**Understanding DAUs, MAUs, and the DAU/MAU Ratio: 10 Key Takeaways**

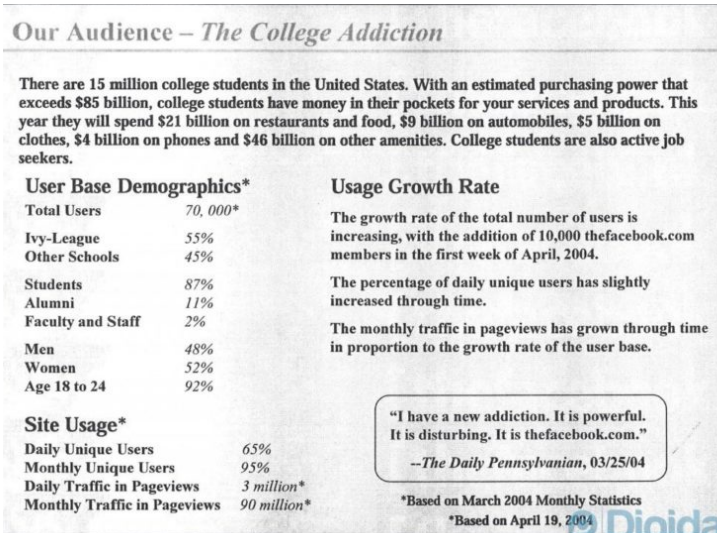
***What are DAUs and MAUs?***

DAU and MAU are key performance indicators used frequently by social networking and other companies with a digital presence to count the number of unique users who visit a site within the past day and month, respectively. Companies that report the figures in the MD&A section of their 10Ks generally make the argument that the metrics provide a more holistic image of the company's user base health. Subsequently, the metrics have been the center of attention for various equity research reports and litigation cases over the ambiguities of what the metrics actually imply about a company's health and its relationship with revenue generation.

***How were the metrics popularized?***

While the concepts of active users is not new (since organizations were invented, they have kept customer lists), unique active users to a webpage was first discussed in a January 2000 paper by Trueman and Wong titled *The Eyeballs Have It: Searching for the Value in Internet Stocks,* which focused on the valuation of internet stocks, like eBay and Amazon, and ties valuation directly to internet usage data like monthly active users.

The beginning of DAU and MAU as KPIs certainly coincided with the rise of the internet, which makes sense as internet and digital popularity called for new ways to define business success other than simple revenue numbers. Facebook was a big company that catalyzed the rise in popularity of the metrics. The company published a "media kit" in April 2004 that cited the platform's DAU and MAU as a percentage of total users to show the "addictiveness" of the platform (Chen 2012).



Our Audience – *The College Addiction*

There are 15 million college students in the United States. With an estimated purchasing power that exceeds $85 billion, college students have money in their pockets for your services and products. This year they will spend $21 billion on restaurants and food, $9 billion on automobiles, $5 billion on clothes, $4 billion on phones and $46 billion on other amenities. College students are also active job seekers.

**User Base Demographics***

| | |
|---|---|
| Total Users | *70, 000** |
| Ivy-League | *55%* |
| Other Schools | *45%* |
| Students | *87%* |
| Alumni | *11%* |
| Faculty and Staff | *2%* |
| Men | *48%* |
| Women | *52%* |
| Age 18 to 24 | *92%* |

**Site Usage***

| | |
|---|---|
| Daily Unique Users | *65%* |
| Monthly Unique Users | *95%* |
| Daily Traffic in Pageviews | *3 million** |
| Monthly Traffic in Pageviews | *90 million** |

**Usage Growth Rate**

The growth rate of the total number of users is increasing, with the addition of 10,000 thefacebook.com members in the first week of April, 2004.

The percentage of daily unique users has slightly increased through time.

The monthly traffic in pageviews has grown through time in proportion to the growth rate of the user base.

"I have a new addiction. It is powerful. It is disturbing. It is thefacebook.com."
*--The Daily Pennsylvanian*, 03/25/04

*Based on March 2004 Monthly Statistics
*Based on April 19, 2004

With Facebook's rise came the rise of social-network games around 2009, like Farmville, developed by Zynga. As social games took off, which was certainly catalyzed by the increased adoption of Facebook, the DAU/MAU ratio emerged as a key metric in determining the popularity and potential of a social game (Stark 2010).

