



2018 Cohort Analysis

Pumping Station: One

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Summary

This study uses historical payment records to Pumping Station: One (PS1) to analyze member growth and member churn, the rates at which people join and leave the organization.

Because payment records include member names, an inference can be made regarding the gender of each member. Not all names can be classified by gender, and likely not all inferences will be correct. Even allowing for errors in the gender classification, the data reveals meaningful differences in growth and churn rates between genders.

Growth: fairly slow and getting slower

New members joined PS1 at a remarkably consistent rate on an absolute basis between 2015 and 2018. On average, 25 new members join per month: 20 men and 5 women. On a percentage basis, this represents a declining growth rate, despite the fact that PS1 dues continue to fall in real terms, and the space doubled in size and added new equipment during this period.

25 new members might seem like significant growth, but members leave at a similar rate. Net growth averages 1.0% per month. Net growth of female members was actually negative every month between July 2017 through March 2018.

Churn: new members don't stick around long, especially if they are female

Churn, the rate at which people leave PS1, has varied over time. For male members, the churn rate has dropped steadily from 9.6% per month to 5.0% per month. For female members, churn rate has been as high as 12.3% per month, and was 8.5% per month in early 2018.

Cohort analysis provides a behavioral lens on the data. In their first six months of membership, female members churn at an average rate of 11.5% per month, compared to an average rate of 7.5% for male members. 45.9% of women leave PS1 within six months. 33.7% of men leave PS1 within six months. Overall, 55.6% of new members leave within the first year.

A club of older members

The “age” of a member refers to the duration of their membership. For example, a “two-year-old” member joined two years ago. In growing organizations, average member age is often flat or even declining over time, as new members join and older members leave. At PS1, member age has climbed steadily, a reflection of moderate growth and churn that is concentrated in new members.

What it means

There are at least two ways to view the high churn rate among new members. The first is that this reflects a natural sorting process as people discover whether there is a good fit between

their interests and what PS1 offers. Perhaps PS1 is like a gym membership for many: an aspirational purchase that they don't end up using.

Alternatively, perhaps PS1 is failing its new members. Anecdotally, many have noted the difficulty of navigating PS1's authorization processes, rules, and cultural practices. Some might find the hurdles too high to clear.

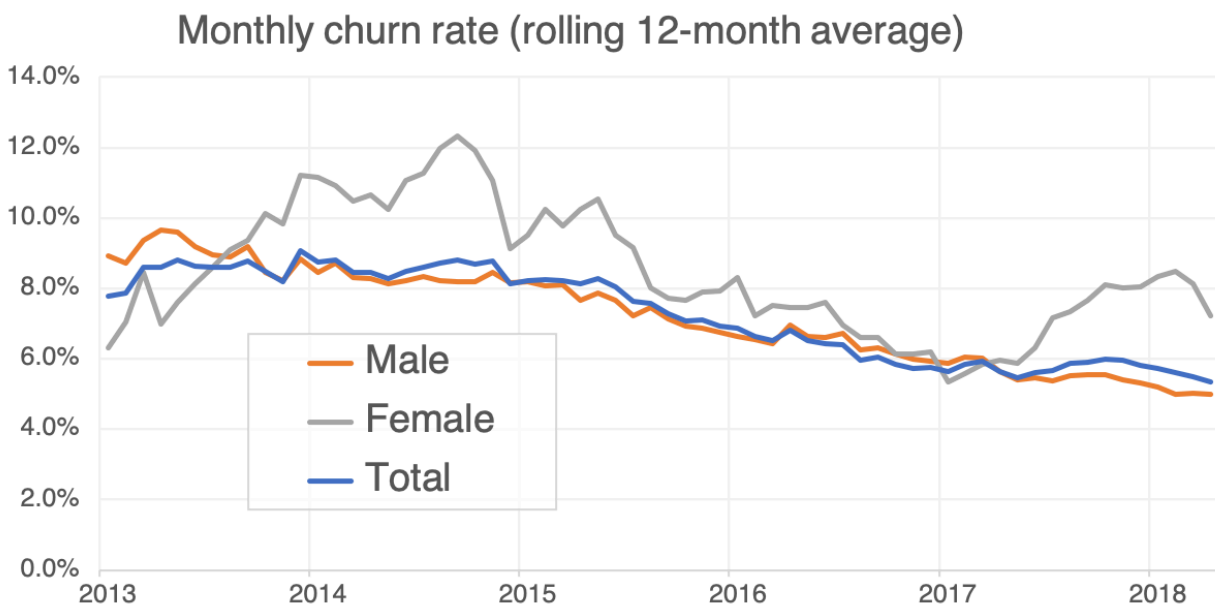
These explanations aren't mutually exclusive, or exhaustive. Almost certainly they are both at least partly true. The gender disparity in growth and churn, however, suggests that the hurdles are higher for some groups than others. A recommended next step is to conduct a survey of churned members to gather better data on why they left.

