

Similarities between virtual and real-world economy: Comparison of virtual good and commodity

To what extent does gold and PLEX function similarly in respective economies?

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Comparison of virtual good and commodity

Gold has long served as an important commodity in the real-world economy. It has been one of the most important metals in world history. Despite its ability to be used as a partial inflation hedge in the long run (Aye, Chang, & Gupta, 2016), its effectiveness as one is affected by policies and change in global market structures, among other factors (Beckmann, & Czudaj, 2012). In most cases, gold price rises during the biggest stock market crashes and it is considered as an asset that will rise when most others fall (GoldSilver, 2018). In addition, gold also has other attributes such as application in jewelry and electronics.

EVE Online is an on-going, active **Massive Multiplayer Online Role-Playing Game (MMORPG)**, online games played by real human players that often involve the exchange of virtual, in-game goods and services. In this game that I started experiencing 3 years ago, I have discovered an in-game item, **PLEX**, which is viewed as an inflation hedge by in-game communities. It has attributes in the in-game world similar to those of gold in the real-world. As I explored deeper into the EVE Online economy, I began to wonder whether PLEX can be considered as the equivalent to gold in EVE Online due to their many similarities, which will be discussed later. MMORPG economies, to a certain degree, simulate the real-world economy (Castronova, 2007). As I am interested in the connection between virtual and real-world economies, I have decided to research the similarities between them, and more specifically, the similarities between gold and PLEX, as viewed by the real-world and in-game communities. My research seeks an answer to this question: **To what extent does gold and PLEX function similarly in respective economies?**

Literature review

Gold

Gold is a commodity in the real-world that has limited supply and has intrinsic value through its applicational uses, such as in electronics. Gold can be salvaged and remelted and is highly non-corrosive; therefore, in the long run, the total amount of gold on Earth will be near constant. It was also used as means of exchange throughout history until the abolition of the gold standard. It is still considered as a valuable investment asset and risk hedge, which will be further explored.

Previous research about gold have pointed towards several attributes of it, including chemical properties, history of gold, and financial advantages (Clark, 2015). As such, I am going to use these as the basis of criteria to compare gold and PLEX.

EVE Online and PLEX

Developed by CCP Games in Iceland, EVE Online's economy is a virtual economy that behaves like a real-world economy to a large extent. There are banks, logistics corporations, trade hubs, and books such as 'EVE Online: ISK Strategy Guide' by Y. Michael Xu that educates players on earning **ISK**, the name of the currency used in the economy. It had an average of 23,000 players online concurrently in May 2018 (Chribba, 2018) and 1-2 million transactions involving over 10,000 unique items daily (Wurtz, 2015). Economic principles such as scarcity, factors of production, geographical limitations, demand and supply, cost and benefit etc. all exist in-game by the design of the game. Although largely player run, the game developer still has full control of the virtual universe. In other words, the economy of EVE Online is mostly a free market economy but government intervention (in this case, from the game developer) can be made without any opposing force due to the nature of the user-developer relationship.

PLEX is a commodity in the virtual world that has an unlimited supply and in-game intrinsic value, as it offers guaranteed in-game benefits even if it loses its in-game monetary value. PLEX can be traded on the in-game market and its price is determined by demand and supply. PLEX supply can be created in the real-world by purchasing it from the game developers using 20 USD and then sold on the in-game market. It will always be a necessity for all players as it offers fuller access to the game than free-to-play players. Players can buy PLEX using USD or ISK and can sell PLEX for ISK. Some players see PLEX as a way to combat in-game inflation as it has fixed utility to all players and can be converted to ISK when needed, similar to the role played by an inflation hedge in real-world.

Prior observations

Prior observations on other MMORPGs

Prior research has indicated that players typically spend 20-30 hours per week in MMORPGs (Castronova, 2007, pg 1). In War of Warcraft, players are paying real money for in-game items (Winson, 2015), showing that they place a high value on their in-game virtual lives. MMORPGs' economies are simulations of the real-world economy, designed by humans, with human players as participants, with lessons learned within that can be applied to the real-world (Lehdonvirta & Castronova, 2014).