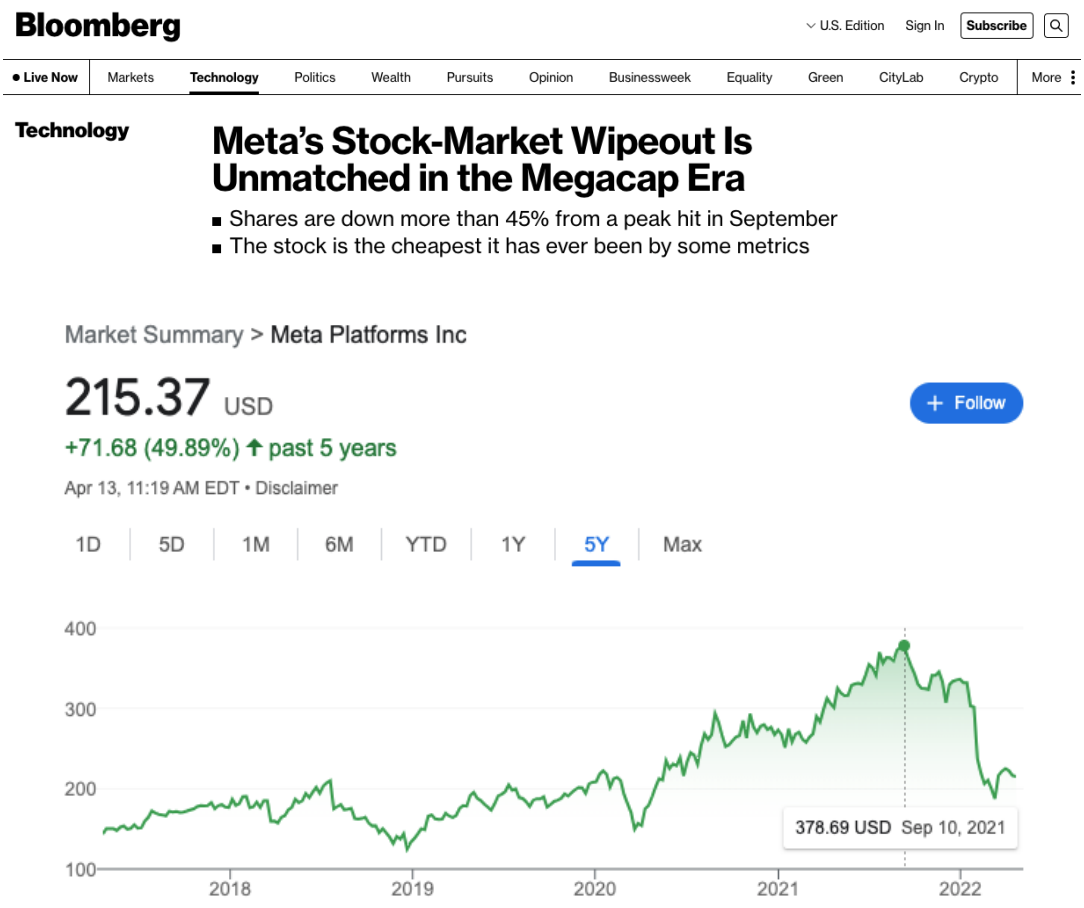
***Takeaways***

For my senior thesis project at Penn, I've been working with my professor, Peter Fader, to think about ways to classify and understanding DAUs, MAUs, and the DAU/MAU ratio to bridge the gap between how relevant these metrics are in the investing world and in litigation, and how little formal research has been published about the metrics.

Below are 10 key takeaways that I've found over the course of my research:

1. **The metrics are highly relevant in the context of investing.**

With the rise of internet-based platforms, DAUs and MAUs took off as non-financial metrics, and began appearing in various financial filings. As a result, investors began using the metrics in their valuations of companies to guide investment decisions. When you think about Meta's $251bn equity wipeout at the beginning of 2022, much of it was in response to Facebook's report that their DAU figure fell in 1Q2022 compared to 1Q2021. The sheer size of the stock's collapse highlights how much weight investors place on these non-financial metrics, as well as how much market share Facebook has been able to amass through strong active user growth trends over the past few years.




2. **Ambiguities relating to DAU and MAU have resulted in massive litigation cases.**

Perhaps because of the enormous weight that the investor community has placed on DAUs and MAUs, there have been a number of substantial litigations over the reporting, or lack thereof, of DAUs, MAUs, and the DAU/MAU ratio.

My professor and thesis mentor, Professor Peter Fader, was involved in the class action lawsuit, Twitter vs. Shenwick, which highlights the ambituigites regarding what exactly the DAU/MAU ratio says about a company's finances and consumer base health. Essentially, the plaintiffs argued that Twitter misled investors by not reporting information pertaining to Twitter's DAU and DAU/MAU ratio in the period leading up to Twitter's stock price decline in 2016. In September 2021, Twitter paid a $809.5mn settlement, which reflects the substantial monetary loss Twitter endured as a result of the lack of reporting standards of DAU and MAU and the lack of a streamlined way to interpret the metrics.

