to improve this avatar is substantial.

The avatar that is most actively used by the player is considered the primary or the main avatar. Some players prefer to manage more than one avatar in the game. These accounts are called secondary avatars, alt avatars, or mules. Simpson (1999) defines a mule as “*a character that is maintained for the sole economic gain of another character.*” While a variety of motives may be found for having an additional avatar, the following three reasons are especially relevant to this thesis:

- Mule avatars can be used to hold extra items for the main avatar.
- Mule avatars can be trained to perform certain activities and then be sold. In that case, the avatar is referred as “pure.” For example, if players focus on woodcutting activities, they are referred as a woodcutting pure.

- Mule avatars can be used as carriers while performing the RMT, for the situations where RMT is prohibited by the game developers. In RMT cases, main players (seller) load all of the items that they would like to sell to a mule account. After receiving the payment, they give the username and the password of this mule account to buyers.

According to the results of the survey, 36% of the respondents have one avatar in the game and 77% of the players have up to three avatars. (See Figure 7.7)

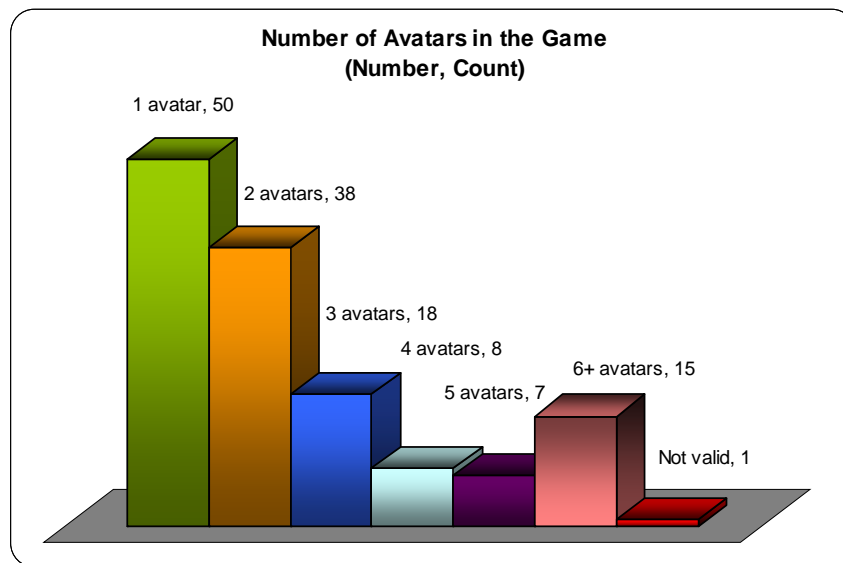


Figure 7.7: Number of Avatars

This survey did not ask participants their reasons for having more than one account. Therefore, reasons may or may not be related to economic activities. However responses to this question eliminated some unrealistic answers in terms of number of accounts.

7.5. Economic Activities

Consideration of economic activities is central to this thesis. This section examines economic activities, perceptions, and behaviors of the players. This section begins by describing the coding scheme used to label a broad range of economic activities

described by players in various open-ended questions. This coding scheme is being used in three different questions (Q7, Q8, and Q9.) This section also identifies players' top three economic activities before it discusses three other critical factors: being rich, describing real world economic changes affecting the RuneScape economy, and identifying similarities and differences between the real world and virtual economies.

7.5.1. Economic Activities Performed in the Game

The first question in the economic activities section of the survey (Q7) asked players to list economic activities that they performed within the game. Buying, selling, and trading were given as common examples of economic activities. This open-ended question focused on players' initial ideas about "what is considered to be an economic activity." Players listed up to five economic activities for this question.

Participants' answers to this first question revealed that buying, selling, mercantile, and GE (Grand Exchange) are the most preferred economic activities; however, these activities are closely related to each other, and sometimes intersect. Thus, coding responses to the first question is controlled by the following criteria:

- If players explicitly mention that all or the majority of their buying/selling activities are made through the Grand Exchange, this activity is coded as the *GE*.
- If players mention that they perform buying/selling and making profit from it, this activity is coded as *mercantile*. *Mercantile* may include *PvP*, *PvE*, or *GE* (without explicitly mentioning it).
- All other trading activities are coded as either *buying* or *selling*. In order to be coded as *buying* or *selling*, players should deal with either other players or shop owner NPCs, not with GE.
- Other economic activities have distinct meanings, so, they are coded separately.

The complete list of the surveyed economic activities follows:

- **Buying:** Buying goods from NPCs or other players.
- **Selling:** Selling goods to NPCs or other players.
- **Mercantile/trading:** Buying and selling goods from/to NPCs or other players aiming to generate profit.
- **Grand Exchange (GE):** Trading via the market place where players can buy/sell goods from/to other players anywhere in the world at any time.
- **Killing/looting:** Killing other players or NPCs and collecting their drops or collecting drops from players or NPCs killed by other players.
- **Producing:** Processing raw materials to create final products.
- **Stockpiling:** Systematically gathering or collecting raw materials or final products (e.g., mining gold ore, cutting trees, fishing lobster).
- **Management (Manage Thy Kingdom-MTK):** Managing a group of NPCs to gather resources for the player.
- **Quests:** Earning different rewards, such as, gold pieces (GPs), items or experience points by completing quests.
- **Bartering:** Trading goods for other goods.
- **Saving:** Collecting GPs for a later use.
- **Consuming:** Eating, drinking, or using resources or materials. (i.e., eating a chocolate cake, firing arrows)
- **Item lending:** Lending goods for GPs.
- **Donating:** Giving away goods and receiving nothing in return.

Some players identified specific skills as an economic activity. In the game, raw, semi-finished or final products can be sold, if not consumed by the player. From one

perspective, the following skills may be considered as actual jobs in the RuneScape labor market. I could code those skills under the main economic activities above, for example, if players indicated that they were woodcutting and selling the logs, it could be listed as *selling* only. Although the output of all skills (goods) are bought, sold, consumed, or destroyed, eliminating the skill names and listing them under the economic activities would result in data loss. It is almost equal to mentioning the total amount of the world trade but not knowing which sectors contributed to this number. Also, considering these skills same as the main economic activities and listing them altogether would create another problem: for example, listing fishing and selling lobsters twice, both under *fishing* and *selling* categories would create duplicate counts. Hence, skill-oriented economic activities (jobs) are coded and counted separately.

