



Policy questions raised by virtual economies



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ABSTRACT

Over the past decade the number and scope of so-called *virtual* economies has risen rapidly. Careful study reveals that the label “virtual”, while useful in a descriptive way, does not identify anything economically unique. Virtual economies tend to behave like any other economy and also increasingly interact in predictable ways with the so-called *real* economy. Yet, these interactions raise important and unresolved questions for law and policy. While most of the legal questions have been addressed by scholars, at this point, most remain unresolved by the courts. In addition, there is little systematic analysis of policy issues for virtual worlds. This paper identifies a number of reasons why the boundaries between the real and virtual worlds are eroding. In doing so, it addresses a few of the major policy issues faced by virtual world operators as the boundaries of their creations push against the real world. It also demonstrates how the developers of virtual worlds already behave as policy makers, and how their own actions continue to blur the boundary between themselves and national governments.

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1. Introduction

Since the late 1970s, people in networked online environments have created, owned, and traded persistent digital things that have value for them. These activities – production, ownership, and exchange – meet every reasonable definition of *economy*. By the late 1990s, persistent online environments came to be labeled “virtual worlds” and hence the economies within them were called “virtual economies.” This was a labeling misstep. A 3D depiction of a car is (perhaps) usefully labeled as a virtual car – a car that is not quite real. But it is not as clear that an economy in a virtual world is not quite real. The “real” economy deals with things that are intangible all the time, as people buy, sell, and trade URLs, images, software, and ideas without second thought to the reality of the product. The items in a virtual world are not different. They are intangible, but they are also useful, scarce, and persistent.¹ In the context of a virtual world they have real value.

One of the more interesting aspects of virtual worlds is that they can be readily manipulated by changing the code. The rules (physical, social, or laws) of a virtual world can be defined more extensively and easily than the rules of the real world. Changing the properties of the game or world can alter the very nature of a virtual economy, often with profound consequences for players. For example, the developers of multiplayer online games occasionally take actions that raise all players’ base level of productivity in the game.² When that happens, the value of the marginal productivity provided by many items falls, leading to a substantial reduction in virtual wealth. This change can reverberate into the real world, where

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¹ How long these database entries should persist is one of the major policy questions that virtual worlds may have to face in the future.

² A common method for doing this is raising the so-called ‘level cap’. This allows players to earn higher levels, which increases the power of their character.

virtual items are often bought and sold for real money. Thus, an increase in the base productivity may thus drastically improve a player's productivity in game, while simultaneously resulting in a (potentially) substantial financial loss in both the real and virtual economies. As this example illustrates, the designers of virtual economies are policy makers in a very real sense, and their decisions affect life both inside and outside of the game.

To players, “code is law” (Lessig, 1999). The power of designers to affect the in-game lives and wellbeing of players, in particular, far outstrips that of their real-world counterparts: the law-makers and enforcers of the real world. Contrast the merchant operating an intergalactic freight business in the virtual world EVE Online versus with a merchant operating an intercontinental freight business in the real world. Yes, the consequences of policy changes – at this period in time – are generally less severe for a merchant in EVE Online, than a merchant in the real world, but the developers of EVE Online control much more than just the laws and rules that bind the merchant. They control the weather, the number of pirates, and the size of the waves.

The conception of developers as policy makers has some interesting implications. Drawing the line between what is real and virtual is becoming increasingly complex, if not impossible. Virtual economies often mix with economies based on non-virtual goods. Some examples of this include reward points, token economies, art, frequent flier miles, antiques, baseball cards, and intellectual property. It is common for players of online games to exchange virtual for non-virtual goods (Lehdonvirta & Ernkqvist, 2011). When this mixing occurs developers and philosophers of virtual worlds often deploy a concept called the *magic circle*, which was introduced by Dutch historian Johann Huizinga in his work *Homo Ludens* (Huizinga, 1955). The magic circle is the theoretical boundary between play activity and serious activity. Historically, virtual goods were only emergent features of play environments such as online games. However, as their genuine economic value became apparent, virtual goods began to be traded against other goods that were not within the magic circle. The trade of virtual for real blurs the distinction between what is play and what is serious.