Less ambiguous are the implications of a high churn rate for PS1's finances. The space's sole source of funding is member dues. A high churn rate makes growth difficult; adds additional administrative overhead and demand for authorizations; and raises the risk that the low net growth rate could tip negative with small changes in underlying trends.

Analysis

Churn rate

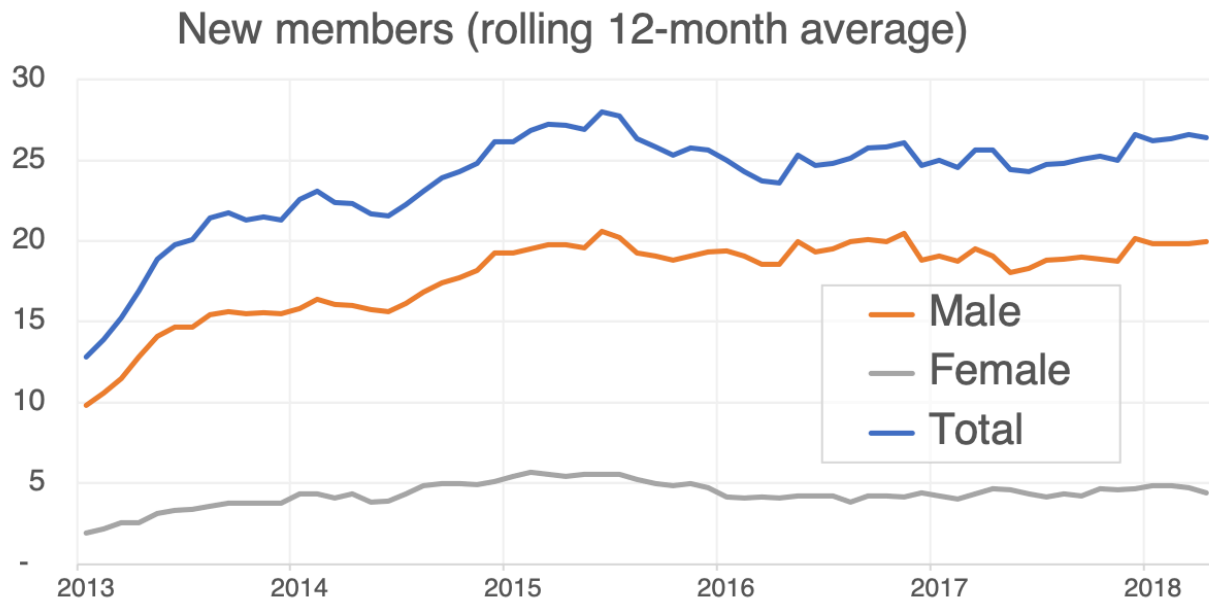
Churn, a measure of the number of members who leave PS1 in a given time period, can be measured in a variety of ways. One common way is tracking the people who leave in a given month as a percentage of members at the start of the month. This chart presents a 12-month rolling average of monthly churn rates.¹



