

Final Project

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1 Introduction

Steam, an all-things-video game virtual marketplace developed by Valve Corporation in 2007, is easily the industry dominant method of game access for PC users. Though competitors such as the Epic Game Store, Itch.io, and GameJolt still capture shares and niches of the PC gamer market, the vast majority of PC gamers worldwide utilize Steam.

Before we get deep into this project, let's take a moment to review relevant terms to our report. Acquisition rate is the rate in which a company obtains new customers, while churn rate is the rate in which those customers leave. The proportion of customers which stay are a company's retention rate, and a customer's expected time with the company is considered their lifetime, with their projected revenue over that lifetime serving as the customer lifetime value. Finally, the network effect is the theory that certain companies - ones which serve as marketplaces or social platforms, for example - operate in a positive feedback loop based in the number of users (the more users, the more value, the more value, the more users, etc.)

This project hopes to observe Steam's current customer acquisition model and the implications that come with it, projecting just a bit over 20 years in the future. Furthermore, it aims to observe ways Steam can continue to monetize its platform through engagement with its customers, although this paper concludes that the diversification of revenue is likely the most safe course of action Steam can take.

When we consider Steam's customer acquisition model, we need to consider the assumptions we're working under - especially since this report does make a few conjectures regarding variable values and the inner workings of gaming communities, particularly regarding the "spread" of casual vs. active gaming.

Here are our Assumptions

- Assume annual risk rates can be effectively converted to annual infection rates.
- Assume the network effect applies to gamer acquisition (and so we can use an infectious disease model)
- Assume, when using global steam data for the USA market, 16.4 percent of the market applies for the US (as the US composes 16.4 percent of all user accounts) [5]
- Assume 50 percent of accounts on Steam are people's primary accounts (i.e, distinct customers) rather than bots, 2nd accounts, company accounts, or test accounts.
- Assume that the percentage growth in daily active users over the last 5 years is the same as the percentage growth in monthly active users over the last 5 years [3]
- Assume we can only convert existing gamers (so our susceptible pop is people who already own consoles)
- Assume People who are over steam don't go back.
- Assume users are either casual (E population, 2 year lifetime), or Active (I population, 5 years lifetime), and that neither user converts to the other
- Assume that the growth in console ownership from the 2010s is the same now
- Assume all yearly rates can be evenly distributed over the span of a month

2 Model Details

A note on rates vs. risks: initially, this project began with a focus on rates, as the network effect of Steam's userbase is hard to measure as much of it occurs online and with a variety of diffusion styles (hierarchical on Youtube, grassroots through peers, etc.). However, due to some technical difficulties as well as a few more assumptions, we have chosen to use the rates of increase observed over the years in Steam data to reverse engineer the network effect (risk of being "infected" by existing Steam users) data and use that for a more traditional S(E/I)R model.

Now, let's look into our variables:

- Casual User Lifetime (months): $dCasual = 24$
- Active User Lifetime (months): $dActive = 60$
- New Casual User Risk: $roCasual = 2.12$
- New Active User Risk: $roActive = .128$
- New Casual User Acquisition rate: $betaCasual = roCasual / (n * dCasual) = 4.641 * 10^{-10}$
- New Active User Acquisition rate: $betaActive = roActive / (n * dActive) = 1.121 * 10^{-11}$
- Casual User Churn Rate: $churnCasual = 1 / dCasual = 1 / 24$
- Active User Churn Rate: $churnActive = 1 / dActive = 1 / 60$
- Casual User Revenue: $casualRevenue = \frac{11}{12} * 10 * .2 * .000001$ [4]
- Active User Revenue: $activeRevenue = \frac{25}{12} * 10 * .2 * .000001$ [4]
- Total Initial Population: $n = 190326069$

Furthermore, a note of clarity on the S(E/I)R model. We've chosen to make it so that casual players don't become active, but rather each new player either becomes active or casual. This seems most congruent with people's experiences on Steam and elsewhere, after I took a small survey of about 10 friends about their experiences on Steam, and read a bit about game sale distribution[4]. It seems people are either heavy hoarders and consumers (active gamers), or casual gamers who pick up the trendy indie games on occasion but focus their time on core games, usually FPSs or MMORPGs

(Team Fortress 2, AAA games, etc). As time is not a factor in Steam's profitability metrics, we define active/casual by game purchasing instead.