The complete list of the surveyed skill-oriented economic activities (jobs) follows:

- ***Slayer:*** A special combat technique that focuses on killing certain NPCs. Valuable loot, including gold pieces (GPs) and goods may be obtained from their carcass. These goods can be sold for GPs.
- ***Runecrafting:*** A crafting skill that allows players to mine rune essence, which can be used for magic. Runes can be either used in combat, or can be sold.
- ***Woodcutting:*** Cutting different trees around RuneScape. The logs can be used for fletching,⁵² can be used in firemaking, or can be sold.
- ***Fishing:*** Fishing in the rivers and the sea. During combat, fish are a good source of food that keeps players healthy. They can be cooked (cooking skill) or can be sold.

⁵² Wikipedia, <http://en.wikipedia.org/wiki/Fletching>, Accessed: July 6, 2009, Fletching: the ancient art of aerodynamically stabilizing arrows from materials such as feathers.

- ***Magic:*** Casting spells using runes. Using different combinations of the runes, players may teleport from one city to another, convert goods to food or GPs (alchemy), and fight.
- ***Farming:*** Growing variety of plants, fruits, vegetables, herbs, and trees from seeds. Herbs are one of the main ingredients of the potions. Some herbs are also used in cooking. Seeds and herbs can be sold.
- ***Mining:*** Mining many different ores around RuneScape. During the mining process, some valuable gems such as diamond may be retrieved. Ores can be used for smithing, and gems may be used for crafting skill. Both ores and processed bars can be sold.
- ***Hunter:*** Tracking and catching different animals around RuneScape. Animal remains may be used in clothing and fletching; animal meat may be sold or eaten. Some caught animals may be used in combat as weapons. Some animals may carry valuable drops.
- ***Crafting:*** Making pottery, leather, jewelry, and weapons. The final products may be used in cooking or farming or may be worn or sold.

According to the survey results for Q7, which asked about types of economic activities players perform in the game, the most performed activities were *buying* (69%), *selling* (68%), *mercantile* (39%), and *GE* (20%), respectively. *Killing/looting* (19%) and *producing* (12%) followed in frequency. *Stockpiling, management, quests, bartering, saving, consuming, and renting* appeared much less frequently—5% or less. The most preferred skill-oriented economic activities were *slayer* (4%), *runecrafting* (4%), and *woodcutting* (3%).

Further analysis of these responses to Q7 provided insight about two important areas: the use of the *Grand Exchange (GE)* and the role of *consuming*. The first insight was that *GE*

offers many benefits over the traditional player vs. player trade. Eliminating the efforts for finding a buyer/seller, standardized price scheme, and 24x7 access are some of the advantages of the *GE*. After the introduction of the *GE* in RuneScape, the majority of the trading practices shifted from PvP to *GE*. Seeing a lower percentage for *GE* (20%) was a surprising result in the survey although one that may be misleading. Players who mentioned *buying/selling/mercantile* (ranging between 39-69%) were very likely to be performing these activities via *GE*, without explicitly mentioning it. Other parts of their responses reinforced this interpretation. If this question had been designed as a multiple choice, *GE* would have likely emerged as a more frequently selected activity.

The second insight from Q7 focused on *consuming*. Very few players (n=2) mentioned that consuming is an economic activity. However, every player in the survey regardless of the level or account ownership duration reported to practice it. Two possible reasons may be assumed for this low occurrence. First, the question was open-ended and second, the definition of the “economic activity” was not provided to the survey participants.

7.5.2. Top Three Economic Activities

In Q8, players identified the top three economic activities that they performed proficiently. In Q9, players named the top three economic activities that made the most money. These two questions helped determine differences between *preferred activities* and *moneymaking activities*.

- ***Preferred activities:*** The results showed that buying was the most preferred activity; 21% of the participants put it in the first place. Even more players, 24%, agreed that selling was the second preferred activity. The mercantile was the third preferred activity, mentioned by 17% of players.
- ***Moneymaking activities:*** Among the top three economic activities that enable players to earn the most gold pieces, mercantile was in the first place with 19%. Players think

that killing/looting was their second moneymaking activity with 19%, and the same percentage for killing/looting applied again for the third place.

Asking two very similar questions with a small variety in wording revealed that players may have different perceptions regarding what is preferred as an economic activity and what is required for money making. Ironically, players have a higher degree of freedom to choose whatever skills they focus on the game, regardless of money, while the job selection in real life has stricter rules, mostly concerning money. For example, players may spend hours by solving quests, being entertained but earning little to no money, instead of focusing on pure skill training (e.g., mining ores and selling them) and becoming wealthy.

7.5.3. Enhancing the RuneScape Economy

In questions 10 and 11 players provided the names of the missing economic activities that they observed in other games (Q10) and the real life (Q11), and should be added to RuneScape. The answers to these questions represented not only a wish list for the game developers but also the rich economic understanding and imagination of the players.

The majority of the participants were happy with the current economic features in the game (i.e., no new features should be added from other games-27% or real life-31%).

The first pattern emerged from the Q10 answers pointed to a common displeasure from one of the current game features: price controls/trade limitations. Players indicated that players should determine the virtual item prices and the trade limitations should be lifted (13%). Obviously, players miss the more liberal economic approach to the game they practiced before 2007, when the game company introduced a series of rules that restricted trade. Other common answers to Q10 addressed more missing features or activities,

including capitalism, complexity, realism, more ways of earning money and alternative economics, such as gambling, crime, and raising armies.

Listing gambling, crime, and raising an army as an economic activity were particularly interesting. Reasons behind these answers may simply be explained by a naïve attempt to catch attention (participant ages are 15, 16 and 17). However, I believe the answers pointing to alternative economics may be evaluated in two ways: either a marketing success of mainstream video games, such as Grand Theft Auto, that center and promote money making out of criminal activities, or an increasing acceptance of the alternative ways of money making/spending in society, no matter what the social results are. Asking more questions in the future studies may reveal a deeper truth about these answers.

More variety appeared in terms of listing the real world economic activities that are missed and desired in RuneScape. Among the answers to Q11, paying jobs was in first place by 12%.