The issues here are more than conceptual. Billions of dollars in transactions take place in virtual economies, and the production, exchange, and currencies of virtual economies now have implications for real world exchange, real world monetary policy, and real world governments. Though technically prohibited by most virtual world operators, the so-called “real-money trade” in the assets of virtual worlds was estimated to be roughly \$1.8 billion in 2007 (Heeks, 2009). While more recent estimates of the size of this trade are unavailable, it is almost certainly dwarfed by the revenues derived from direct sales of virtual assets to consumers. The rudimentary virtual worlds that function on top of social networks such as Facebook or Tencent's QQ network are estimated to have generated \$6 billion in revenue in 2013, a 31.9% increase over 2012 (Boyland, 2013). The markets for virtual currencies are so large and so liquid that some governments have felt it necessary to restrict their use. Witness, for example, China's ban on trade using Tencent's QQ coin when it became apparent that users were buying and selling real goods with the virtual currency (Rosenberg, 2009). The number of people engaged in virtual economic activity is also rising at a substantial clip, with industry research suggesting that in 2011, 170 million people spent some time playing in persistent or semi-persistent virtual worlds in the US and the UK alone (Information Solutions Group, 2011). In sum, the past decade has seen a dramatic increase in the trade in virtual economic assets, in the number of people exposed to or engaged in that trade, and in the importance of virtual economic activity for people and governments inside and outside virtual environments (Lehdonvirta & Ernkqvist, 2011).

This overlap of the real and the virtual reveals a host of questions for entities in both realms. Governmental authority extends to all goods produced and exchanged in a country, and the regime of taxation and economic regulation is extensive, heavy, and critically implicated in the well-being of all the citizens. The conception of developers as policy makers and the blurring of the magic circle thus raises questions about the policy issues that developers are obligated to manage and the regulation of virtual worlds by outside forces. These questions are of immediate importance to governing agencies in both realms.³

The rapid integration of the real and virtual has not escaped the notice of other scholars, especially those in the field of law. Teitelbaum, Elders, and Alavian (2012) focus in particular on the legal questions and policy tools surrounding the management of virtual currencies by virtual world providers, while Arnold IV (2012) focuses on the difficulties of building a coherent tax policy to deal with virtual economic activity. Chambers (2011) provides an introduction to some of the ways that virtual economies can impact the real one, and argues that regulation by external agencies is both desirable and inevitable. Readers interested in more background on the legal side of this topic may wish to consult (Lastowka, 2010) and (Lastowka & Hunder, 2004).

The remainder of the paper is organized as follows. First, it briefly discusses the history of virtual economies, taking time to consider how the decisions of publishers have progressively blurred the boundaries between both worlds. It then identifies and discusses – more or less briefly – a host of questions that are raised by this new conceptualization. The final section concludes.

2. Virtual economies

Virtual economies were first identified within the genre of online multiplayer games, also known as virtual worlds. Two undergraduate students at the University of Essex – Richard Bartle and Roy Trubshaw – hold the distinction of designing the

³ Nevertheless, the conception of developers as governors may have a short shelf-life if the issues we outline here motivate extensive intervention of regulators.

first virtual world in 1978. It was called Multi User Dungeon or MUD and placed players in a fantasy world similar to contemporary single player adventure games like Zork or Colossal Cave (Bartle, 2003). MUD and other early virtual worlds were spaces created and occupied by hobbyists. Some of them allowed persistent items to be traded between players, making them the homes of the earliest virtual economies.

Due to the restrictive costs of internet service, it was not until the late 1980s that virtual worlds became commercially available. Since then, the scope and scale of virtual worlds and virtual economies have increased exponentially. The number of users that could use the virtual world at the same time – called the *concurrency* of the virtual world – also rose, so that the industry adopted the term *massively multiplayer online role-playing game* (MMORPG, or MMO) to refer these worlds. By 1997, the Korean virtual world *Lineage* housed a persistent virtual economy with over one million users. Around the same time in the United States, *Ultima Online* was considered a tremendous success when it obtained one hundred thousand users. By 1999 Sony Online Entertainment's *Everquest* had over three hundred thousand users. Although numbers are increasingly difficult to come by, as of this writing approximately 18 million people currently subscribe to an MMO service, seven million of whom are found in Blizzard Entertainment's *World of Warcraft* (Geel, 2013).

These virtual worlds are all part of the MMO genre that is generally considered to be the traditional virtual world, but other non-traditional virtual worlds now exist that weave persistence with impermanency to create hybrid spaces where players jump between temporary worlds earning rewards that are stored on a persistent profile. Games like *Magic the Gathering Online*, *Team Fortress 2*, *League of Legends*, and *Diablo II & III* all operate in this fashion, and host substantial virtual economies populated by a combined total of several hundred million users (Superdata Research, 2014). More recently, online social networks have begun to provide persistent profiles for players across a variety of semi-persistent game worlds and services (e.g. *Xbox Live*, *Steam*, *Facebook*, and the *Playstation Network*) and are starting to feature the requirements for functional virtual economies. For example, Activision's recent release *Destiny* is a console game that players purchase with a one-time fee, but is only accessible if one also subscribes to the Xbox Live or Playstation Network services. As of this writing, *Destiny* has sold at least 7 million units (VGChartz, 2014).

Non-game virtual worlds have also emerged, such as *Second Life* and *Habbo Hotel*, where players can socialize, purchase digital real estate, and participate in user-generated production economies. These worlds have done much to blur the boundary between the real and the virtual because they are not spaces for play.