Our Equations are thus:

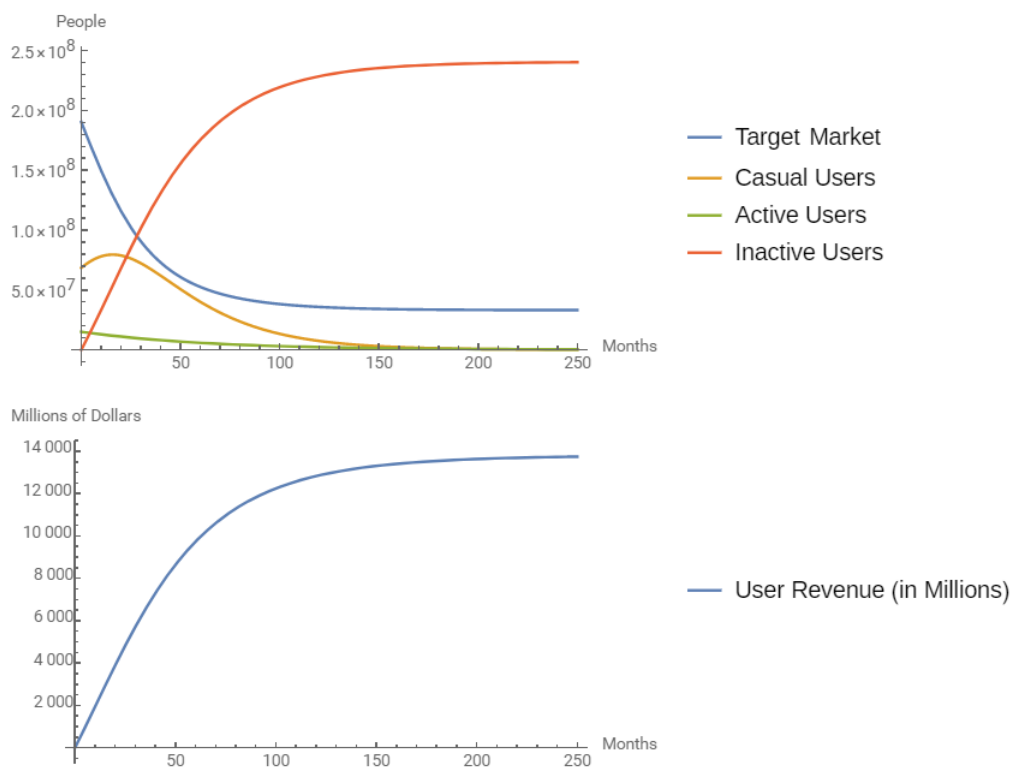
- PC Owners: $\frac{dS}{dt} = -betaActive * S(t) * I(t) - betaCasual * S(t) * E(t)$
- Casual Users: $\frac{dE}{dt} = betaCasual * S(x) * E(x) - churnCasual * E(x)$
- Active Users: $\frac{dI}{dt} = betaActive * S(x) * I(x) - churnActive * I(x)$
- Retired Users: $\frac{dR}{dt} = casualRevenue * E(t) + activeRevenue * I(t)$

Finally, our initial values are defined by a bit of reverse engineering as well. We've scaled down monthly active users and active users in E(0) and I(0) to be proportional to the US population using Steam global data. PC user data is from Statistica. The assumptions made while calculating these are in the assumptions portion of this paper.