The complete list of missing economic features for both Q10 and Q11 are given below:

- ***More liberalism:*** Player-owned companies, shops, and cities
- ***Complexity:*** Advance stock market with bonds and stocks
- ***Realism:*** Interest rates, time accounts, loans, more investment options, taxes, a mail system, and price differentiations based on location
- ***More ways of earning money:*** Paying jobs, more mini-games, quests, and paid slaying tasks
- ***Social services:*** Donating and assisting others in performing economic activities
- ***Alternative economies:*** Gambling, crime, raising armies, and politics

7.5.4. Being Rich

One of the interesting results derived from Q12 concerns in-game wealth. In-game wealth is measured both in the number of gold pieces (GPs) and in the nature of the goods in the bank account (e.g., rune items, made of “rune ore,” are much more valuable than steel or iron items). The Q12 asked players if they considered themselves economically accomplished (or rich) in the game. Of the total participants, 44% answered as “yes,” 35% answered “no,” and 21% answered “neither rich nor poor.” Players who identified themselves as rich usually reported more than 10 million GPs in their virtual bank accounts.

When I investigate the survey answers, I found that the perception of wealth not only depends on the actual GPs players have, but also on having necessary skills to increase their net wealth at any time. Many experienced players expressed their confidence in their game skills claiming that even if they lose large amount of money, they can manage to make that cash back in a matter of days. These findings are supported when the answers of the players are compared across their average level. Figure 7.8 indicates that players who have higher average level consider themselves as rich.

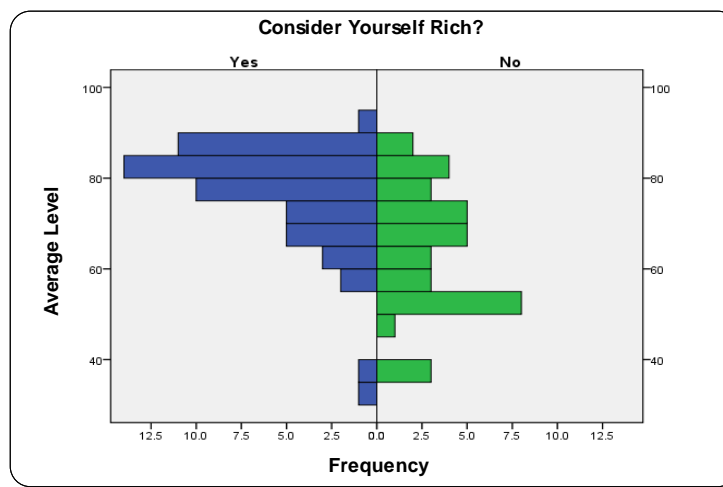


Figure 7.8: Relationship between Being Rich and the Average Level

Moreover, Figure 7.9 shows that teenagers who have high average levels consider themselves rich, while there is no directional association for adults.

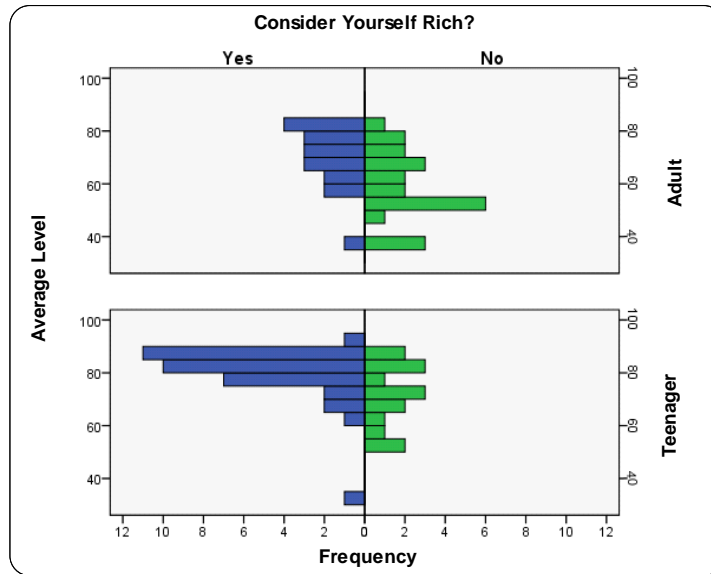


Figure 7.9: Adult Teenager Difference about Being Rich and the Average Level

Participants who do not consider themselves rich generally compared their wealth with players who have similar statistics but greater amounts of wealth. Some players confessed that they play safe or casually, which results in lesser wealth accumulation. Other players freely admitted that they neither have mercantile ability or other skills nor the desire to accumulate large sums of GPs.

Some quotations from players summarize different approaches to wealth:

P1: *“Yes. I am richer than most of my friends and people I know. I work hard for my money, always have. I guess it pays off in the long run.”*

P2: *“Yes, because I am self-sufficient.”*

P3: *“I do consider myself quite well-off in RuneScape. Although the net total of my assets is relatively low, I feel that my skills enable me to make money. This is equivalent to spending money on tuition fees so as to gain knowledge of an area that will get you a*

good job later in life. I have invested money into certain skills to progress, so as to gather a larger yield from them.”

P4: *“Not really. I cannot bring myself to take the risk necessary to become richer.”*

P5: *“No, I am rather pitiful at money making as I do not work very hard to achieve what I want; yet, I desire a lot more than what I could do.”*

P6: *“No, because I never spent all my years grinding skills like others. I played to simply relax and enjoy.”*

P7: *“Up to a certain point, I do. I set a goal to get it and I got it. Yet, I manage to accomplish those goals at the wrong time. I bought a dragon chain (24M) the day before they became 10M cheaper. Compare it to an American buying a huge house. With the current economic situation, the prices are decreasing. He will not be happy he bought that house at the top price either.”*

7.5.5. Does the Real World Economy Affect the RuneScape Economy?

The majority of the participants (77%, n=106) agreed that the changes in the real world economy (RWE) do not affect the RuneScape economy. Figure 7.10 reveals that teenagers and adults do not differ in their perception of whether virtual economy in RuneScape is affected by the real world economy.