Prior observations on EVE Online economy

EVE Online is 'a site in which players actively co-construct a shared reality centered on unfettered capitalism' (Taylor, Bergstrom, Jenson & Castell, 2015) in which some players choose to become 'industrialist' who engage in the production of goods in the virtual universe. To them, working as an industrialist to maintain factories is part of their gameplay, and it can be considered as immaterial labor (Taylor et al., 2015).

Methodology

As gold has been thoroughly researched, I will focus primarily on the attributes of PLEX that are comparable to gold instead of going in-depth into the attributes of gold.

Method of conversion between PLEX, ISK and USD

The value of a single PLEX is 3,273,008 ISK on November 25, 2018 (EVE Marketdata, 2018), the price being the median price of PLEX at Jita, EVE Online's biggest trade hub.

500 PLEX is purchased with 20 USD, therefore 1 PLEX is the equivalent of 0.04 USD. Therefore $1 \text{ USD} = 3,273,008 / 0.04 = 81,825,200 \text{ ISK}$. This conversion rate is used for all ISK to USD conversions in this research, except for GDP calculation, which uses the conversion rate based on the same day median PLEX price at Jita.

All other data not in USD is converted to USD using Google Finances on the same day of data retrieval.

Criteria for comparison of gold and PLEX

Financial value

I aim to find out the financial value of PLEX in EVE Online through gathering price data of PLEX to EVE Online inflation indices. Furthermore, I aim to explore how its price is determined. This criterion is set based on the financial value of gold.

Applicational uses

Comparison of their 'physical' applicational uses as gold and PLEX themselves, rather than just being a financial instrument, but how do they compare in their applications in other areas such as gold in electronics manufacturing and jewelry. This is used to measure their usability outside of the context of market value. This criterion is set based on the chemical properties of Gold.

Recent developments

Looking at recent developments of PLEX by investigating recent events. This criterion is based on the history of gold.

Scarcity, Production, and destruction cycle

Exploration of the scarcity, production, and destruction cycle of gold and PLEX. This criterion is based on the differences between the respective economies as one is real, and one is virtual.

Criteria for comparison of respective economies

The following criteria are based on the standard comparison criteria for different economies and based on the differences due to EVE Online being a virtual economy, different from the real-world.

Economic figures

Comparison of basic economic figures, including GDP, money supply, CPI, and participants in the economy.

Economic priorities

Different countries can have different economic priorities, how similar are EVE Online and the real-world economy's priorities?

Differences in the basis of economies

Does the real-world economy have fundamental differences to EVE Online economy?

Player opinions and historical significance

Finding out the historical significance of gold and PLEX while taking input from EVE Online discussion forums and the players as to their opinions on the similarities between Gold and PLEX and the two economies.

Limitations

External limitations

Due to lack of previous research in this area, the scope of this discussion is limited to the similarities between gold and PLEX. Furthermore, owing to limitations in time and access to resources, I was unable to travel to Iceland to attend the annual conference on EVE Online to speak to more players regarding their opinions in this matter. I have had no choice but to rely on online discussion forums for player opinions.

EVE Online related limitations

The data gathered does not account for parallel trading of PLEX, a practice where players trade ISK or PLEX for real-world money despite such actions violating in-game rules which may result in in-game punishments (Grimmi, 2008). PLEX bought through parallel trading is significantly cheaper, with its price being 7.3 USD for 500 PLEX on <https://www.g2g.com/> instead of 20 USD through official distribution channels. However, this limitation exists in all economies because there are black market activities in every economy.

