

Chapter 17

A Test of the Law of Demand in a Virtual World: Exploring the Petri Dish Approach to Social Science

Edward Castronova
Indiana University, USA

Travis L. Ross
Indiana University, USA

Mark Bell
Indiana University, USA

James J. Cummings
Indiana University, USA

Matthew Falk
Indiana University, USA

ABSTRACT

We report results of an experiment on prices and demand in a fantasy-based virtual world. A virtual world is a persistent, synthetic, online environment that can be accessed by many users at the same time. Because most virtual worlds are built around a fantasy theme, complete with magic, monsters, and treasure, there is considerable skepticism that human behavior in such environments is in any way “normal.” Our world, “Arden,” was designed to test whether players in a typical fantasy environment were economically “normal.” Specifically, we tested whether fantasy gamers conform to the Law of Demand, which states that increasing the price of a good, all else equal, will reduce the quantity demanded. We created two exactly equivalent worlds, and randomly assigned players to one or the other. The only difference in the two worlds was that the price of a single good, a health potion, was twice as high in the experimental world than in the control. We allowed players ($N = 43$) to enter and play the environment for a month.

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We found that players in the experimental condition purchased 43.1 percent fewer of the potions, implying a demand elasticity of -0.431. This finding is well within the range one expects for normal economic agents. We take this as evidence that the Law of Demand holds in fantasy environments, which suggests in turn that fantasy gamers may well be economically normal. If so, it may be worthwhile to conduct controlled economic and social experiments in virtual worlds at greater scales of both population (thousands of users) and time (many months).

INTRODUCTION: VIRTUAL WORLDS AS PETRI DISHES

Since 1997, there has been a rapid increase in deployment and use of virtual worlds: online computer-generated environments that can be accessed by thousands or even millions of people at the same time (Castronova, 2005). Each user explores the virtual world using an *avatar*, a human or human-like character that walks, talks, fights, and hugs, much as a real human does. While inhabiting her avatar, the user can chat with other people, play games, go on quests, or harvest virtual goods. The range of activities is determined by the designers and is typically vast since, unlike real-life people, an avatar can fly, turn into a fish, or become purple, just by changing the underlying computer code. With this kind of design flexibility, there are many possible applications for a virtual world beyond entertainment.

Until fairly recently the implementation of full-scale virtual worlds for research was limited due to cost and feasibility. Consider that World of Warcraft cost many millions of dollars to build and had teams of experienced individuals guiding the design and implementation. Obviously, a research team trying to recreate World of Warcraft has a herculean task ahead of them. However, post-dating the implementation of Arden a new possibility has arisen. The recent success of browser-based virtual worlds using Facebook and other social media platforms has made the development a virtual world for research and other serious applications a possibility for small teams with limited budgets (Ross & Cornell, 2010; Szell, Lambiotte, & Thurner, 2010).

In this paper, we consider a serious research application of virtual worlds: their use for controlled experiments. Several unique features argue for this kind of use. First, virtual worlds allow controlled experimentation at the level of an entire world. If desired, designers can fix the code so that two research environments are exactly the same, down to every leaf on every tree. Second, this technology allows truly vast research environments. If desired, a research team could create a world that covers hundreds of millions of square miles. Third, virtual worlds allow huge numbers of research subjects. Current commercial virtual worlds commonly have many millions of players. Fourth, virtual worlds allow a long time scale for research. Again, current commercial virtual worlds typically retain users for many years. One world, *Ultima Online*, has been in continuous existence since 1997. Finally, the people who engage with one another inside virtual worlds seem to constitute a genuine society. Casual observation reveals that, even at modest size, significant social relationships seem to develop. It appears, again to the casual observer, that friendships and reputations are forged and broken. Some individuals seem to acquire some kind of interpersonal or political power, while others are deemed “weak.” Information networks seem to be active. Perhaps most surprising, virtual worlds seem to develop internal markets, in which players trade virtual items with one another at what appear to be stable and robust prices.

More careful observation of virtual worlds tends to confirm these suspicions. In a recent study, Chesney, Chuah and Hoffman (2009) conducted a series of classic experiments from experimental

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