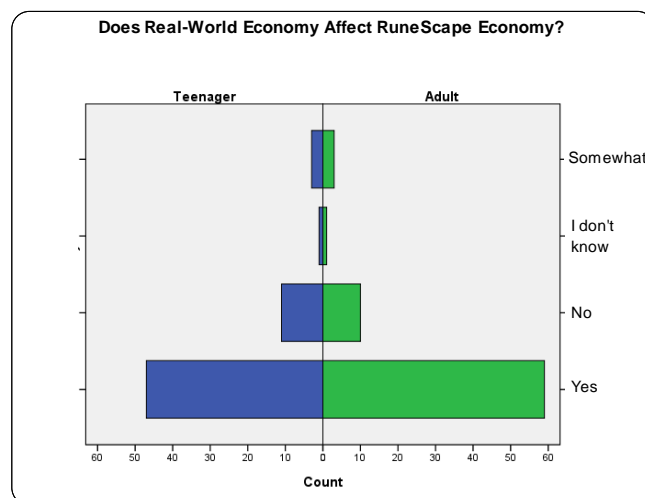


Figure 7.10: The Affect of Real World Economy on RuneScape Economy

The participants who saw a relationship between two realms often mentioned that they were more cautious about the membership fees, number of hours they spend in the game, and, more interestingly, the buying activities they perform in the game, in the light of the recent changes in US economy.

Some examples of participants' answers to Q13 are given below:

P1: *"Some people find it hard to pay for membership to RuneScape, leaving less people to trade valuable members-only items."*

P2: *"You look at the [game] price rises and falls a lot closely when you hear about the [real world] stock market so often."*

P3: *"The bad real economy right now makes me much more cautious about the more expensive items I buy or items I try to merchant."*

P4: *"I don't play as much because I need to make money in real life."*

Surprisingly, some players noticed hidden behavioral patterns concerning the relationships between the RuneScape economy and the real world economy.

P5: *"It has no connection, except for bank holidays, more people play on bank holidays."*

P6: *"As far as I am aware, they make a minimal impact. The only way that real life makes an impact on trading in RuneScape is when the holiday periods come around, meaning that players usually pay a higher price for rare items. For example, the few weeks prior to Christmas typically show an increase in the prices paid for the item Santa Hats."*

P7: *"Another example might be when the real world trading was shut down; the number of autoers [players who use macro programs to perform automated tasks in the game] collecting game supplies massively diminished, and had a huge impact on game prices."*

Additionally, some emotional examples emerged:

P8: *“I think I find myself helping other players with items more. I can’t help all the people in real life that are dealing with hard financial times but I can in RuneScape and so I do when I can. With the exception of those who are not trying to help themselves at all and are just begging.”*

7.5.6. Similarities and Differences of the Two Economic Realms

Q14 and Q15 revealed similarities and differences between the RuneScape economy and the real world economies from the players’ perspective. These questions were important in terms of comparing my findings with the players’ perceptions about the game economy. The majority of the players found some degree of relevance (70%) and difference (73%) between two realms. These questions revealed players’ high level of understanding about game economics.

Similarities

Among the survey participants who find a similarity between two worlds (n=96), the rule of supply and demand was the most stated example (38%). Players also listed price movements (22%) and economic fluctuations (16%). Grand Exchange was often associated with the stock exchange (17%).

Price controls by the government (Jagex), monopoly effect in production, trade restrictions, inflation, recession, similarities to different economic systems such as socialism, or capitalism, existence of global economy, currency (gold pieces), black-market, production, wealth distribution, stockpiling, and speculation are also mentioned as similarity in differing percentages from 1 to 7.

Some player quotations regarding the similarities between two economies:

P1: *“Some aspects are similar, like supply and demand. Items crashing in price when supply is high or demand is low and items rising in price when there is high demand or low supply. It is all similar as there are floor prices for items, like in real life.”*

P2: *“Whenever a new item is released in game the prices for it are very high but fall to a more reasonable level later.”*

P3: *“Yes, it is slightly similar. The grand exchange is similar to the stock market, where you can purchase shares and sell them back for profit.”*

P4: *“The similarities are slight in my view, but still have some basis in the free market model represented by capitalist countries like the U.S., U.K. and to an extent Japan. The Dow Jones, NASDAQ, and Tokyo Exchanges are represented in the RuneScape world by the limited trade allowed between players, in that there is a greater amount of fluctuation in pricing that is driven by the consumer demand, however this is more of a “black market” approach. If an item cannot be purchased on the GE, the trade caps allow player-to-player interactions with a much higher % in value than through conventional markets. With the introduction of junk trading, any item can be bought or sold for any price, but it is outside of the basic game controls. However Merchanting Clans have found loopholes in the GE mechanics and can drive prices easier than a single player, just like big corporations currently have more control over individuals on price fixing.”*

P5: *“A small hint (“Hold onto you Robin Hood hats”, which was a pun) made the price of that item skyrocket. It's the same on the stock exchanges. If one company announces to take over another, both will skyrocket.”*

Differences

Among the survey participants who find a difference between two worlds (n=100), 24% mentioned either government (Jagex) or large mercantile groups (clans) control the prices in the game, which is a difference from the real world in general. This approach is

somewhat a naïve interpretation of the RWEs. In capitalist economies price is somewhat determined by the supply and demand, but, government also acts as a regulator. Also, hidden or not, some big companies, especially in sectors where monopolies exist, control the market price to some degree. Another group of respondents found RuneScape economy easier to manage compared to RWE (11%). Similar percentage of the participants (9%) saw no resemblance between two economies without mentioning any specific reason.

Survey respondents listed other differences of virtual economics from real world economics:

- higher cost of raw materials compared to finished products,
- ability to buy skills with money,
- fewer or non-existent economic regulations,
- existence of fantasy items,
- luck factor in looting,
- unlimited supply of resources,
- lower interest in personal wealth,
- lack of some important goods, item decay, tax system, and currency exchange,
- different rules for price determination, employment, and production cycles,
- limited human interaction in trade, especially after GE.