Initial Values:

- PC Owners: $S(t) = 190,326,069$ [1]
- Casual Users: $E(t) = 68,470,000$ [2]
- Active Users: $I(t) = 15,030,000$ [5]
- Retired Users: $R(t) = 0$

3 Known and Initial Model



The above graph depicts what Steam's userbase and user revenue will look like (assuming current rates) up to 250 months in the future. It's interesting to notice a few things - the casual users peak a bit after month 15, at the value 79,510,900 users. However, the rate of acquiring new casual users.

Within this model, it appears that the lifetime revenue as the company as a whole will top out at 13.741 billion dollars, though the rate of new revenue levels out and declines after the number of casual users peak. This is not a sustainable model - by the end of the model, new users are few and can't keep up with the churn rate. Ultimately, about 33.122 million PC users remain untapped in S.

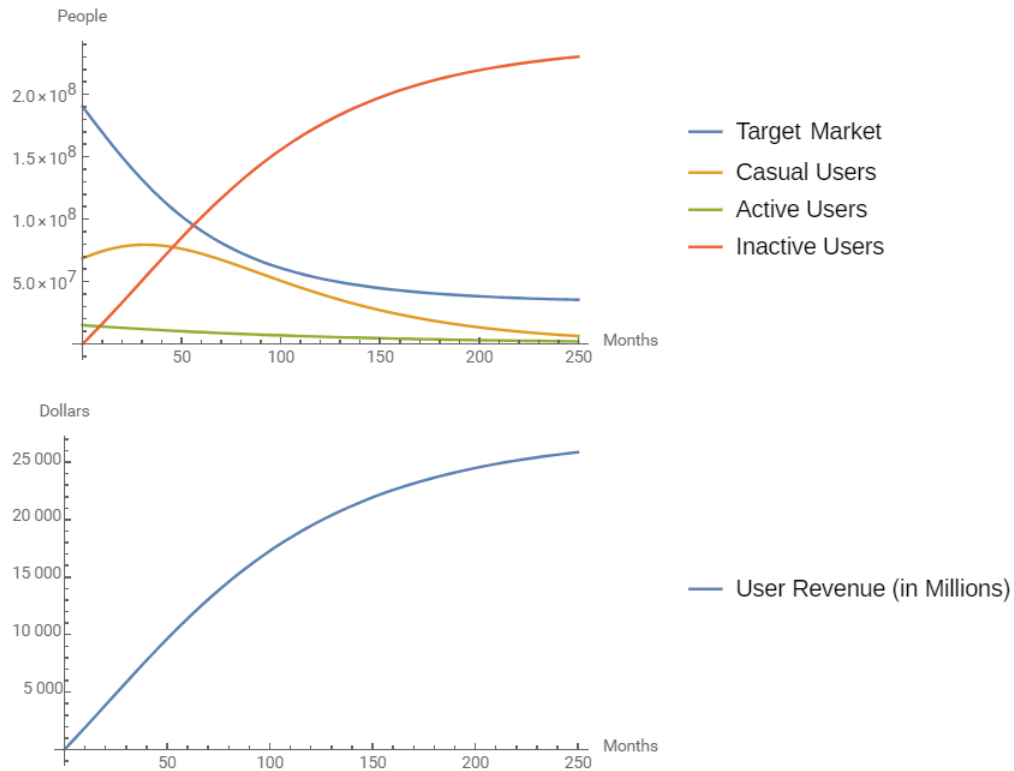
Looking at the model, we seem to have two problems - we don't tap into the full PC user base and, user revenue growth levels off after the next 2 years. In our next section, we'll look into both of those problems to see what Steam could try to pursue in order to optimize their future growth.