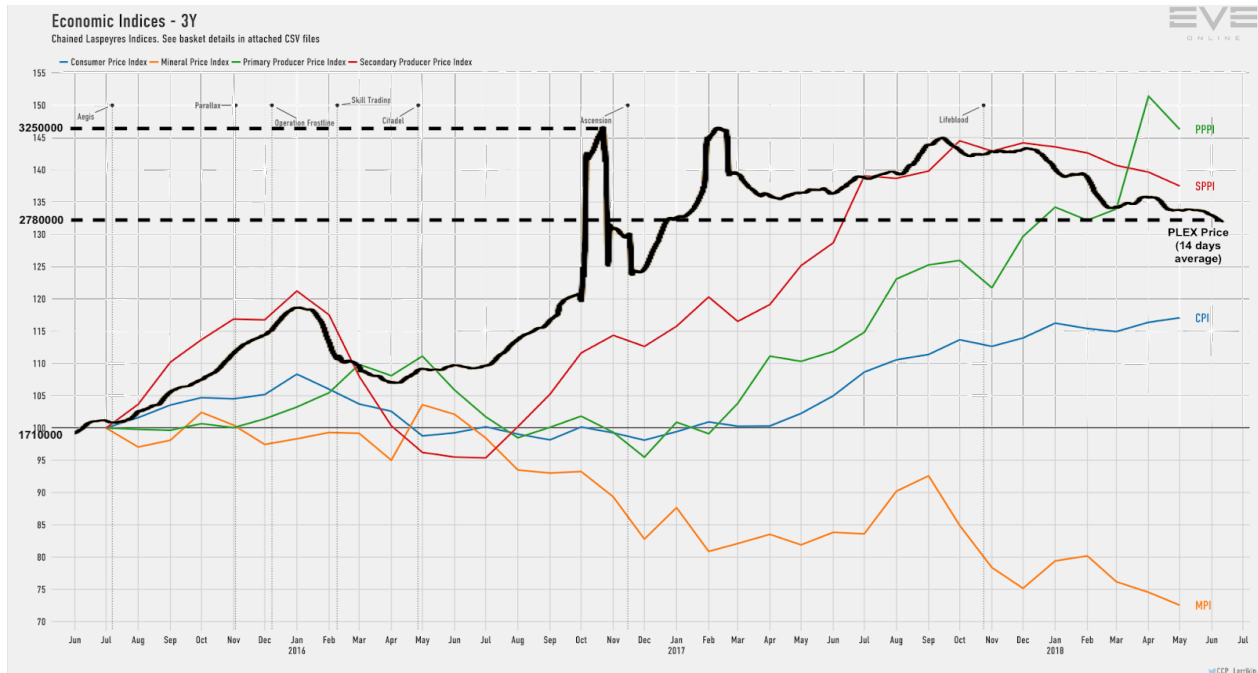
Findings

Comparison of Gold and PLEX

Financial value

Gold was, and still is, one of the most important metals (Aye, Chang, & Gupta, 2013). The gold standard was widely adopted. The last major currency to abolish the use of gold as a monetary standard was the Swiss Franc which abolished the need of a 40% gold reserve for currency issued as recently as 2000 (Hur, 2017). Currently, gold is used as an inflation hedge (Aye, Chang, & Gupta, 2016).

PLEX price, on the other hand, has its in-game price determined completely by the demand and supply of the market and its real-world value determined solely by the game developer.



This black curve is the PLEX Price overtime on a 14 days average (EVE Marketdata, 2018) plotted on the graph of economic indices (Larrikin, 2018a) from July 2016 to May 2018. Only the CPI, PPPI, and SPPI will be discussed, their in-game definitions are as follows:

Consumer Price Index (CPI)

Similar to CPI in real life, CPI in EVE Online measures the overall price changes in consumer products. It includes nearly all items that are not used to produce other goods in-game (EVE Inspiracy, 2014).

Primary Producer Price Index (PPPI)

PPPI consists of manufacturing items that are used to manufacture other manufacturing items in-game. Items that are used in production for final consumer products are excluded (EVE Inspiracy, 2014).

Secondary Producer Price Index (SPPI)

SPPI includes items that are used to manufacture consumer items (EVE Inspiracy, 2014).

As seen in the graph, the PLEX price overtime follows similar patterns as SPPI and there is a delayed effect seen in PPPI despite PLEX is not a constituent of any of the above indices.