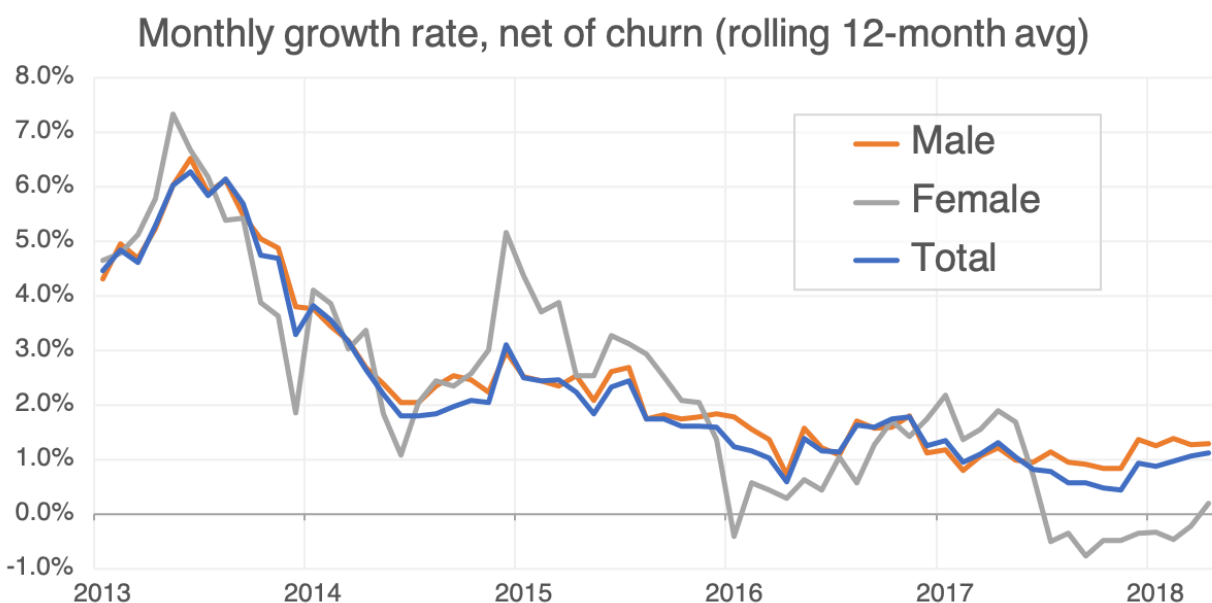
Historical churn rates for male members of PS1 has been on a steady decline from 9.6% per month in April 2013 to 5.0% in April 2018. Historical churn rates for female members are higher than for male members for almost the entire analysis period, going from a peak of 12.3% in September 2014 to roughly the same rate as male churn in mid-2016 before climbing as high as 8.5% in February 2018.

¹ Where noted, the charts and analyses use 12-month rolling averages to help smooth out some of the volatility from month to month and better reveal underlying trends. For example, a 12-month rolling average churn rate for December 2017 is actually the average of churn rates between December 2016 and December 2017.