MMOs were the first computer systems to establish the basic prerequisites for virtual economies on a large scale. These include the presence of goods, the ability to produce and destroy goods, and the ability to exchange goods between people. Although there are many single-player game that include economic simulations as part of the game, for a virtual economy to exist players must interact in virtual markets. Exchanging a virtual good with a game character (a *bot* or *merchant non-player character*) does not constitute an economy. This is not an exchange in an economic sense; it is rather the destruction of one virtual good for the production of a new entry in a database. By contrast, player-to-player exchange involves the reassignment of an existing entry in the database from one player to another player. The player to whom the item is assigned controls the good, but rarely does she have any legal ownership over it. In most virtual economies, the controller is a temporary owner (lessee, tenant, or borrower), with ownership residing in the owners of the database (Lastowka, 2010). Only in a very few systems, such as *Second Life* or MindArk's *Entropia Universe*, is a virtual good considered the legal property of the person who controls it.

For a market economy to exist in a virtual world there must be *gains from trade*. This means that there are at least two goods in the possession of two different people, the non-owner values the goods more than the owner, and the goods can be exchanged. A production economy requires *production technology*, which includes the ability to obtain inputs and transform them into new goods.

While the market economies in most virtual worlds are often quite robust, the production economies of virtual worlds vary, and most are rather simple. In popular MMOs (e.g. *Everquest*, *EVE Online*, and *World of Warcraft*) production takes place when a player combines some existing items to create a new item. The constituent items are destroyed in the underlying database, and then new item is added to it. All of the feasible combinations are preprogrammed into the database; therefore, the user never has the ability to create anything that was not already provisioned by the developers. A few virtual worlds have more complex production economies. For example, the virtual world *Second Life* allows players to add value to the economy by creating new content using the *Linden Scripting Language*, and *Team Fortress 2* allows players to use 3D modeling software to create wearable accessories, which they can sell in an online marketplace.

Despite the varying degrees of complexity in virtual economies, their basic functional requirements are the same. They need some process for moving, storing, and recording the location and ownership of goods. Under these requirements, any number of economies may be created. Public goods or commons economies would include items usable by all. Club goods economies would include items owned by subsets of users (such as player guilds) but not the whole. Social economies can include goods whose production and distribution depends not just on individual decisions and markets but also on the decisions of a governmental authority.

3. Virtual economies and real-world policy

The first virtual economies emerged because groups of people were given the ability to move, store, and own items in a virtual world. They were fairly simple barter economies, but developers recognized that they were an important feature of virtual worlds. Of course, as virtual worlds increased in complexity so did the economies within them. It was not long before

scholars had noted that the real GDP of virtual worlds was rising at rates that far outpaced that of many real world economies (Castronova, 2006b; Lehdonvirta & Ernkqvist, 2011), with at least one virtual economy posting a 50% rise in real GDP over a period of 5 months (Castronova et al., 2009).

The remainders of this essay asks what all of this might mean for the real world policy community. The answers fit into two boxes. In Box 1 are all of the things that you would expect: places where the activities of users and companies in this space will bump up against real-world agencies, rulings, and regulations. Box 2 is more surprising (to the authors, anyway): It contains all of the ways in which game developers are acting like policymakers themselves. In other words, the proceeding analysis suggests that the line between real and virtual world policy is blurring. Virtual world managers are already doing quite a bit of policymaking themselves. Assessing their decisions is more an act of comparative policy analysis than anything else.

3.1. Virtual economic activity and the real world

There are many places where the normal activity of a virtual economy will eventually raise some sort of policy issue.

3.1.1. Revenue

Virtual economic transactions are economic transactions. There is no economic difference between trading a magic wand for a gold piece and trading legal services for a McDonald's gift card, yet the latter would be taxed as a barter exchange while the former would not. Eventually the revenue agencies of the world will have to rule on the tax status of virtual items and make whatever distinctions they will make (Arnold IV, 2012).

3.1.2. Reporting

Parallel to the above, who bears the burden of reporting virtual economy transactions and how will they be classified? The following case is illustrative: Until recently, players of the online game *Diablo III* could sell their virtual goods to other players through an auction platform provided by the publisher, Blizzard Entertainment. The platform was called the Real-money Auction House (RMAH), and – as the name suggests – it gave players the opportunity to buy and sell items for real money: dollars, euros, etc. The seller's revenues from the sales (net of a \$1 fee for most transactions, or 15% of the sale price in a few special cases) was transferred to an account that Blizzard maintained. Players could add money to that account by a variety of methods (PayPal, credit card, etc.), and they could draw on that account to buy items from other players, or to pay for other Blizzard products, such as a copy of *Starcraft II*, or a new virtual pet for *World of Warcraft*. Alternatively, at an additional fee of 15% of the amount withdrawn, players could transfer money from their Blizzard account to a PayPal account.