Some player quotations regarding the differences between two economies:

P1: *“Real life doesn’t have gnome scarf or \$700 million Christmas crackers.”*

P2: *“It is a game, and some people could care less about how rich they are.”*

P3: *“Far, far fewer factors effect the RuneScape economy compared to the real world economy. Certain raw materials are more expensive than the finished products (e.g., raw fish vs. cooked fish)”*

P4: *“The GE constraints and player-to-player caps on trade are much more reflective of a socialistic/communist based approach of extreme government (Jagex) control vs. truly free (market based) trade. China’s approach to the value of the yen and most of the markets in Asia is what I think about when I relate RuneScape economics to the real world. This is reflected in the mechanics of the GE. An item cannot “crash” or spike on the GE without Jagex control. Everyone pays about the same price for every item (over the short term). In the real world an item or a company can lose 100% of its value just as easily as gaining that and more in the course of a day.”*

P5: *“Wealth can also be created by high alchemy.”*

P6: *“No one is going go hungry if the Grand Exchange collapses or goes crazy. No one has to worry about losing a job because a factory went under. There are always more resources re-spawning somewhere in RuneScape.”*

P7: *“Well it doesn’t go into global breakdown.”*

P8: *“If everything starts going to hell, Jagex can just adjust the prices, also you can't buy on credit.”*

7.6. Frequency of Economic Activities

The survey questions measuring the frequency of economic activities initially had 20 items with a 7 point Likert-Scale (1: Never, 2: Rarely, 3: Monthly, 4: Bi-weekly, 5:

Weekly, 6: Daily, and 7: Frequently). Data consisted of a total of 119 observations.

According to the descriptive statistics given in Table 7.2, RuneScape players used Grand Exchange very frequently (Mean=6.71, SD=0.678) while they almost never bought/sold

items from/to other players with real money (Mean=1.03, SD=0.289). Some other economic activities that players show high frequencies were; “selling items to other players with gold pieces (GPs)”, “buying items from other players with GPs”, “accumulating goods for sale,” and “buying items from NPCs with GPs”. Players reported very small frequency of “creating avatar only for selling with GPs” and “pure accounting.”

Table 7.2: Frequency of Economic Activities

Sequence	Item Description	Mean	SD
1	Buying items from NPC's with GPs	4.93	1.630
2	Selling items to NPC's with GPs	3.92	1.774
3	Buying items from players with GPs	5.93	1.351
4	Selling items to players with GPs	6.03	1.334
5	Buying items from players with real money	1.03	0.289
6	Selling items to players with real money	1.03	0.289
7	Grand exchange	6.71	0.678
8	Hiring other players	1.84	1.200
9	Being hired by other players	1.74	1.305
10	Accumulating goods for sale	5.50	1.478
11	Lending for GPs	3.45	2.041
12	Borrowing from other players for GPs	2.24	1.544
13	Loot sharing	3.38	1.827
14	Buying house	2.48	1.389
15	Improving house	3.17	1.548
16	Buying items with GPs only for selling	3.53	2.020
17	Creating avatar only for selling with GPs	1.07	0.362
18	Pure accounting	1.59	0.868
19	Donating money	3.41	1.763
20	Stockpiling then selling	3.48	2.074

N=119 and 18 observations were not included since they had at least one missing value.

Reliability analysis of the survey for 20 items provided Cronbach's Alpha value of 0.739 that is acceptable considering the initial use of the newly developed survey. However, item-total correlations for 11 of the 20 items were lower than 0.30 indicating that contribution of these items to the total survey score was low. Therefore, I dropped these items from the analysis and as a result Cronbach's Alpha internal reliability value

increased to 0.752. Item-total correlation values of the final set of 10 survey items are given in Table 7.3.

Table 7.3: Item-total Correlations for the Final Item Set

Item Description	Corrected Item-Total Correlation
Buying items from players with GPs	0.462
Selling items to players with GPs	0.381
Lending for GPs	0.513
Borrowing from other players for GPs	0.526
Loot sharing	0.511
Buying house	0.302
Improving house	0.381
Buying items with GPs only for selling	0.344
Stockpiling then selling	0.484

7.7. Real Money Trade

While some MMOG companies, such as Sony (EverQuest), allow players to trade game items for real money, Jagex always discouraged real money trade (RMT). At the end of 2007, the game company announced a series of rules that restrict the RMT, claiming; “the real money trade is evil.” Currently, the penalty of participating RMT is being banned from the game.

Players’ opinion about buying/selling virtual RuneScape items (including gold pieces) for real money is measured in two different sections in the survey. The first set of questions (Q16 and Q17) was more open-ended, asking players’ opinion about RMT without explicitly pointing to the player. The second set, questions between Q38 and Q45, aimed to measure the current reflections of this policy, especially asking the players’ participation in these activities. The final question in this section (Q46) measured if players consider earning money from virtual item sale as playing or working.

7.7.1. Thoughts for Buying and Selling with Real Money

Majority of the players appeared to be against buying (85%) and selling (64%) virtual items with real money (n=137). However, an interesting result emerged from Q16 and Q17. A considerable number of players showed some degree of sympathy to spending/earning real money by trading virtual items. Moreover, a higher degree of acceptance is observed for selling vs. buying. Some participants even pointed to the current economic conditions in US economy and regarded the money coming from the virtual item sale as an additional source of income. Participants, who are sympathetic, generally claimed that they do not/will not practice RMT themselves but it can be tolerated by other players. The pressure of being banned definitely affected the answers as seen in the following examples:

P1: *“If there were no negative real world results (example: stolen credit cards being used to pay for membership, for which money had to be returned by Jagex) then I couldn't care less that other people wanted to buy intangible virtual items. I personally would never do it, though.”*

P2: *“Some people do not have as much free time as other. If they wish to use their hard earned real money to buy gold or items I don't have a problem with it.”*

P3: *“Making money in RuneScape can take vast amounts of time. For adults, it makes sense to spend this time at a job and buy the items in RS cheaply. I am not an adult however so I would not consider this.”*

P4: *“I understand the motive, but it is not a victimless crime.”*

P5: *“I am not completely opposed to it, though; I would never participate in it for fear of being banned. The economy is bad at this time, so getting money from anywhere, even a video game, is useful, though against the game rules.”*

P6: *“I think that as long as people are willing to buy items in the game for real life money, it is OK to sell your items if you want to. What could be better than getting a bit of cash for playing a game?”*

P7: *“I think that it isn’t particularly bad on a small level, e.g. if I sold my money to a friend I have in real life. But gold and item selling is usually done on a massive scale. I don't think it is right.”*

P8: *“If I had millions to spare, I’d do it. Some investors/merchants are making 20mil+ in a day. That’s \$80 irl [in real life] a day. Very nice!”*

7.7.2. Practicing the Real Money Trade

Almost all players reported that they do not practice RMT. As explained earlier, authenticity of these answers can not be verified, since the avatar names were asked at the beginning of the survey. Consequently, the answers to the RMT questions are regarded as insignificant and are not included in the statistical analysis. A couple of players who are involved in RMT admitted that they practice/d it rarely or in the past. Among those players who participated in the RMT, buyers spent \$1-100 and sellers earned \$1-500.

