Sideloading in iOS before, during and after the EU regulation

Luis A. Saavedra, Alastair R. Beresford, Alice Hutchings, Hridoy S. Dutta
Computer Laboratory, University of Cambridge
luis.saavedra@cl.cam.ac.uk, alastair.beresford@cl.cam.ac.uk

The iOS ecosystem is usually considered a 'walled garden' free from sideloading. While Android allows users to install apps directly from the Internet, it is thought that jailbreaking is the only way to install apps. The truth is jailbreaks have become rarer and obsolete with the newest versions of iOS. However, sideloading in iOS is a reality, requiring a similar number of steps as on Android, albeit with some caveats. We present the results of the first analysis of 40 389 modded iOS apps from the 9 most popular iOS sideloading markets.

Having studied the sideloading ecosystem on Android and its effects on users we found hundreds of markets and analysed over 300 000 *modded apps* from the 13 most popular markets.[1] Modded apps are apps whose features and functionality have been altered by a third-party. Modifications included game cheats, such as infinite coins or lives; premium features provided for free; and apps with modified advertising identifiers or excluded ads. Almost 70% of apps had changed code, with 38% of them having changed permissions, 6% added advertising libraries, and 21% of those with advertising IDs had them changed. Less than 3% of modded apps had all their ads and trackers removed despite the markets' claims. Around 5% of the apps analysed were pirated paid apps (offered for free). In terms of user security, 9% of modded-code apps were classified as malicious by VirusTotal compared to less than 0.5% of apps in Google Play.

We then surveyed the 27 629 original app developers affected by modding found in ModZoo, receiving 717 full responses.[2] The respondents have a total of 4.9 billion instals in Google Play with an average of 6.8 million and developers of all sizes were represented. More than half are also iOS developers. One in four developers were unaware of modded Android app markets, and two in five were unaware of modded iOS apps. Developers of all sizes suffer revenue loses from in-app purchases (76%), advertising (28%), sales, third-party API use within their apps, and increased server costs and support requests. Many developers also suffered reputation damage and felt demoralised with the inability of current technical and legal tools to combat modding such as license checks and DMCA notices, respectively.

In order to complement this research, we studied the modded apps and sideloading ecosystem in iOS. We found 89 sideloading and modded app markets and scraped the 9 most popular ones over an 11-month period obtaining a 40 389 modded app dataset: **iOSModZoo**. Because there is no existing dataset of Apple Store apps, we scraped the App Store for the official version of the apps found in modded markets, obtaining a dataset of 77 189 apps and their metadata: **iOSZoo**. We present the results of our study, conducted at a pivotal point: before, during and after the EU regulation that forced Apple to allow sideloading of apps for users in the EU. We find little change to the sideloading markets during this period, which continue growing in terms of users and apps. We find fewer modded but more paid apps offered for free than in Android and more varied monetisation strategies.

---

[1] https://doi.org/10.1109/eCrime66200.2024.00018
[2] *App-solutely Modded: Surveying Modded App Market Operators and Original App Developers*, to appear in ACM AsiaCCS 2025