Further investigation about constituents of SPPI found that it consists of items which the CCP Games label as ‘commodities’ (Larrikin, 2018b). PLEX Price over time follows similar patterns as the curve of SPPI instead of the CPI which means that it too, like gold, is a commodity and a partial inflation hedge in the long run (Aye, Chang, & Gupta, 2016) in limited situations. Furthermore, the trend of PPPI has similarities with delayed PLEX price curve, showing that in-game applicational value of PLEX is significant through its applicational use as an item used in in-game manufacturing, which is reflected in the PPPI curve.

Therefore, PLEX can be seen as a commodity in EVE Online with its financial and applicational value is comparable to that of gold.

Applicational uses

Gold has numerous real-life applications in industries such as electronics manufacturing, dentistry, medical diagnosis and treatment, jewelry etc. due to its physical attributes and aesthetics attributes (King, 2018).

PLEX can be used to purchase services in-game, allowing players to increase the aesthetics of their in-game characters or vehicles (EVE University, 2018b), and faster progression in the in-game education system, known as ‘Skills training’ (EVE University, 2018a).

Therefore, both gold and PLEX have significant applicational values in their respective economies as gold is used manufacturing of goods while PLEX is used the in-game education system.

Recent developments

The unit of PLEX has been recently changed. 1 legacy PLEX was to be divided into 500 new PLEX in a push for greater usage of PLEX in-game, such as support for microtransactions which allows for more usability of PLEX. PLEX also ceased to exist in physical form in the context of the virtual universe. Instead, it is now stored virtually and universally accessible in the virtual universe. This eliminated the need to transport PLEX in the virtual universe and the risk of losing it in transport.

In the real-world, gold has physical form and cannot be accessed anywhere. However, gold is often stored in vaults such as the Gold Vault of the Federal Reserve Bank of New York, which is utilized by many governments and central banks (New York Fed, 2019). The transfer of gold between accounts is merely moving it to another compartment in the same vault. The recent change of PLEX towards a virtual currency system is to some degree, similar to the system used by the Federal Reserve Bank of New York, increasing the degree of similarities between them.

Scarcity, Production and destruction cycle

Gold is produced through a complicated chemical process and existing gold products can be melted to create new ones. Being highly non-corrosive, the overall quantity of gold extracted and available will increase in the long run.

PLEX is produced when players pay USD to purchase PLEX in real life without additional in-game cost. PLEX is destroyed when it has been consumed by players for their own

benefit for its uses as mentioned earlier. Therefore, the amount of PLEX in circulation is determined by how many PLEX is purchased using USD and how many PLEX is consumed.

From observing the production and destruction cycle of gold and PLEX, we can see that the supply of them in respective economies are both limited to the real-life production cost of.

Comparison of respective economies

Economic figures (If EVE Online is a country)

	EVE Online	Real-world ranking
GDP	25.6 million USD (2017) (Larrikin, 2018b)	229/230 (Central Intelligence Agency, 2019a)
M0, amount of currency in circulation (Financial Times, 2018)	14.7 million USD (Larrikin, 2018b)	84/86 (Trading Economics, 2018)
CPI Growth per year	~0% (Larrikin, 2018b)	11/227 (Central Intelligence Agency, 2019c)
Participants in the economy (Population of a country)	23000 (Chribba, 2018)	219/238 (Central Intelligence Agency, 2019b)

Economics priorities

EVE Online is a product of the game developer CCP Games, who runs the game for profit. CCP Games, therefore, desires growth in player numbers of the economy in place of actual growth as more players would create more real-life revenue and profit.

The real-world economy, on the other hand, focuses on economic growth and improvements in the allocation of resources instead of an increasing number of participants in the economy, in the form of real-life human population.

Differences in the basis of economies

EVE Online economy creates demand by on-going warfare. A lack of warfare and fluctuation in the economy makes players bored, decreases the player count, which leads to a

further reduction in warfare and fluctuation of the economy, eventually leading to a failed economy (Morrison, 2016).