4 Possible Ways of Increasing Revenue

Idea 1: Doubling User Lifetime

Changes:

- Casual User Lifetime: 24 to 48 months
- Active User Lifetime: 60 to 120 months

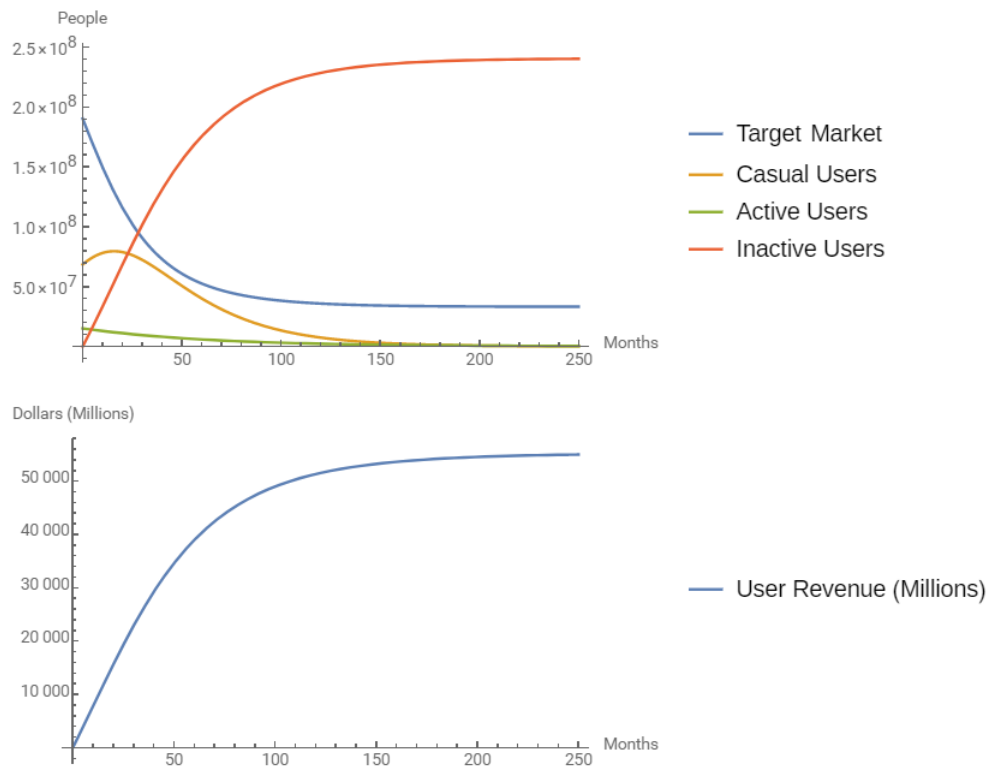


Doubling lifetimes extends the peak of our casual userbase to month 31, as well as the cumulative revenue to over 25 billion dollars, which is just shy of double our initial revenue figures, but spread over a longer period of time. We leave about 33 million PC users untapped.

Idea 2: Doubling User Revenue

Changes:

- Casual and Active User Lifetimes are returned to their initial values
- Casual users yield twice as much revenue per timestep
- Active users yield twice as much revenue per timestep

