What are the odds? Lower compliance with Western loot box probability disclosure industry self-regulation than Chinese legal regulation

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ABSTRACT
Background and aims: Paid loot boxes are video game monetisation methods that provide randomised rewards of varying value. Loot boxes are prevalent internationally: approximately 60% of the highest-grossing mobile games in 'Western' countries (specifically, Australia and the UK) contain loot boxes (Zendle et al., 2020a).[1] Loot boxes represent an important revenue stream for the industry: the sale of loot boxes in one single game can generate more than US$528,000 per day from just one country alone (Zendle et al., 2020b). Global loot box spending was estimated to have been US$15 billion in 2020, and is estimated to rise and exceed US$20 billion by 2025 (Juniper Research et al., 2021).

The loot box purchasing process hides and *randomises* what rewards the player will actually receive (and, by implication, the rewards' value) until after both the purchase decision and payment have already been made. Most of the time, the player will receive a reward that is perceived to be worth less than the price of the loot box, but, rarely, the player will receive a valuable reward. Players often purchase multiple loot boxes to

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attempt to obtain the valuable rare rewards. Therefore, loot boxes have been considered conceptually and structurally akin to gambling (Drummond and Sauer, 2018; Nielsen and Grabarczyk, 2019). Loot box expenditure has been found to be positively correlated with problem gambling severity (e.g., Zendle and Cairns, 2018).

Many countries across the world are considering whether to regulate loot boxes. Belgium and the Netherlands have proactively 'banned' the sale of certain implementations of loot boxes by actively enforcing existing gambling law. Although such a restrictive approach provides immediate consumer protection, it also limits players' consumer freedom and harms companies' commercial interests, and therefore may not be the ideal regulatory solution for all jurisdictions (Xiao, 2021).

A less restrictive approach that balances consumer freedom with consumer protection is requiring companies to disclose the probabilities of obtaining randomised rewards from loot boxes, which is easy to implement and therefore incurs minimal compliance costs. Such a measure seeks to provide consumers with information to help them make more informed purchasing decisions, but does not limit the consumers' ability to purchase loot boxes.

Presently, this measure has been adopted as law *only* in China, where a 95.6% compliance rate was previously observed (Xiao et al., 2021). In other countries, such as the UK, the industry has instead generally adopted this measure as self-regulation. However, it is not known whether self-regulation acting alone, which does not have the same enforcement powers as the law (*e.g.*, being able to impose financial penalties and injunctions against non-compliant companies), would be as effective at ensuring a high compliance rate.

Method: The 100 highest-grossing iPhone games on the UK Apple App Store on 21 June 2021 as reported by App Annie, an authoritative independent analytics company, were selected to form the sample. In addition, as preregistered, 31 games that were both included in Xiao et al. (2021)'s sample and available on the UK Apple App Store with an English version (but were not within the UK 100 highest-grossing list on 21 June 2021) when data was being collected by the present study were added to the sample. Thus, a total of 131 games were coded.

The raw data, a full library of screenshots showing, inter alia, loot box purchase pages and the process for accessing in-game disclosures, and printouts and archived links to website disclosures are available via <https://osf.io/cx5rv/>.

A 'paid loot box' was defined as being either an Embedded-Isolated random reward mechanism or an Embedded-Embedded random reward mechanism, as defined by Nielsen & Grabarczyk (2019). This variable was coded based firstly on 40 minutes of gameplay. If no such mechanic was found within that time, this variable was coded based on up to 2 hours of internet browsing of video streams and screenshots.

Games were coded as having disclosed probabilities if the likelihood of obtaining potential rewards from loot boxes was found either in-game or on the official website. Considerable efforts were expended when attempting to find disclosures but the risk of false negatives could not be entirely removed: however, any disclosures that were not found by the present study were also unlikely to have been observed by and helpful to the

average, or indeed even the determined, consumer. Features of observed probability disclosures were recorded.

As preregistered, 20 games (15% of the sample of 131 games, rounded up) were dual-coded by both L.Y.X and L.L.H to test the inter-rater reliability of the coding, which was highly satisfactory.

Results: Of the 100 highest-grossing UK iPhone games, 75.0% contained loot boxes implemented by the game developer. 76.3% of 80 games deemed suitable for children aged 12+ contained loot boxes. A preregistered binomial test revealed that the UK loot box prevalence rate in mid-2021 of 75.0% was *not* significantly lower ($p > .999$) than the 59.0% early 2019 UK prevalence rate (Zendle et al., 2020a); on the contrary, it was significantly higher ($p < .001$).

Of the 75 games containing loot boxes, 64.0% (48 games) disclosed probabilities as required by Apple's self-regulation, whilst 36.0% (27 games) did not. Locations at which disclosures were observed are displayed in Table 1. A preregistered binomial test revealed that the UK disclosure rate of 64.0% was significantly lower ($p < .001$) than the 95.6% PRC disclosure rate (Xiao et al., 2021).

Four subcategories of website disclosures were identified, as summarised in Table 2. Eight subcategories of in-game disclosures of varying prominence and accessibility were identified, as summarised in Table 3. One egregiously hidden in-game disclosure subcategory is shown in Figure 1. In contrast, the most prominent subcategory is shown in Figure 2. Most disclosures were *not* easily accessible.