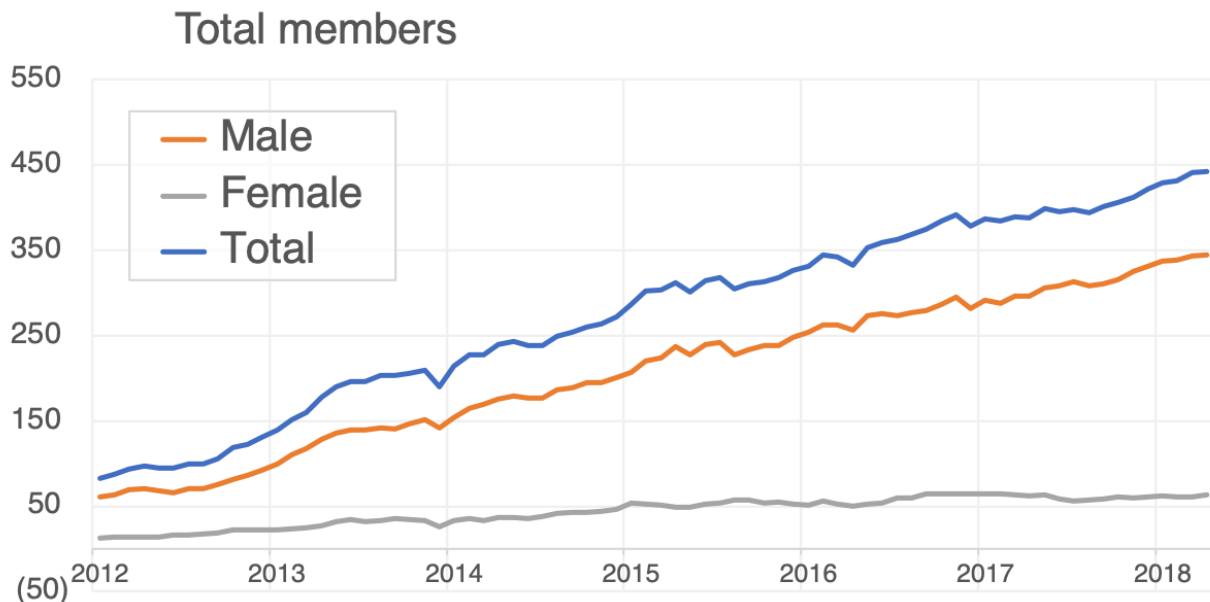
Growth rate



On an absolute basis, the number of new members joining PS1 every month has been highly consistent over time. Since September 2014, PS1 has added between 24 and 28 new members per month (again, on a rolling 12-month basis), without exception. The average of 25.5 new members consists of approximately 20 men and 5 women. Growth has remained stable on an absolute basis despite the fact that inflation-adjusted dues have dropped over this period, the space has doubled in size, and more equipment has been added.



A steady influx of new members indicates falling growth on a percentage basis, particularly when taken net of churn. Monthly growth net of churn reached a peak of 6.3% in June 2013. Since January 2017, monthly growth has averaged 1.0%. PS1 actually lost female members for the entire period between July 2017 and March 2018.



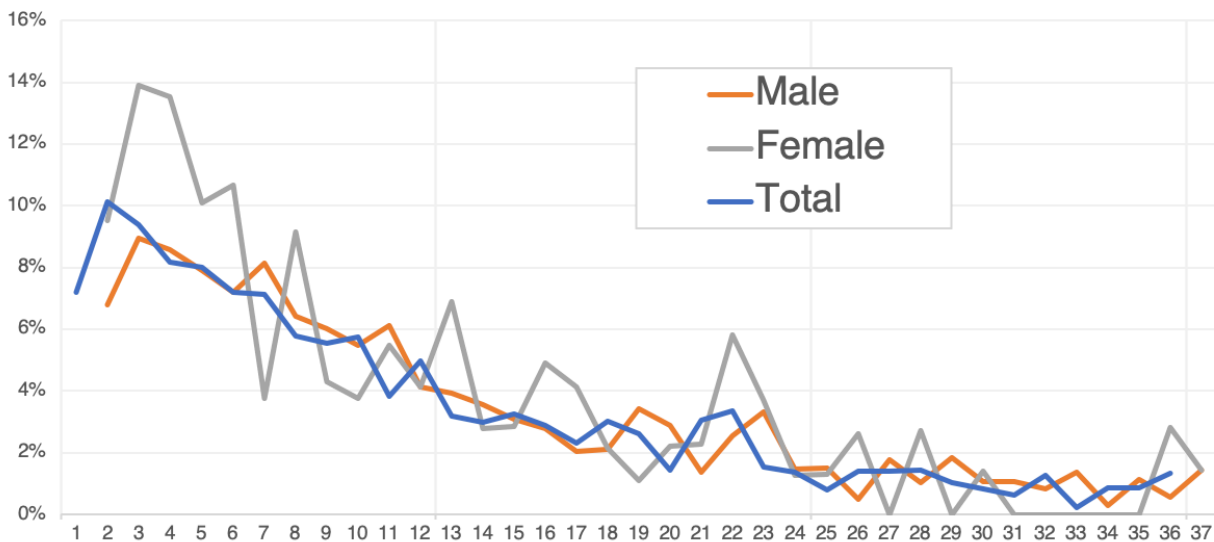
Overall, PS1's membership has experienced linear growth. The higher churn of female members means that their absolute numbers have remained relatively constant since 2015. On a percent basis, female members have dropped over time.²

² Note that according to this analysis, PS1 had 443 members in April 2018. This number is undoubtedly too low, although imperfect recordkeeping makes it difficult to know exactly how far off it is. An audit in December 2017 suggested that PS1 had 466 members in December 2017, compared to 422 according to Paypal records. 24 members paid by cash rather than Paypal, leaving only twenty members unaccounted for. This gap likely comes from a few different sources: members who pay dues in advance; members who don't pay dues (such as area hosts); and members with special arrangements, such as scholarships or group memberships. These missing members don't change the overall trends, but they do slightly inflate the apparent growth and churn rates.