TECH

## Twitter to Pay $809.5 Million to Settle Securities Suit

Suit alleged social-media company misled investors about user engagement in 2015


Twitter said it expects to record a charge for the settlement in the third quarter.

PHOTO: DAVID PAUL MORRIS/BLOOMBERG NEWS

*By Colin Kellaher*

3. **How DAUs and MAUs are measured is extremely different across industries, and even across businesses within the same industry.**

Revolve Group, a fashion retailer, calculates the number of active users as those who had made a purchase in the last 12 months. In this case, it's easy to see that measuring Revolve's active user count is pretty simplistic, and not really prone to any sort of measurement error, as transacting on a platform is "observable."

To contrast, consider a company like Twitter, which is a social media platform. The company reports monetizable daily active users, defined as the number of accounts that logged into one of Twitter's avenues, like the website or app, that shows advertisements.

The two companies are drastically different, and thus there are clear differences between Revolve and Twitter's active user count definitions. Namely, every user included in Revolve's active user base definitively made a transaction on the platform in the last 12 months, and thus contributed to firm revenue, but not every user who signed into Twitter necessarily interacted with ads, or even scrolled

through their feed long enough to encounter an ad, implying that not every Twitter user active contributed to generating revenue for the company. This example illustrates the discrepancies between active user definitions across industries and their varying ties to monetization.

4. **Measuring DAUs and MAUs is highly susceptible to manipulation and/or measurement errors.**

An active user count can be easily manipulated due to rather lofty interpretations of what "active" really means for a company, or simply due to measurement error. Consider some notable "reforms" to the active user count definitions reported by notable social media companies in response to investor criticism:

a) Prior to 2015, before Twitter changed their active user count to include only monetizable users, they included Fast Follower sers in their active user count. Fast Followers do not actually login to Twitter's platform, and instead receive Tweet notifications through text message. These Fast Followers don't interact with or view Twitter ads, and don't contribute to revenue.

b) In Twitter's Q4 2015 earnings call, Twitter was asked to explain why the platform lost 4 million MAUs in the previous quarter. Twitter said the decline was due to the fact that the 4 million MAUs lost had not actually been using Twitter, but were mistakenly counted when applications automatically contacted Twitter servers for regular data pulls. These users don't interact with Twitter, and counting them in the active user count seems flawed.

c) Prior to 2015, Facebook included users who interacted with third-party extensions, like "liking" an ESPN article, in their active user count. It's debatable whether these users should be counted towards Facebook's active user base, as they technically never accessed Facebook.

This list of reforms calls into question: have other social media companies, and digital companies in general, made similar changes to make sure that their active user count captures the actual base of active users that contributes towards revenue generation?

Ultimately, these examples show that an "active" user can take on a variety of forms, and in many cases, companies define "active" users by a minimal action like logins or interacting with a platform through a third-party. Lots of these actions that define active users are low commitment and low friction, and don't actually reflect the true usage or stickiness of an app or platform.

5. **The DAU/MAU ratio, and DAU and MAU individually, say nothing about true engagement.**

DAU and MAU metrics are merely quantitative assessments of the user base, and thus shouldn't be applied qualitatively, as the metrics ignore the quality or engagement of a user's experience.

Of course, the applicability of DAUs, MAUs, and the DAU/MAU ratio to evaluate performance varies across settings. I spoke with Shruti Keoliya, PM at Zynga, the company that popularized the DAU/MAU ratio, and she says that the DAU/MAU ratio is used as a benchmark for success only among certain casual games meant to be played in a social context (think *Words with Friends*).

When the DAU/MAU ratio is used to measure engagement, people implicitly assume that logging in more times over the course of a month implies that customers are engaged. However, there are many other circumstances, like games that generate revenues through in-app purchases, where the DAU/MAU ratio doesn't capture anything about how the users are actually interacting with and generating revenue for the game.

6. **The DAU/MAU ratio and DAU and MAU individually ideally should be used in conjunction with other non-financial metrics to evaluate company performance.**

In speaking with Becky Ann Hughes, VP of Growth at Electronic Arts, she says her team uses another measure called "utility" that takes into account DAUs and MAUs, as well as a myriad of other factors, like the last login time and duration spent on the platform. These measures in conjunction with one another, I believe, better capture "engagement."