Blizzard is responsible for reporting transaction fees as part of its income, and it stipulated in the RMAH Terms of Use that sales “may be considered income for tax purposes”, but it took no responsibility for reporting those sales; that was left to the user (Blizzard Entertainment, 2013). But even if it were not, it is unclear where along the chain from RMAH sale to PayPal withdrawal that the revenues from those sales become income for the seller. Common sense suggests that any moneys transferred to PayPal are taxable as income, but it is less clear whether the money that Blizzard transferred to the user's Blizzard account – which was accounted for in real currency, and which could be used to buy both real and virtual items – is also reportable as income.

Right now the major concern is tracking the income generated by players who cash out of the system, but at some point, the internal transactions of the virtual economy – e.g. when user uses her Blizzard account balance to buy virtual goods – will have to enter the system of national economic accounts. In principle, this could be achieved if players were able to freely transfer virtual assets to a local currency, as they were in *Diablo III*, or as they currently do in *Second Life*. The number of virtual world operators that allow this, however, is quite small. For a variety of reasons – including concerns about cheating and meritocracy in the larger game (Castronova, 2006a), unclear effects on revenues (Gans & Halaburda, 2013), tax liability (Arnold IV, 2012), and property rights (Lastowka, 2010) – virtual world operators have sought to prevent users from engaging in the sale of virtual assets for real money. Alternatively, an estimate of the value of virtual economic activity based on shadow prices could be achieved if, for example, the real-world wages of players were known. However, these data are extremely difficult to obtain without explicit cooperation from virtual world operators, who have historically not been forthcoming. In sum, given the private control over virtual economies, and the apparent view of virtual economy managers that the value of these economies is a trade secret, most virtual economies cannot be accounted for in national accounts at this time.

3.1.3. Income and wealth

Many policies react to the incomes, wealth, and assets of people. Virtual items should count here, and agencies will have to determine how they will handle them. Right now, virtual items sold on eBay or in games like *Diablo III* do create an income stream that is reportable. But what about income generated in the terms of a Facebook currency that is never cashed out into dollars? And what happens with the capital gains from investments in the virtual world?

3.1.4. Employment

Eventually many people will be able to earn a living wage doing virtual work. Such a person should not be counted as unemployed, but current practice would do so.

3.1.5. Money

Virtual currencies are bursting out of the ground like dandelions in springtime. Up to now, policymakers have favored a single monetary unit covering as large a geographic area as possible. How will the proliferation of these wildcat currencies be handled by central banks? Virtual worlds often suffer from hyperinflation. How will policy makers address the conversion between real and virtual currency?

3.1.6. Business organization

Virtual economies take the concept of “work from home” to new lengths. Organizations with labels like “corporation”, “association”, and “guild” are common in the virtual worlds of EVE Online, World of Warcraft, and others. These organizations collect, store, and deploy vast amounts of virtual resources in pursuit of their particular goals – such as game advancement, competition with other organizations, or the simple pursuit of virtual profit. The magnitudes of wealth at stake do not approach that of real corporations, but they are not insignificant: A recent, widely reported altercation between EVE Online corporations was thought to have cost the participants approximately \$300,000 in lost wealth (Moore, 2014).

All of this raises important questions: If an EVE Online corporation makes a profit, should it have to pay taxes? If so, to whom? And how should it account for its profit when there is no official exchange from the virtual currency of Eve to a real currency? What happens when these organizations dissolve, or a member leaves the organization, or quits the virtual world? Currently in most virtual economies, the collected resources remain in the hands of the person who started the organization, who can grant or revoke access to those resources at a whim. Is that legal? Or do members have an ownership claim that would be upheld by a civil court? The End-User License Agreements for virtual worlds almost always force users to give up any ownership claim of any virtual good in the world. This has been challenged in court, however, and legal experts suggest that courts will eventually start to intervene in these matters. (Lastowka, 2010)

3.1.7. Business regulation

Virtual economies generate any number of ad hoc employment relationships with unusual forms of compensation. There are issues of workplace safety – people have died while working and play in in virtual economies (Arnold IV, 2012). Players frequently pay one another in virtual currency for virtual services rendered, or put out contracts for delivery of virtual goods.⁴ If a player in a virtual world hires a child to perform a task for her in that virtual world, and then compensates the child with virtual currency, is that transaction subject to child labor laws? Do minimum wage laws apply?

3.1.8. International trade and finance

It almost goes without saying that the participants in a virtual economy are drawn from the entire world. If I sell a magic wand to a person in Mexico, does my transaction fall under international trade regulation?