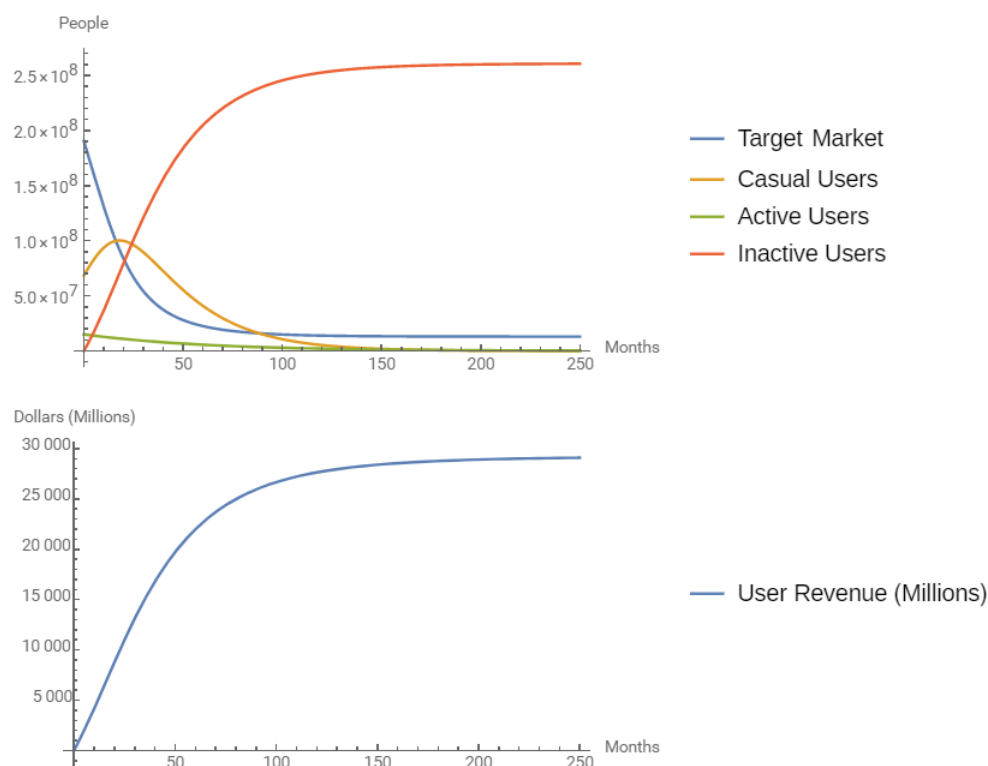


Doubling lifetime value per user ends up resulting in the same peak in casual users as well as the same remaining untapped PC users as the initial model, but pretty obviously, it results in significant returns on the revenue side: over 55 billion dollars in lifetime value, a 4x increase in line with doubling two revenue values.

Idea 3: Increasing Casual Proportion (95 Casual: 05 Active)

Changes:

- Revenue for both casual and active users are returned to initial values
- Risk for new casual users was recalculated using an initial rate of 95 percent
- Risk for new active users was recalculated using an initial rate of 5 percent