Some player quotes reflecting different perspectives towards RMT are as follows:

P1: (Against) *“People that participate in real world trading are cheaters, and should be banned from the game. It cheapens the efforts of honest players.”*

P2: (Sympathetic) *“Trading virtual goods for real money in RuneScape is officially against the rules set by Jagex, however it is still done. I can see how this, especially at a lower age, can be a lot more fun, and sometimes more rewarding (depending on your average income, both online and in the real world) then getting a real job.”*

P3: (Realistic) *“Most people who trade items for real world money wouldn't openly admit to it, as the action violates the rules and easily results in erasure of that account.”*

7.7.3. Earning Real Money from the Game: Is It Playing or Working?

Starodoumov (2005) asked EverQuest 2 and Project Entropia players if they consider earning real money from virtual item sale as playing or working. He hasn't reported the actual distribution of the answers in his paper. However, he indicated that as long as the real money doesn't involve, perceptions of the game nature doesn't change. Therefore, it is still considered as playing.

Among 34 valid answers to Q46, 53% of the survey participants considered buying/selling virtual items for real money as working. Fewer participants (24%) still considered it as playing. Some players thought it is both playing and working (15%). The respondents saying neither working nor playing were 9%. When investigated for age groups, 50% of teenagers and 55% of adults considered buying/selling virtual items for the real money as working. However, 25% of the teenagers considered it as both playing and working compared to 9% of adults. Moreover, 27% of adults considered it as playing compared to 17% of teenagers. Figure 7.10 provides visual demonstration of the teenager-adult differences.

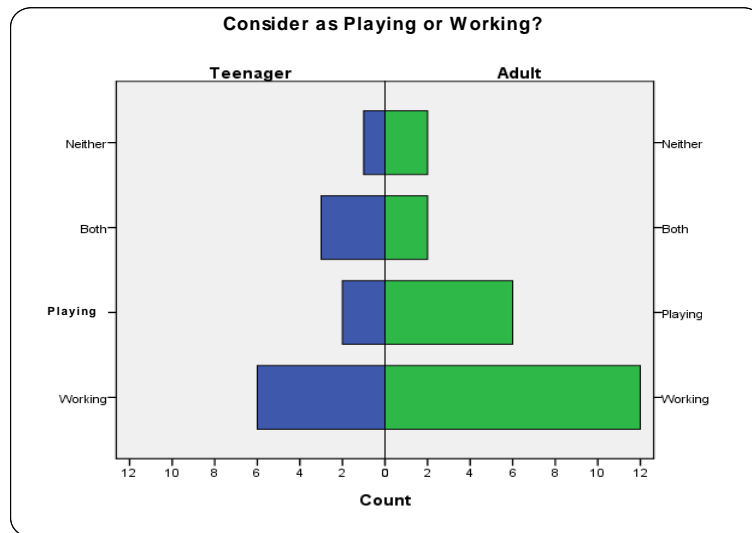


Figure 7.10: Adult Teenager Difference about Playing/Working

Some actual player quotations are:

P1: *“I consider it to be playing. It is sometimes fun to make money, and in any case it is not that difficult. Also, only under rare circumstances can the pay even be compared to a wage.”*

P2: *“I consider it to be illegal (because it is).”*

P3: *“Depends on the scale and activity. If no experience points are gained and it is done frequently, I can consider it as work, but it can be a way to make money which is more fun than an average job.”*

P4: *“I would consider it working. However, if you play the game legitimately with no intent to sell your money/items but then decide to sell them before you quit, I would consider that playing.”*

While players’ answers revealed mixed feelings between the temptation of an alternative and fun way of moneymaking and guilt of rule breaking, I agree with Starodoumov’s point of view in this debate. The virtual item trade is working, if real money is involved, no matter how small the amount is.

7.8. Conclusion

I conducted the RuneScape Economics Survey in a one-and-a-half month period in 2009. This study is the first academic survey that focuses on player perceptions about the RuneScape economy, real economy, and interactions between them. The findings of this survey are a valuable resource for the game company Jagex, other game developers, players, educators who are interested in virtual economics, and researchers who would like to use virtual economies as a laboratory for understanding economic behavior. I realize that MMOG players’ perceptions of economy are more sophisticated than I initially expected.

My RuneScape Economics Survey measured five areas: player demographics, game play, economic activities, economic activity frequencies, and real money trade.

Demographics: Based on my personal observations as a member of RuneScape, I expected a higher percentage of teenager players. I was surprised to see that 55% of the players are adults. Another unforeseen result was that majority of players (96%) were male, which created a gender bias in my survey. My further investigation in game forums revealed that female players may comprise much more than 4% in the game, but they were less audible. The reasons of this low occurrence may be explored in a future study. Survey respondents came from 21 different countries, which is satisfactory in terms of hearing voices from different cultures.

Game Play: RuneScape players are loyal. Most of them (64%) have been playing the game three to five years. They are avid players spending 20 hours+ in a week in this virtual world. Medium-level players constitute majority (69%) of survey participants. Survey respondents also have up to three avatars in the game.

Economic Activities: RuneScape players engage in variety of economic practices in the game. A typical player performs up to five different economic activities, including ones that are observed in real world economies, such as buying, selling, saving, consuming, and others that are not—for example, killing, looting, and alchemy. Players also have many other ideas about how to improve the virtual economy, based on their observations in other games as well as in real world economy. Although they have hard time associating the virtual economy with real world economy (77%), further questions revealed that 70% found similarities and 73% found differences between the virtual economy and the real economy.

Economic Activity Frequencies: Among survey respondents, Grand Exchange appeared to be the most frequently used economic feature, which was expected considering the advantages over the traditional PvP and PvE trade. Players listed the real money trade as the least engaged activity. The answers to the economic activity frequencies were reliable, as buying was often associated with selling. Lending was paired with borrowing. Players who bought a house spent money for improving it. Finally, players who were merchants also stockpiled virtual goods for sale.

Real Money Trade: The timing of my survey was not ideal in terms of measuring the effects of RMT. Game developer restricted RMT in 2008, and it had almost vanished by the time I conducted my survey. In my survey, players appeared to be obeying the rules, but they claimed that if no consequences existed, they would participate in RMT. Furthermore, even if RMT were restricted by the game developers, determined players always found alternative ways to perform RMT. A majority of survey respondents (53%) indicated that buying virtual items for real money was working.