3.1.9. Ownership, privacy and liability

Do users own their virtual creations? Thus far, the contracts presented to consumers all insist that virtual goods are offered only as limited licenses. Very well: To what extent does the owner of a virtual environment owe me a certain level of protection for my virtual goods? Theft is a significant problem in virtual worlds and many virtual citizens have enough liquid assets to make it profitable to hack them. Recent security advancements such as authenticators have increased the security of virtual worlds, but for publishers it remains an arms race of hacking techniques versus security features. Furthermore, do virtual citizens have a right to privacy? Virtual worlds are surveillance societies. Everything a virtual citizen does is logged and tracked. Can the developers of virtual worlds conduct whatever surveillance they wish? Eventually, there will be debate about the current contracts of virtual worlds to which players must agree if they desire to enter the world, the terms of which are remarkably favorable to the developer in all of these matters (Lastowka, 2010).

We could go on and on. In almost every conceivable realm of economic activity, agencies will have to update rulings to clarify their handling of virtual items and activities.

3.2. Virtual policy

Even though virtual economies were emergent features of virtual worlds, developers have always played a role in management. The design of the physical properties, laws, and rules of the game inevitably influences prices and trade. However, recent technical challenges in the management of increasingly complex virtual economies have demonstrated that virtual worlds feature economic policy issues quite similar to those facing national economic policy makers. Therefore, over the course of the last decade the designers of virtual worlds have begun to employ trained economists to monitor and navigate virtual economic policy (Goldstein, 2012). In the future it is likely that virtual worlds will be monitored even more

⁴ An example of a menu of prices for various services in *World of Warcraft* can be found here: <http://us.battle.net/wow/en/forum/topic/2795119625>.

closely as their value increases and the magic circle dissolves. This section lists some of the surprising ways in which the developers of virtual worlds are behaving like policy makers.

3.2.1. Interest elicitation

In a typical textbook, the first task of policy design is to determine the public interest. Usually this involves discovering the stakeholders on an issue and determining how different policies will affect them. There are several methods of interest elicitation, from purchases to votes to surveys. Over the past several years, managers of virtual economies have found that interest elicitation is certainly a key part of their design process. Every virtual economy maintains an active online forum where users can vent and suggest. Paid community managers often engage with community members as a process of interest elicitation, trying to solve emergent problems and keep tabs on the pulse of the community. At least one world (EVE Online) has allowed the election of a Council of Stellar Management, player representatives that bring player concerns directly to the developers and in many ways have a say in development trajectory of the game.⁵

3.2.2. Data collection

Like real-world policymakers, the managers of virtual economies carefully track economic data and use it to make decisions. In the last 5 years user telemetry has become standard practice in virtual worlds and developers will use such advanced visualizations as heat maps, which show geographic locations where an activity was more frequent, and social network graphs, which show who is connected to whom. Almost all behavior is collected and one of the fastest growing areas in the industry is reporting and visualizing behavioral data. In addition, other research methods, such as survey tools and biometric feedback are also being employed to inform policy decisions in virtual worlds.

3.2.3. Decision-making

Makers of virtual economies usually have a design lead who acts as the principle decision-maker. As happens within governing bodies, a more or less regular (if not formal or formally ratified) process takes information from interest elicitation and data collection and gathers it into policy recommendations. Various internal stakeholders debate the different recommendations, and the design lead makes a determination based on factors like revenue or fun. The overseers of the process are similar to the overseers of an agency process. Instead of executive branch overseers, the virtual economy makers must respond to executives of the company. Instead of budget authority, they must respond to accounting and external investor interests. Instead of the media and citizen interests, they must respond to representatives of users. As with real-world policy, this maelstrom of discussion and pressure eventually results in a decision.

3.2.4. Implementation

The managers of virtual worlds already address a number of policy decisions similar to those made by real world policy agencies. Of these, one of the most interesting is virtual monetary policy. Because they have access to the underlying database that records monetary transactions and inventory, and because they have access to all parameters that affect the insertion and deletion of rows in that database, virtual economic managers are far more powerfully equipped to affect the money supply and to target virtual economic sectors than are their real counterparts. The virtual world manager can draw currency out of the economy by offering players attractive assets and big-ticket items for which it is the monopoly supplier. Or, it can raise the tax that players incur when they sell items to one another through the in-game marketplace. Since there is no government circulating these taxes back into the economy, the revenue is simply removed from the world. In the worst case scenario – which is not without precedent – the manager can simply remove money from the inventory of any and every player (Terdiman, 2005).