Cohort analysis

A more sophisticated way to analyze churn is via cohort analysis, which looks at churn not by calendar month but in terms of duration of membership. In other words, cohort analysis groups together all the people who churn after one month, all the people who churn after two months, and so on. The result is a behavioral analysis of when in their membership cycle people tend to leave PS1.³

Cohort churn as percent of previous month

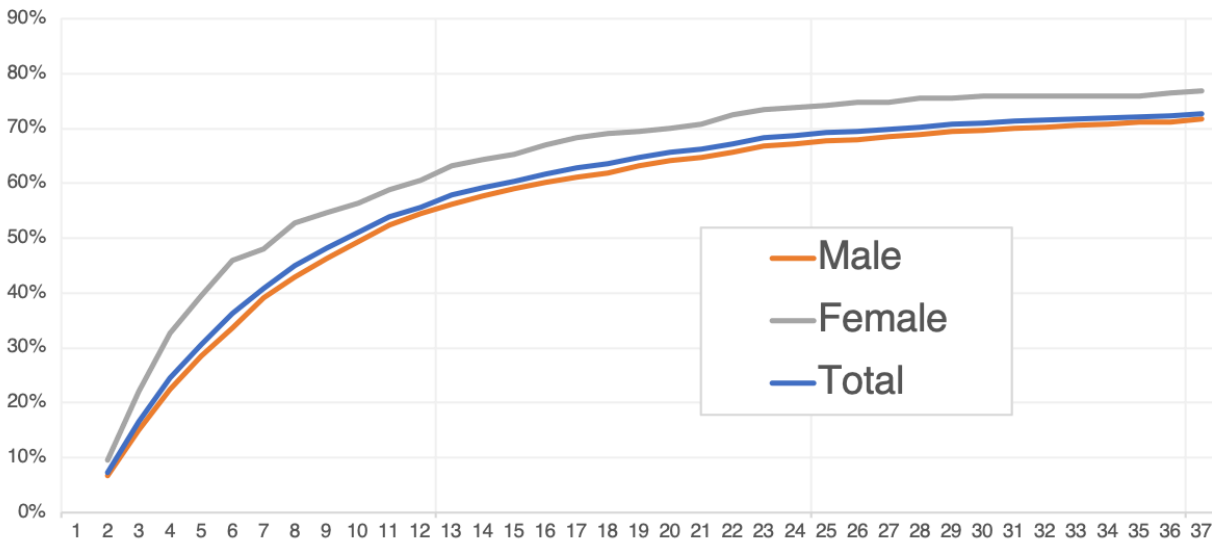


Cohort analysis shows that most members churn within the first year (the 12-month mark on the chart). The longer they remain, the less likely members are to leave. After two years of membership, monthly churn flattens out at roughly 1% per month.

Female members churn at a higher rate than male members, especially during their first six months. In their first six months of membership, female members churn at an average rate of 11.5% per month, compared to an average rate of 7.5% for male members.

³ See https://en.wikipedia.org/wiki/Cohort_analysis for a deeper explanation of cohort analysis.

Cumulative cohort churn by month



Cohort analysis can also be used to calculate cumulative churn of the initial population. 40.6% of women leave PS1 within six months, and 60.5% within their first year. 34% of men leave PS1 within six months, and 54.5% within their first year.

For growing software-as-a-service (SaaS) companies, a standard target is 5 - 7% annual churn, which equates to a monthly churn rate of 0.42 – 0.58%.⁴ PS1's most recently measured monthly churn is 6.0%.

However, 7% annual churn is rarely achieved by small businesses. PS1's churn rate is by some measures within the range expected for an organization of our size. One payment processor released a study of churn rate by business type.⁵

- Companies that sell consumer services have a median monthly churn rate of 7.69%.
- Business-to-consumer companies that charge between \$25 and \$50 per month have a median churn rate of 8.52%.