EVE Online also differs from the real-world economy in its legal systems. In EVE Online, in-game scamming, stealing or other forms of taking advantage of a player which are usually illegal in the real-world are not punished (CCP Games, 2019).

This is illustrated by the actions taken by the CEO of EBank, the largest bank in EVE Online's history, who stole 200 billion ISK in-game and sold it for real-world currency in order to pay his real-life debt. Not only did he violate in-game rules by selling ISK for real-world currency, but his actions also led to the declaration of bankruptcy of EBank and the loss of trust in financial institutions of the EVE Online community, no new large scale financial institutions have been established since the downfall of EBank (King, 2009).

The element of trust between the players is not seen in EVE Online economy due to a lack of a legal system to punish the breaking of trust, therefore, the development potential of EVE Online economy is limited to an economy based on warfare.

Player opinions and historical significance

In the real-world, gold has long been associated with value throughout history. Egyptians, including pharaohs and priests, have highly prized gold starting around 3000 B.C., and the capstones of the Pyramids of Giza were made of solid Gold (Hur, 2017).

In EVE Online, which was released in 2003 (CCP Games, 2003), PLEX is also associated with value and has been in existence since 2008 (Grimmi, 2009). Player Teckos Pech considers PLEX as a luxury good which is primarily bought by players with a high in-game income for their own in-game benefit or as a good for value storage (Pech, 2017). PC Gamers sees PLEX as an inflation hedge and considers it to be the premium currency (Messner, 2017).

Player Contagion believes that PLEX is the closest item in-game as an inflation hedge as the game developers would intervene the market according to inflation while player Vaerah Vahrokha in the same post believes that PLEX ‘is not comparable to gold (imperishable, rare and precious)’ (EVE Forums, 2013).

Summary of findings

Comparison of Gold and PLEX

	Gold	PLEX
Limitation in the quantity that can be produced	Limited by physical amount stored	Limited by players purchasing PLEX with USD
The significance of financial value in respective economies	Significant	Significant
The significance of historical context in respective economies	Significant	Significant
The significance of applicational uses	Significant	Significant
Recent development	No notable developments	<ul style="list-style-type: none"> • Virtualization • Decrease in denomination • Becoming more similar to Gold in the form of trading
Production and destruction cycle	<ul style="list-style-type: none"> • Exploration of mineral reserve • Extraction • Smelting 	<ul style="list-style-type: none"> • Purchase of PLEX using USD • Sold on the in-game market

Comparison of respective economies

	EVE Online	Real-world
Legal system	Limited	Well established
Method of growth	Increased intensity of warfare	Development
Economic priorities	Fluctuation and keeping players entertained	Growth and improvements of allocation of resources

Discussion

Comparison of respective economies

If we consider EVE Online as a real-world nation, it would rank at the very bottom of the rankings for measuring a nation's economy as shown in 'Economic Figures'. This can be partly attributed to the small population size (player) and the lack of financial services after the fall of EBank. The stagnation in inflation could be a potential reason of the low GDP figure as players lack the incentive to spend. Despite the relatively small size of EVE Online's economy, it should be noted that EVE Online's economy is still comparable to some small countries such as El Salvador's, which has an M0 of 17.7% of EVE Online's (Trading Economics, 2018). As such, EVE Online's economy can be considered as having real-world significance due to the size of its economy, which is small but still comparable to some small countries.

Despite the size of the EVE Online economy and the high degree of similarities between the real and the EVE Online economy, notable differences still exist. The economy is based largely on warfare, which is not an uncommon setting in MMORPGs as people care less about the development of the economy as a whole but their personal enjoyment in playing these games. Fighting with spaceships are often seen as an exciting concept that is hard to realize in the real-world, but it is a common if not essential activity in EVE Online. The ability to conduct activities inaccessible in real life such as scamming, stealing, without legal consequences as mentioned in 'Differences in the basis of economies' is one of the reasons why thousands of players are drawn to the game. The continuation of open warfare throughout the whole game universe is one of the main driving forces of the EVE Online economy as it creates a constant demand.