Anecdotal evidence suggests that managers rarely change parameters to increase outflows because this is felt as an additional burden by players. Instead, managers engage in monetary policy primarily by affecting the inflow of money. For example, the manager can lower the *drop rate* – the rate at which virtual coins are released by slain enemies, treasure chests, and other objects in the virtual world. When you consider that the manager could conceivably customize these factors for every player and object in the game, one point becomes clear: virtual central bankers have access to a breathtaking number of levers through which to control the flow of virtual currency (Simpson, 1999). Thus, while most virtual economies lack a financial sector through which to transmit monetary policy – and therefore lack such notions as a deposit rate or a money multiplier – they do not need either to regulate the amount of money in the economy.⁶

We have left one question to be begged: What is the problem that the virtual central banker is trying to solve with its monetary policy? Although ostensibly the intent is to keep prices steady – hyperinflation has been a very serious problem in some virtual worlds (Koster, 2007) – the ultimate goal of most virtual world publishers is to attract paying players and keep them paying for as long as possible. That may be at odds with the dual goals of maintaining “low inflation” and a “‘maximum’ sustainable [economic] output” (Federal Reserve Bank of San Francisco, 2004). Whether this is true remains an open question, worthy of further research.

⁵ <http://community.eveonline.com/community/csm/>.

⁶ EVE Online is a rare and important exception to this.

3.2.5. Assessment

All virtual economy managers engage in testing of rules. Most environments maintain a *test server*, which is separate from the *live server*, where new rules are given a test drive before they are distributed to the entire player base. Current players are given the opportunity to join the server and are invited to give their feedback on the changes. The managers will also use data collected from player surveys and behavior to fine-tune changes. When they are satisfied that the change is having the desired effect, it is implemented on the live server.

Additionally, there is a *live team* that runs the day-to-day operations of the virtual economy. The live team watches how decisions have affected the environment, and should anything dramatic happen, stand ready to report to decision makers. It has also become common (in smaller virtual worlds) for the live team to implement low-scale, so-called *A/B tests* on live servers by randomly selecting players into a sample, dividing them into control and test groups, and running tests of proposed economic changes without players' knowledge. Many proposed minor changes to virtual worlds and economies are tested in this way (Lehdonvirta & Castronova, 2014).

3.2.6. Revenue models

Over the last 30 years the revenue models of virtual worlds have shifted from models where developers treated virtual worlds as content to be purchased and consumed (e.g. pay-by-the-minute, client sales, subscriptions, microtransactions) to models where developers tax services and transactions within the economy (e.g. premium content, real-money trade, currency sales). In some cases, these models were the reaction to a changing marketplace or the result of a failure to generate significant revenue using a more traditional revenue model. Other times they were simply innovation or a response to an emergent phenomenon like *gold farming*, whereby players explicitly collect resources from the virtual environment in order to sell them for real money (MacInnes, 2006). Regardless of the reason for the shift there is a clear trend in companies attempting to move from revenue models that frame publishers as content providers to models that frame publishers as the providers of services tied to governing virtual economies.

Large game publishers such as Valve (Steam), EA (Origin), and Activision-Blizzard (Battle.net) have begun to provide even more extensive services across a range of smaller economies. These publishers have dabbled in creating persistence at a meta-level, providing players with the opportunity to engage in economic transactions across a variety of games and services all within the platform of one publisher. In this type of economy a player might exchange a digital copy of the movie *The Big Lebowski* for 15 U.S. dollars, or simply trade it for a user-created hat that they can use to decorate their avatar in their favorite virtual world. With each transaction, smaller developers sell content and the publisher generates revenue through services and taxes.

3.3. Rules are policies are rules

The overlap between what virtual economy managers do and real-world policymakers do, at least in terms of textbook policy analysis, suggests that the rules of a virtual economy are the same sort of animal as the policies of the real economy. This conclusion is buttressed by the results of several studies that suggest that basic economic (Castronova et al., 2009), psychological (Yee, 2014), and social (Williams, Consalvo, Caplan & Yee, 2009) behaviors are observed in both real and virtual worlds. Thus, real-world policy analysts may be quite comfortable assessing the rules of a game's virtual economy using the same tools that they would use to assess such agencies as the European Central Bank or the US Department of Commerce. The needed skills are not so much digital expertise or excellent gaming skills, but experience in comparative policy analysis. The agencies of virtual economies are agencies like any other, but they live in a unique historical and cultural context.

The central tenet of this essay has been that virtual economies *are* economies. To compare them is not to look at a simulacrum and the Real McCoy side-by-side; they are of a kind. But is there any place where this claim breaks down? Aren't virtual worlds fundamentally different from the real world in some way?