I conclude my survey findings with few notes about the survey design. First, asking for the avatar name was not beneficial. Although asking this question helped to gather additional data, most players hesitated revealing their true attitude towards RMT. Second, using open-ended questions helped increase my understanding of player perceptions at a deeper level, but it also limited the power of statistical analysis. Third, data sampling was one of the most challenging parts of the survey design. Since player demographics were not publicly available, I selected a non-random convenience sampling method, which limited my ability to represent the actual population.

CHAPTER 8

CONCLUSION

The main purpose of this thesis was to investigate relationships between virtual economics and real world economics. I studied whether virtual worlds can be a laboratory for economic research, how realistic virtual economies are, and what level of economic understanding of resides in RuneScape players. The rationale behind this work was to treat virtual economies as comparative economies that can be used as a laboratory to test the real world economic concepts and behaviors. While exploring answers to my research questions, this thesis also revealed three unique contributions to the literature: a faucet-drain economy modeled for RuneScape but that can be extended to other MMOGs, a first of a kind formula for explaining the money supply in MMOGs, and a comprehensive survey that focuses on player perceptions in the area of virtual economics.

Initially, I identified my main audience as game developers, players, and economists. However, my findings are also meaningful for educators, researchers, and people who are interested in MMOGs and economy in general. Based on the results of this thesis, game developers can learn about player insights and improve the game accordingly. Players may increase their awareness about the economic concepts, familiarize new income-generating techniques, and transfer some of the economic learning to the real life. Economists can explore a variety of economic theories and behaviors, based on methods I introduce in this study. Educators can use virtual economy to teach different economic concepts in a fun environment. Virtual economics can be a low-cost mass education method for economy. Finally, the multidirectional methodology used in this thesis can

help future researchers who are aiming to discover issues related to virtual economics to establish alternative data collection methods.

In this chapter, I first present the answers to my research questions and then briefly summarize limitations of the research. Finally, I suggest possible areas worth exploring in further research.

8.1. Results

In this study, I tried to answer the question about whether virtual world economics reflect the real world economics. While seeking my answer, I focused on a specific MMOG, RuneScape, as a case study. Based on my findings, I found out that “virtual economics of RuneScape partially reflects real world economics,” “player perceptions of virtual and real world economy are surprisingly deep,” and “virtual worlds can be used to study real world economy.”

8.1.1. Similarities and Differences

My first subordinate research question was about finding similarities and differences between virtual world economics and real world economics. In general, several economic features in RuneScape are derived from real world equivalents. Use of currency, trade practices, aggregate supply and demand, elasticity of demand, and determination of price and profit create a virtual economy similar to those seen in real world economies.

Economic agents, such as individuals, clans, and the government, act rationally in order to maximize their utilities. Citizens of Gielinor (players) and the organizations they form (clans) obey the economic rules that are introduced by the government (Jagex), while trying to bend the economic rules for their benefit.

However, some economic concepts do not necessarily reflect the real world dynamics. First, unlike complex functions of real world banking sector, RuneScape banks mainly act as safekeeping. Second, earning income is not a necessity but a preference in the virtual economics. Third, scarcity shows a dual structure that destroys the real world perceptions by providing same opportunities to all players at the beginning of the game and concerning an unlimited raw resource supply. However, scarcity principle applies to the demand for player-generated goods in the economy. Also, players have to divide their scarce time between the different activities in the game in order to reach their biggest possible wealth. Fourth, the money supply in virtual worlds has its own rules that eliminate all the government regulations observed in the real world. In order to protect the fun-factor, game developers introduce faucet-drain economy with unique rules. Fifth, unpleasant happenings of the real world (decay, death) never apply to RuneScape. Finally, unlike real world, RuneScape has a closed economic system.

Apart from very limited real world trade, RuneScape represents a closed economy that is not affected by manipulations from other economies. All resources in the game environment are either programmed by game developers or created by players based on pre-programmed game rules. The RuneScape economy also shows some of the perfect competition circumstances that are rarely found in real world economies:

- ***Equal access:*** All items in the game are produced with the same production technology and raw materials.
- ***Homogeneous products:*** Items are homogeneous, so no difference exists between their features. For example, all iron swords come with the same shape, dimension, quality, and endurance.
- ***Perfect knowledge:*** Players learn actual prices of the items from the *Grand Exchange* or from stores and can compare them any time they want. While price differences

may be observed between locations, players always find places to buy at a low price and sell at a high price.

- ***Low entry and exit barriers:*** The number of stores is pre-determined in RuneScape, and players can not be a store owner. However, technically, each player can trade with others and act as a private company. Therefore, players do not face limitations for entering or exiting the market.
- ***Prices are determined by the market:*** Aside from pre-determined store prices and GE trade restrictions, all prices in PvP market come from actual market supply and demand. All of these features are similar to perfect competition.

In summary, the economic environment in MMORPGs has its own dynamics where some of the features of the virtual economies are similar to real world economies while other features are not.

8.1.2. Player Perceptions

My second subordinate research question concerned the economic perceptions of RuneScape players. In order to answer this question, I designed the RuneScape Economics Survey and received 137 valid responses. During my initial observation period, the majority of the game players I encountered were teenagers. When I analyzed my survey answers in detail, I found out that the age distribution of my participants was almost balanced, with slightly more adults. After my analysis, I drew four conclusions:

- The economic activities in virtual economy of RuneScape are varied and surprisingly detailed.
- The intentions behind the different economic behavior are worth study in future research.
- Adults can be avid players, just as teenagers.
- Teenagers can evaluate the economy and make complex economic decisions.

Although teenagers may not be considered as economically independent individuals, their behaviors in the game environment showed a great capacity of performing and responding complex economic tasks.

8.1.3. Virtual Economy as a Laboratory

Finally, in response to my third subordinate research question, based on my direct observations, analysis of the survey results and other-reports, I believe that virtual worlds can be a laboratory for studying economic theory and behavior. However, laboratory conditions should be determined carefully before the actual experiment. I explain the ideal laboratory conditions in the next two sections.