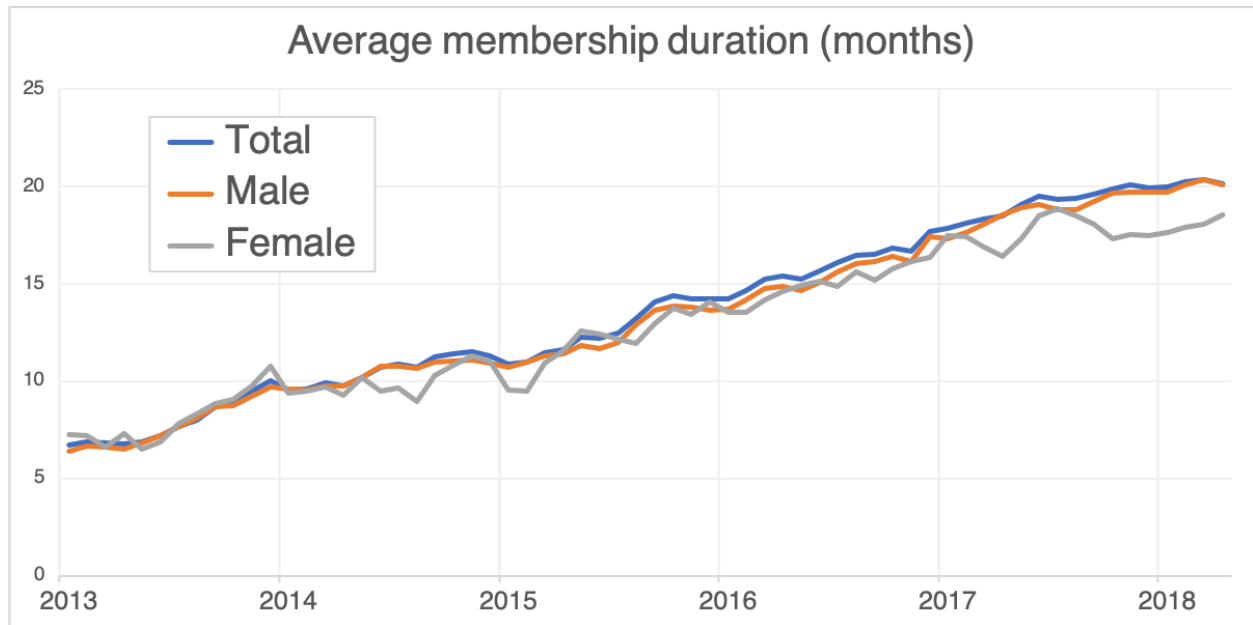
These benchmarks are useful, but it is hard to know what constitutes a true benchmark for PS1, a volunteer-run not-for-profit organization that serves member-constituents.

⁴ <https://sixteenventures.com/saas-churn-rate>

⁵ <https://info.recurly.com/research/churn-rate-benchmarks>

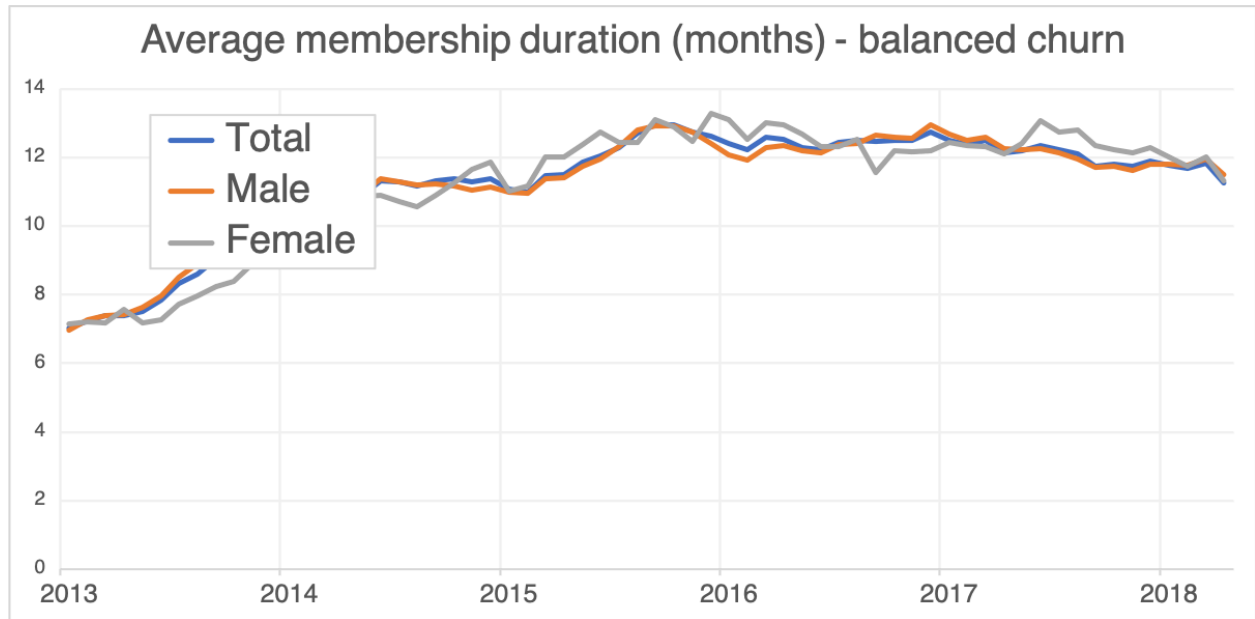
Member “age”