It is true that virtual economies exist within virtual worlds that do not have the same physical, ecological, social, and technological constraints of the real world. However, the difference is not fundamental, but one of degree. Threats of physical harm may be more or less worrying, resources may renew at faster or slower rates, different modes of communication may be easier or harder to utilize, family ties may be more or less strong, and tools may be more or less anachronistic or futuristic. Nevertheless, humans operating in virtual environment face constraints that lie in the same dimensions as those operating in real environments, just as humans living in Ancient China faced constraints that lie along the same dimensions as those faced by humans in the contemporary United States. Even death, seemingly only a concern for real-world residents, must also be a concern for those in the virtual economy.⁷

Even if it is accepted that the constraints are not fundamentally different, it might be objected that policy-makers and game economy managers harbor fundamentally different motivations for policy design. After all, while policy-makers in the real world are (one hopes) motivated to promote welfare, the managers of a virtual economy are agents of a profit-maximizing firm. Thus

⁷ See Section 3.1.7. The question of whether death (or its absence) constitutes a constraint that is unique to the real economy is rather problematic, and should be carefully considered. When a player "dies" in Super Mario Brothers, she does not really die, but she does suffer a cost for failing to meet certain constraints while completing a task (e.g. not getting hit by an enemy's weapon). Neither is turning off the game analogous to killing Mario. Similarly, logging out of a virtual world is not analogous to death in the real world. Instead, these actions are best thought of as migration. To log out of or turn off a virtual world or game constitutes a migration from the virtual to the real, just as logging in or turning on a game is best thought as migration back from the real to the virtual.

the choice of economic policy that is ideal from the manager's perspective may not be the one that is ideal for the users' welfare. For example, as mentioned in Section 3.2.4, it may not be in the game company's best interest to institute policies that result in the highest sustainable virtual economic growth. Yet while motives of virtual economic managers and real world policy makers may differ, and though they are used to meet different ends, the rules and tools they utilize are of a kind. Additionally, many of them face constraints that are similar to that of a virtual economic manager. Fiscal authorities, for example, must choose policies that ensure that revenue at least balance with outlays. Finally, the fact that the rule-makers of the two realms have different motives does not mean that policy designed in one realm would not have the same effect in the other. There are despotic governments that institute policies to maximize the profits of an elite few (though it would be extreme to call virtual world operators "despots"). Similarly, there is no reason to think that a virtual economy would naturally reject a set of policies that maximize welfare. Nevertheless, the question of how and whether policies systematically differ between real and virtual economies remains open, and is worthy of more research.

4. Conclusion

This essay has described a shift in the conception of the designers of virtual worlds from the delivers of content to the governors of complex social systems. Traditionally, virtual worlds have attempted to insulate themselves from the policy issues of the real world by defining themselves as spaces for play, enclosed in a magic circle. The role of world-makers as governments was recognized very early in the history of virtual environments, but was considered from the start as completely distasteful and unfortunate. As author Julian Dibbell describes it in his book *My Tiny Life*, the technicians who built the world of *LambdaMoo* in the 1980s soon become frustrated at the amount of heat they took for changes to the virtual environment (Dibbell, 1998). One day the "wizards" (as they were called) decided not to be involved any more, insisting that they would only take care of the "technical functioning" of the world, that its social norms and political tides were no longer part of their ambit. They refused, in other words, to be a government, finding it simply too difficult and inelegant. Almost immediately, however, the wizards learned the lesson that it is impossible not to be in charge, that not issuing rulings is the same thing as issuing non-rulings, and that therefore the person in the governor's seat cannot *not* govern. Policymaking is not a job that anyone creates and then inhabits. The social world of humanity creates policymaking jobs and, if it must, imposes them on specific people to handle as best they can. These same forces have created policymaking positions in the leadership of virtual world making companies. The acts of these companies are policy already and can be studied as such.

The reality of economics is that whenever the necessary conditions exist – a group of people with some process for moving, storing, and recording the location and ownership of goods – an economy based on real value is certain to follow. While part of the erosion of the magic circle has occurred because of the inevitable consequence of economies emerging under the necessary conditions and communities demanding governance, developers have also encouraged erosion by crafting new revenue models and managing worlds as if they were policy makers. As developers continue to impose themselves as the policy makers of virtual worlds with real consequences for ethics, law, and government we imagine that a collision between virtual policy makers and real world policy makers is inevitable.