8.2. Limitations

This thesis focused on a specific part of a contemporary phenomenon, MMORPGs. I studied this broad and complex phenomenon from a narrower perspective, in terms of the virtual economics of a single MMORPG. During the report preparation period, I observed the following limitations:

- ***Time:*** This study was conducted in a short time period. Dynamics of the RuneScape economics and the related in-game data may differ in a longer time period. More time and larger user involvement are required to prepare a more detailed and accurate economic analysis.
- ***Subjectivity:*** Part of this study was based on observing other players within the actual game environment and deriving information from public websites and forums. This observation method is subjective and may introduce some inaccuracy, bias, or missing information.

- ***Cross-sectional in-game data:*** The examples in this thesis (e.g., item selling/buying prices) were selected as cross-sectional and may not necessarily reflect all of the game characteristics.
- ***Limited MMOG data:*** Gathering the MMOG market statistics and demographics is not easy. Market data used in this study were retrieved from corporate press releases, news articles, public comments, and a personal website (mmogchart.com) that is commonly used as a source for market data for many other researchers. The MMOG industry lacks a public central reporting system that limits researchers who are interested in creating a healthy market analysis and data sampling for their surveys.
- ***Open-ended questions:*** Using many open-ended survey questions increased the variety of answers but complicated the statistical analysis process.

8.3. Future Studies

Recruitment process of my survey was harder than I expected. I selected all of my participants using non-random convenience data sampling method. As a result, the distribution of the participants was biased towards male players. In the future, I plan to contact the game developer and ask for possible collaborations in terms of reaching a larger and more balanced participant pool. Also, this study covers players' understandings of the game economics. Learning the logic and reasons behind the current economical implementations in the game from game developers' perspective would enable in-depth analysis using the other side of the coin.

Virtual worlds are still evolving. Since they haven't reached their maturity yet, finding comparable virtual economic systems is hard. The selection of a single MMOG results in a narrowly focused study. Although this thesis focused on one case study, a follow-up study that includes other virtual economies would be interesting.

During the process of selecting economic concepts to examine, I found that few academic research articles evaluate virtual economies as a whole or explore economic issues in detail. A follow-up study could seek to expand other economic issues that can be observed in virtual economies, such as inflation, employment, and economic growth. All of these issues can be observed either from the internal perspective of the virtual economy or from possible interactions between virtual economics and real world economics.

APPENDIX A

RUNESCAPE ECONOMICS SURVEY

1	Age	DEMOGRAPHICS
2	Gender	
3	Avatar Name (Please enter only your primary avatar name, if you have more than 1 avatar)	
4	How many months have you been playing RuneScape?	GAME PLAY
5	How many accounts do you have in RuneScape?	
6	Over the past year, how many hours a week on average have you played RuneScape?	ECONOMICS
7	What type of economic activities (buying/selling/trading, etc.) do you perform in RuneScape?	
8	Please list the top 3 economic activities you perform proficiently in RuneScape?	
9	What are the top 3 in-game economic activities that enable you to earn the most gold pieces?	
10	What economic activities available in other games should be added to RuneScape?	
11	What economic activities that you perform in the real life should be added to RuneScape?	
12	Do you consider yourself economically accomplished (or rich) in RuneScape? Why?	
13	How do real life changes in the economy affect your trading activities in RuneScape?	
14	Do you think the RuneScape economy is similar to the real world economy? If so how?	
15	Do you think the RuneScape economy is different from the real world economy? If so how?	
16	What is your opinion about buying virtual RuneScape items (including gold pieces) for real money?	
17	What is your opinion about selling virtual RuneScape items (including gold pieces) for real money?	
	How frequently do you perform the following economic activities in RuneScape? [Frequently (more than once a day), daily (once a day), weekly (4 times a month), bi-weekly (2 times a month), monthly (once a month), rarely (less than once a month in a year), never, other (please indicate)]	
18	Buying items from Non Player Characters (NPC) with in-game money (gp or gold pieces)	
19	Selling items to Non Player Characters (NPC) with in-game money (gp or gold pieces)	
20	Buying items from other players with in-game money	
21	Selling items to other players with in-game money	
22	Buying items (including avatars) from other players for real money (USD, Euro etc.)	
23	Selling items (including avatars) to other players for real money (USD, Euro etc.)	
24	Participating in the Grand Exchange in RuneScape	
25	Hiring other players to perform certain in-game activities for in-game money	
26	Being hired by other players to perform certain in-game activities for in-game money	
27	Performing certain activities (i.e., mining, woodcutting, fishing) to accumulate goods	
28	Lending one of your items for in-game money	
29	Borrowing other player's item for in-game money	
30	Loot sharing (a system developed by the game designers for equally sharing monster drops in combat areas with other players)	
31	Buying a house with in-game money	
32	Furnishing or improving your house with in-game money	
33	Buying an item with in-game money only for selling purposes (i.e., not using it)	
34	Creating an avatar only for selling it for in-game money	
35	Creating an avatar only for performing certain activities for in-game money making (pure account)	
36	Donating money to other players (receiving nothing in return)	
37	Stockpiling any item in demand, to sell it for a higher-than-average price	
38	If you buy RuneScape virtual objects for real money, explain why.	REAL WORLD TRADE
39	How do you determine the purchase price for virtual objects you buy? (i.e. paying \$x is fair for the item y)	
40	How frequently on average do you buy RuneScape virtual objects for real money? [Frequently (more than once a day), daily (once a day), weekly (4 times a month), bi-weekly (2 times a month), monthly (once a month), rarely (less than once a month in a year), never, other (please indicate)]	
41	How much have you spent buying virtual objects for real money so far? [\$0, \$1-50, \$51-100, \$101-500, \$501-1000, \$1000+, Other (please indicate)]	
42	If you sell RuneScape virtual objects for real money, explain why.	
43	How do you determine the selling price for virtual objects you sell? (i.e. selling the item y from the price \$x is fair)	
44	How frequently on average do you sell RuneScape virtual objects for real money? [Frequently (more than once a day), daily (once a day), weekly (4 times a month), bi-weekly (2 times a month), monthly (once a month), rarely (less than once a month in a year), never, other (please indicate)]	
45	How much do you earn by selling virtual objects for real money, on a weekly basis? [\$0, \$1-50, \$51-100, \$101-500, \$501-1000, \$1000+, Other (please indicate)]	
46	Do you consider performing income-generating activities for real-world money (buying/selling game objects for real-world money) to be playing or working?	
47	Additional comments (you may add any comment regarding to this survey)	

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