Payment data allows us to calculate how long a person has been a member at any period of time. In aggregate, this data reveals the average member “age” in any given month — that is, the average duration of membership.



PS1’s population is getting steadily “older” over time. In January 2013, the average member had been a member for seven months. By April 2018, the average duration of membership was 20 months.

It might seem that longer memberships are a natural consequence of the passage of time. As years go by, there are more members who have been around for long periods of time. But membership duration is entirely a function of how many new members are joining and which members are leaving. In a more quickly growing organization or one in which churn is more evenly distributed throughout the population, member age should be flat or even declining.



For example, this chart shows what the average membership duration at PS1 would be if members churned at an even rate over their first 36 months. Interestingly, the average age at any point in time is lower than for PS1's actual membership, even though the average person in this hypothetical scenario stays with PS1 for much longer than our actual members do (18.5 months vs. 13.7 months). The current pattern of short average membership duration and an "old" existing member base reflects churn that is heavily concentrated in new members.

Methodology

Data source

This study was based on Paypal payment records. Although these records are relatively complete, they do have a number of issues:

1. PS1 began to switch over to a new member management system in May 2018. Members who switched from the old member management system to the new cancelled their recurring Paypal payments. For this reason, the study only goes through April 2018.
2. Paypal only provides seven years of records, so our data only goes back to December 2011, leaving out the first three years of PS1's history.
3. Paypal doesn't capture all members. As noted above, about 67 members appear to be missing from the analysis. Although these missing members shouldn't affect overall trends, it will somewhat inflate calculated growth and churn rates.

The Paypal data also contains some idiosyncratic payments that don't seem to correspond to member dues. To weed out these values, we only used values of type "Subscription Payment," a status of "Completed," and a value between \$30 and \$80.

Although PS1 does have multiple member tiers, this analysis did not distinguish between them.

PS1 memberships renew from month to month, and it is not uncommon for members to leave the organization for a period of time and then re-join later. For the purpose of this study, a member was considered to have churned if they left PS1 for a period of at least three months. If they rejoined after three months, they were considered a new member.

Gender classification

The U.S. Census Bureau publishes lists of the most common first names for males and females in the United States.⁶ The first step in gender classification of the subscription data is to look up the position of the member's first name in each of these lists. If the name is more commonly a male name than a female name, for example, then the member is assigned the male gender, and vice versa.

Many names don't appear on either of the census lists. In this case, they were passed into a tool called Gender API,⁷ which provides a likelihood metric of the name being male or female. As long as the likelihood was 60% or more, Gender API's result was used.

⁶ https://www.census.gov/topics/population/genealogy/data/1990_census/1990_census_namefiles.html

⁷ <https://gender-api.com/>

Some names couldn't be classified via either of these methods. These were assigned a value of "unknown."

This methodology is obviously imperfect. It takes no consideration of non-binary gender classifications. And it will provide incorrect results in some cases. The results of the gender assignment don't have to be perfect, though, to reveal useful aggregate trend data.