References

- Arnold IV, W.E. (2012). Tax enforcement in virtual worlds – Virtually impossible?. *Syracuse Journal of International Law & Commerce*, 40(1), 187–216.
- Bartle, R. (2003). *Designing virtual worlds*. Indianapolis: New Riders Publishers.
- Boylard, K. (2013). 8 Hot industries for start-ups. Retrieved from <<http://www.ibisworld.com/media/2013/02/06/8-hot-industries-for-start-ups/>>.
- Castronova, E. (2006a). A cost–benefit analysis of real-money trade in the products of synthetic economies. *Info*, 8(6), 51–68.
- Castronova, E. (2006b). One the research value of large games: Natrual experiments in Norrath and Camelot. *Games and Culture*, 1(2), 163–186.
- Castronova, E., Bell, M.W., Cornell, R., Cummings, J. J., Emigh, W., & Falk, M., et al. (2009). A test of the Law of Demand in a virtual world: Exploring the Petri dish approach to social science. *International Journal of Gaming and Computer-Mediated Simulations*, 1(2), 1–16.
- Castronova, E., Williams, D., Shen, C., Ratan, R., Xiong, L., & Huang, Y., et al. (2009). As real as real? Macroeconomic behavior in a large-scale virtual world. *New Media & Society*, 11(5), 685–707.
- Chambers, C. (2011). How virtual are virtual economies? An exploration into the legal, social and economic nature of virtual world economies. *Computer Law & Security Review*, 27(4), 377–384.
- Dibbell, J. (1998). *My tiny life: Crime and passion in a virtual world*. New York: Henry Holt.
- Blizzard Entertainment (2013). *Diablo III Auction House terms of use*. Retrieved from <http://us.blizzard.com/en-us/company/legal/d3rmah_tou.html>.
- Federal Reserve Bank of San Francisco (2004). *What are the goals of U.S. monetary policy?* Retrieved from <<http://www.frbsf.org/us-monetary-policy-introduction/goals/>>.
- Gans, J.S., & Halaburda, H. (2013). *Some economics of private digital currency*. Bank of Canada Working Paper series. Bank of Canada.
- Geel, I.B. (2013). *MMODData.net*. Retrieved from <<http://MMODData.blogspot.net>>.
- Goldstein, J. (2012). Video game company hires economist to study virtual worlds. Retrieved from <<http://www.npr.org/blogs/money/2012/06/25/155715077/video-game-company-hires-economist-to-study-virtual-worlds>>.
- Information Solutions Group (2011). 2011 PopCap games social gaming research. Retrieved from <http://www.infosolutionsgroup.com/pdfs/2011_PopCap_Social_Gaming_Research_Results.pdf>.
- Huizinga, J. (1955). *Homo Ludens*. Boston: Beacon.
- Koster, R. (2007). 'Flation. Professional website Retrieved from <<http://www.raphkoster.com/2007/01/17/flation/>>.
- Lastowka, G. (2010). *Virtual justice: The new laws of online worlds*. New Haven: Yale University Press.
- Lastowka, G., & Hunder, D. (2004). The laws of virtual worlds. *California Law Review*, 92(1), 1–74.
- Lehdonvirta, V., & Castronova, E. (2014). *Virtual economies: Design and analysis*. Cambridge: The MIT Press.
- Lehdonvirta, V., & Ernkivist, M. (2011). *Converting the virtual economy into development potential: Knowledge map of the virtual economy*. Washington, DC: infoDev/World Bank.

- Heeks, R. (2009). Understanding 'gold farming' and real-money trading as the intersection of real and virtual economies. *Journal of Virtual Worlds Research*, 2(4) <http://dx.doi.org/10.4101/jvwr.v2i4.868>.
- Lessig, L. (1999). *Code and other laws of cyberspace*. New York: Basic Books.
- MacInnes, I. (2006). Property Rights, legal issues, and business models in virtual world communities. *Electronic Commerce Research*, 6(1), 39–56, <http://dx.doi.org/10.1007/s10660-006-5987-8>.
- Moore, B. (2014). *Inside the epic online space battle that cost gamers \$300,000*. Retrieved 24.10.14, from <http://www.wired.com/2014/02/eve-online-battle-of-b-r/>.
- Rosenberg, D. (2009). China bans online 'gold farming'. *CNet*. Retrieved from <http://www.cnet.com/news/china-bans-online-gold-farming/>.
- Simpson, Z.B. (1999). *The in-game economics of ultima online*. From <http://www.mine-control.com/zack/ueecon/ueecon.html>.
- Superdata Research, I. (2014). *Comparing MMO ARPU for major free-to-play titles*. Retrieved from <http://www.superdataresearch.com/blog/mmo-arpu/>.
- Teitelbaum, D.E., Elders, M.-H., & Alavian, R. P. (2012). Issues for payments in virtual economies. *Journal of Payments Strategy & Systems*, 5(4), 373–389.
- Terdiman, D. (2005). *Cheaters slam 'Everquest II' economy*. Retrieved from <http://www.zdnet.com/article/cheaters-slam-everquest-ii-economy/>.
- VGChartz (2014). *Global sales for destiny*. Retrieved from <http://www.vgchartz.com/gamedb/?name=Destiny>.
- Williams, D., Consalvo, M., Caplan, S.E., & Yee, N. (2009). Looking for gender: Gender roles and behaviors among online gamers. *Journal of Communication*, 59(4), 700–725, <http://dx.doi.org/10.1111/j.1460-2466.2009.01453.x>.
- Yee, N. (2014). *The Proteus Paradox: How online games and virtual worlds change us—And how they don't*. New Haven, CT: Yale University Press.