In the real-world, however, countries often find wars too costly, owing to the destruction they will likely bring. Weapons in the real-world are less likely to be used in actual warfare and

more likely to be used as a deterrence than in EVE Online, such as to support the strategy of Mass Assured Destruction. There are no real-world consequences for destroying entire trade fleets in Jita, the universe's most important trade hub, whereas in a single gunshot fired in Sarajevo in 1914, started a World War One that killed 40 million soldiers and civilian (Mougel, 2011). The way that growth is achieved in the real-world economy and the way it is achieved in the EVE Online economy is fundamentally different.

Therefore, EVE Online is fundamentally an economy that is based on enjoyment, and not necessarily development, as there are no future generations to think about and no families to take care of. If you died in battle, you can just respawn and join the battle in a new spaceship.

Although the two economies might have different priorities and different approaches towards solving economic problems such as growth in consumer demand, which in real life is solved primarily through economic development and in EVE Online primarily through an increase in warfare, they are, fundamentally, economies where human interaction and human psychology plays a big role. As human interaction and human psychology in-game and in the real-world follow similar patterns, common traits such as self-interest are persistent in both worlds. Even the seemingly cruel, warfare filled EVE Online universe has EVE-Scout that acts as 'Good Samaritans' in-game by rescuing players stranded in remote parts of the EVE Online universe (Messner, 2018). This suggests that human behaviors in the context of respective economies are similar though players still priorities real life responsibilities. As an economy is composed of human activities, similar human behaviors suggest that EVE Online's economy and the real-world economy are comparable to some extent.

Comparison of gold and PLEX

Gold and PLEX both have similar attributes in their respective economies as shown in findings. Despite this, the findings might be inaccurate due to the limitation of not able to account for parallel trading of PLEX and notable differences in the basis of economies between the real-world economy and EVE Online.

In EVE Online, infinite numbers of PLEX can be produced by the economy's de facto central bank and sole controller of EVE Online universe, the game developer. Gold, on the other hand, is limited in the quantity that can be supplied. Gold's physical property will remain while CCP Games can make changes to PLEX as seen in 'recent development' which influences PLEX's attributes.

CCP Games doesn't need to accomplish anything in EVE Online's economy, it merely needs to keep players engaged through warfare to earn a profit in the real-world. Players engage in economic activities in EVE Online because it brings them real-world fulfillment. PLEX is bought and sold by players, either by USD or ISK, because of PLEX's value to the players is not only measured in USD or ISK but also its promise in giving the players an enjoyable gaming experience and creating real-life satisfaction.

The uncertainty in the future attributes of PLEX directly contradicts the relatively unchanging attributes of gold. While their current attributes are similar and comparable, they might not be in the future. It is incorrect to assume that attributes of a virtual item in a virtual economy fully controlled by its game developers will stay the same. Therefore, while gold and PLEX function similarly in respective economies at the present, it is difficult to say whether they will remain such.

Conclusion

From my findings and discussion, I have concluded that PLEX in EVE Online function similarly to gold in the real-world economy at the present due to their similar attributes across different criteria and the similarities between the two economies.

Therefore, virtual good in a well-designed virtual economy can function, to a large extent, similar to a real-world commodity in terms of attributes and role in the market, as virtual economies can be similar to the real-world while following similar economic principles (Lehdonvirta, & Castronova, 2014), allowing virtual economies to act as a simulation of real economy to the extent which the designers and developers of such virtual world allows it to be. Although the similarities between a virtual good and a real-life good might be changed in the future as a virtual good's attributes can be altered.

Further exploration

Further research can be done on EVE Online and simulations can be run in-game to test certain economic theories.

The research can serve as a basis for the comparison between virtual economy and real-world economy in future research. Experiments can also be conducted on the scale that was never possible with real human activities and interaction. Economists can experiment impact of economic policies without real-world consequences, thus allowing experimentation of economic policies to test out their effectiveness with real human data, giving us a better understanding of economics and whole new worlds to explore, with endless possibilities of research, experimentation, and opportunities.

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