7. **DAUs and the DAU/MAU ratio don't make sense when evaluating products or platforms that aren't meant for daily use.**

Per one of Andrew Chen's blog posts about DAU/MAU, when we think about companies that have earned sky-high valuations, like Uber and Airbnb, not all of these companies monetize users based on daily interactions. Uber's most profitable business segment is Uber Black, which are typically used only for special occasions, and Airbnb makes money when customers go on vacation, which is rather infrequent. In these particular cases, using DAUs and the DAU/MAU ratio to evaluate the platforms seems flawed.

8. **DAU, MAU, and the DAU/MAU ratio makes the most sense for evaluating companies that make money through showing ads to users.**

The tie between user base size, which is the high-level information DAUs and MAUs provide, and revenue generation is the strongest in a business model that relies on advertising revenues. The intuition is: more users = more eyes = more revenues from advertisers, who often pay platforms to access their vast user base.

That's not to say that DAUs and MAUs are not meaningful in the context of other business models. For subscription and transaction-based businesses, DAUs and MAUs offer information about the potential future growth of the platform, as higher DAUs and MAUs today imply a larger pool of customers that are able to be converted into paying subscribers or customers who will make another transaction.

9. **The DAU/MAU ratio should not be treated like a stagnant metric to evaluate platform performance because it is highly subject to a variety of natural consumer processes.**

The DAU/MAU ratio is a popular metric in social media and gaming, with many arguing that the metric is representative of "engagement."

Consider what happens within a customer cohort defined by the time of customer acquisition (i.e. all customers who begin using the platform on 1/1/2021 are considered to be part of the same cohort). Because of natural customer heterogeneity, there are likely differences across log-in frequencies – there are some power users and some light users within the user base.

Assuming customers don't change their behavior and continue logging in with the same frequency as when initially acquired, those customers that are extremely light users, say they log in once every two months, won't be included in the MAU count in the subsequent month following acquisition. The decline in MAUs is more significant than the marginal decline in average DAUs, mechanically causing the DAU/MAU ratio to rise. More generally, the decline in MAUs is not because of any change in customer behavior, but is merely due to the fact that all customers are counted in the first month following acquisition as MAUs, but those who are extremely light users will not be counted towards DAUs and MAUs in all subsequent months. This ultimately causes the DAU/MAU ratio to increase following customer acquisition, and then stabilize in succeeding periods.

Here, the key idea is that the shakeout process causes the DAU/MAU ratio to mechanically increase, even though there are no substantial changes to the total number of logins and the overall level of engagement.

While this example may seem simplistic, the core concept holds even when factoring in individual-level login changes over time and customer churn. As users increase or decrease their usage over time as they familiarize themselves with the product, these changes will, on net, wash each other out and will be small relative to the broader cohort-level heterogeneity. When considering customer churn, initially casual users or very infrequent users are more likely to drop out of the customer base, which further accelerates the increase in the broad-level DAU/MAU ratio following cohort acquisition.

Ultimately what happens to the DAU/MAU ratio is a result of platform-level customer heterogeneity and has nothing to do with customer engagement or platform experience.

10. **In addition to intra-cohort dynamics, there's a dilution effect from new customer cohorts that artificially deflates the DAU/MAU ratio.**

In addition to intra-cohort dynamics, another key process that affects the DAU/MAU ratio is the effect of dilution from new customer cohorts. Consider, for example, a new cohort that enters the existing customer base. Typically, as customer cohorts mature, the DAU/MAU ratio increases over time, assuming the product is largely successful and attracts customers who increase their usage over time, and then stabilizes, reflecting the idea that core users emerge and are the customers who are retained over time. However, when a new cohort joins, the customers in the new cohort typically use the product less frequently than more mature users. In other words, acquisitions of new customer cohorts that are initially familiarizing themselves with the platform "punishes" the overall platform DAU/MAU ratio, when, in reality, the cohort just has not gone through the shakeout process to identify the most valuable customers.

When considering points 9 and 10 together, the DAU/MAU ratio is fogged by both intra-cohort and cross-cohort dynamics that makes it hard to tease out the true underlying "engagement" and "retention" of the customer base.

***Conclusions***

There are numerous factors that affect DAU, MAU and the DAU/MAU ratio, which I've referenced in my paper, including revenue model, seasonality, and intended frequency of use, and thus it's very hard to evaluate companies solely based on these non-financial metrics. While I believe it's true that DAU and MAU capture high level quantitative information about a customer base that could be tied to monetization and revenue generation, it doesn't say anything qualitative about the customer base. Moreover, while the DAU/MAU ratio could be applicable in specific settings, like evaluating games that are intended to be played every day and generate revenues through ads, it is significantly affected by natural consumer processes that makes it hard to understand the true underlying stickiness of a platform.