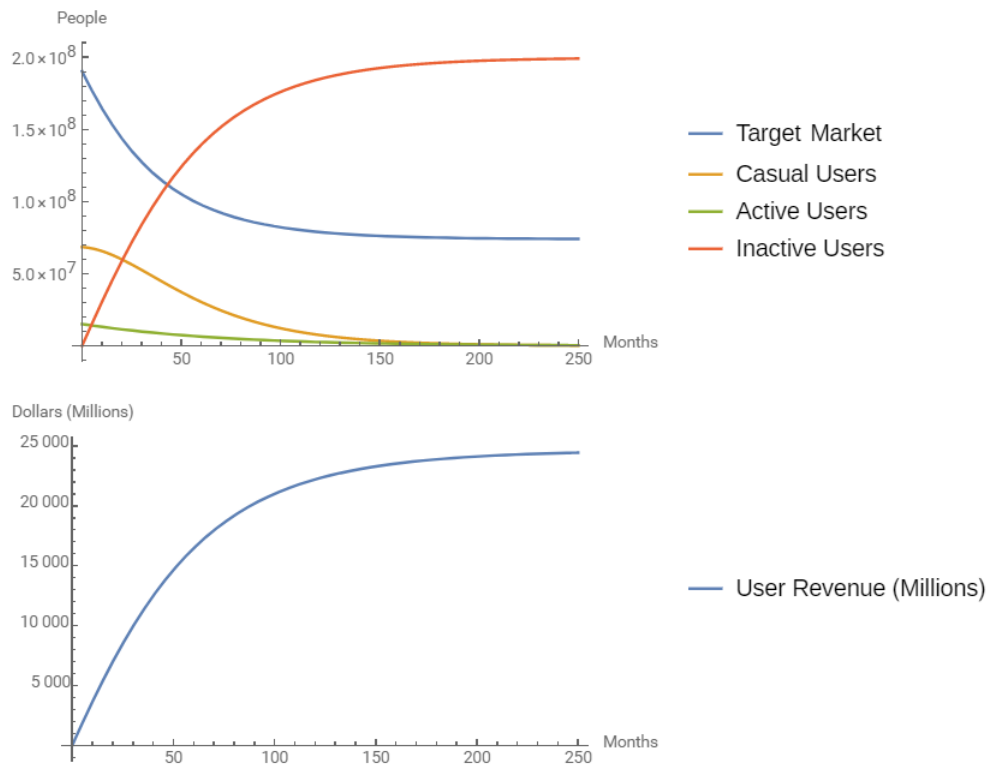


The most marked improvement between the initial model and this one is the untapped PC users - we end with 12 million untapped, rather than 33 million. Somewhat intuitively, increasing the proportion of casual users made them a greater force of conversion, and so they reached a greater number of PC users. Though active users are twice as profitable per user than casual users, the sheer numerical increase of casual users resulted in a significantly higher overall revenue - 29 billion dollars cumulatively.

Idea 4: Increasing Active Proportion (75 Casual: 25 Active)

Changes:

- Risk for new casual users was recalculated using an initial rate of 75 percent
- Risk for new active users was recalculated using an initial rate of 25 percent



This adjustment results in a significantly larger remaining market, with around 73 million untapped, and yet for how much of the market remains untapped, the revenue remains relatively high, at around 24 billion dollars. It's an interesting situation to be in and one which may yield good profit with lower costs, as it devolves Steam to its seemingly core audience. However, this is assuming supply holds up in response to the shrinking audience.

5 Conclusions

Now, the major conclusions of our report. Through observing our initial model, we observed two inefficiencies in our customer acquisition model - a significant untapped target market, as well as a cumulative revenue model which levels off at a certain point. We tested for a few adjustments in order to see how we can tackle these problems.

When it comes to saturating our target market, expanding our casual userbase ends up being the most successful method. The casual userbase, though less profitable, bring a lot of revenue through sheer numbers, and with some research into engagement metrics, Steam could experiment in various ways to extend the casual user lifetime so that this benefit is further multiplied.

When it comes to revenue, however, things get a bit more interesting, because although the graph with the higher casual users brings more revenue, increasing active proportion brings similarly high revenue (29 vs. 24 billion), which, if one could take into account customer acquisition costs (which lead to lower margins on the casual side), may result with the active user focus being more profitable. This isn't particularly surprising - Steam, as they get money from transaction fees, has incentive to get a userbase that is prone to transacting often and over a long period of time.

So we end up with two separate conclusions: focusing on developing a core active userbase may prove most profitable, while spurring on a casual userbase will result in greater market saturation. With that being said, however, keeping an eye into modern Steam movements, the company is likely aiming for the latter rather than the former, due to potential alternate revenue sources, such as selling user data for targeted advertisement or other research, or the potential for Steam to become a content platform beyond simply a marketplace. This secondary model has actually been rather visible in these past two months: Game studios are now allowed to live stream their games and regularly engage with fans, though a cut of those sorts of revenue still go to Steam. As in nearly every single model, user based revenue stagnates, such movements may be wise ones in order to reduce company risk and diversify revenue.

Ultimately, this report hopes to clarify the current user base of Valve's Steam

marketplace, as well as analyze where Steam may go to optimize on its future potential revenue and value as a whole. For further research, we could hope to include greater costs - a customer acquisition cost in particular. A better determination of the churn rate also seems to be a good improvement to find. A greater understanding of these metrics will serve to improve our decision making ability significantly.

References

- [1] Statista Research Department. *Computer Ownership in the US 2019*. Statista, 22 Apr. 2020.
- [2] Christina Gough. *Number of Steam Users 2020*. 9 Apr. 2020.
- [3] Charlie Hall. *Steam Is Gaining 1.5 Million New Users Every Month*. Polygon, 4 Aug. 2017.
- [4] Ethan Levy. *We're Buying More PC Games Than We Can Play*. Kotaku, 12 Mar. 2014.
- [5] Steam. *Steam: Game and Player Statistics*. Valve Corporation.