Discussion and Conclusion: The results are conclusive evidence that legal regulation is more effective than Western industry self-regulation. Companies were statistically significantly more likely to disclose probabilities in the PRC where legal requirements applied than they were to disclose in the UK where only advisory-level industry self-regulation applied. Indeed, 31.6% more highest-grossing games disclosed probabilities in the PRC than did in the UK. Therefore, policymakers and regulators in countries such as the UK and Australia, where practically voluntary and non-enforced industry self-regulation similar to Apple's is already in force, should nonetheless consider imposing loot box probability disclosure requirements as law to increase the rate of compliance and better protect consumers from potential loot box harms, *e.g.*, overspending.

A preprint of this research is available at: <https://doi.org/10.31219/osf.io/g5wd9>.

Table 1

Locations of Observed Disclosures (*n *= 75)

Location of Disclosure	Number of games
In-game only	32 (42.7%)
On the official website only	0 (0.0%)
Both locations	16 (21.3%)
No disclosure found	27 (36.0%)

Table 2

Subcategories of observed website disclosures (*n *= 16)

Number of games	Adoption rate	Summary of disclosure format, including link to example implementation
7 (43.8%)	9.3%	Published as a 'probabilities' or 'drop rates' post on the customer support website and could be found using the website's search function, *e.g.*, Game 15: *Brawl Stars* (Supercell, n.d.)
5 (31.3%)	6.7%	Inaccessible from the homepage (*i.e.*, a web address exists for the disclosure, but the link can only be found through a search engine or is only linked to from in-game, such that the disclosure on the official website is not hyperlinked from anywhere else on the website), *e.g.*, Game 37: *Star Wars: Galaxy of Heroes* (Electronic Arts, n.d.)
2 (12.5%)	2.7%	Published under the 'news' or 'notice' tab and which were then chronologically listed alongside other posts, *e.g.*, Game 6: *Clash Royale* (Supercell, 2018)
2 (12.5%)	2.7%	Published on a page that is linked directly from the homepage; however, the link does not reference 'probabilities' or 'drop rates' and therefore it is unclear that the link leads to the disclosure, *e.g.*, for Game S20: *BanG Dream! Girls Band Party*, on the FAQ page of the website as described in the Method section (BanG Dream! Project et al., n.d.)

***Note*. Adoption rate refers to the percentage of the 75 games implementing first-party loot boxes that adopted each subcategory. Example games used to illustrate each subcategory were not necessarily included in the subsample.**

Table 3

Subcategories of observed in-game disclosures (*n *= 48)

Number of games	Adoption rate	Summary of disclosure format	Further details
26 (54.2%)	34.7%	Immediately after tapping a small generic symbol	*e.g.*, a question mark sign '(?)' (Game S14: *Art of Conquest*), as shown in Figure 1; an 'i' or '*i*' sign, which stands for 'information' (Game 31: *RAID: Shadow Legends*); an exclamation mark sign ['!'] (Game S23: *Ulala: Idle Adventure*); or a 'details' button (Game 27: *Genshin Impact*)
13 (27.1%)	17.3%	After tapping a small generic symbol and following additional steps	Same types of generic symbol as above. Additional steps include, *e.g.*, tapping on another button (Game 77: *The Sims FreePlay*), as shown in Figure 6; or tapping on another button and following a hyperlink to the game's official website's disclosures (Game 6: *Clash Royale*)
3 (6.3%)	4.0%	Immediately after tapping a small button explicitly referencing 'probabilities' or a conceptually similar term	*e.g.*, a button stating 'Character Summoning Rates' (Game 33: *DRAGON BALL Z DOKKAN BATTLE*), as shown in Figure 4; 'Appearance Rates' (Game 52: *Fire Emblem Heroes*); or 'Drop Rate' (Game S22: *Mr Love: Queen's Choice*)
2 (4.2%)	2.7%	Interacting with a graphic symbol that conceptually referenced 'probabilities' and 'chance'	*e.g.*, a dice symbol (Game 87: *Last Day on Earth: Survival*), as shown in Figure 2
1 (2.1%)	1.3%	Automatically displayed on the loot box purchase page without requiring any additional input from the player	Specifically, as implemented in Game 98: *Dragon City Mobile*, as shown in Figure 5
1 (2.1%)	1.3%	After tapping a small button explicitly referencing 'probabilities' and following additional steps	Specifically, tapping a 'Pack Probabilities' hyperlink button and then tapping a 'Continue' button that takes the player to the official website disclosure (Game 37: *Star Wars: Galaxy of Heroes*)
1 (2.1%)	1.3%	By tapping a graphic element on the loot box purchase page that was not seemingly interactable and then following additional steps	Specifically, tapping the picture depicting the loot box above the payment/price button (colloquially known to players as the loot box 'banner') and then tapping an [*i*] button and an 'OK' button to confirm being redirected to the official website disclosure (Game 69: *Monster Legends*)
1 (2.1%)	1.3%	By interacting with certain buttons not on the loot box purchase page	*e.g.*, a button hidden within the game's settings menu (Game 14: *8 Ball Pool*), as shown in Figure 2

Note. Adoption rate refers to the percentage of the 75 games implementing first-party loot boxes that adopted each subcategory. Example games used to illustrate each subcategory were not necessarily included in the subsample.

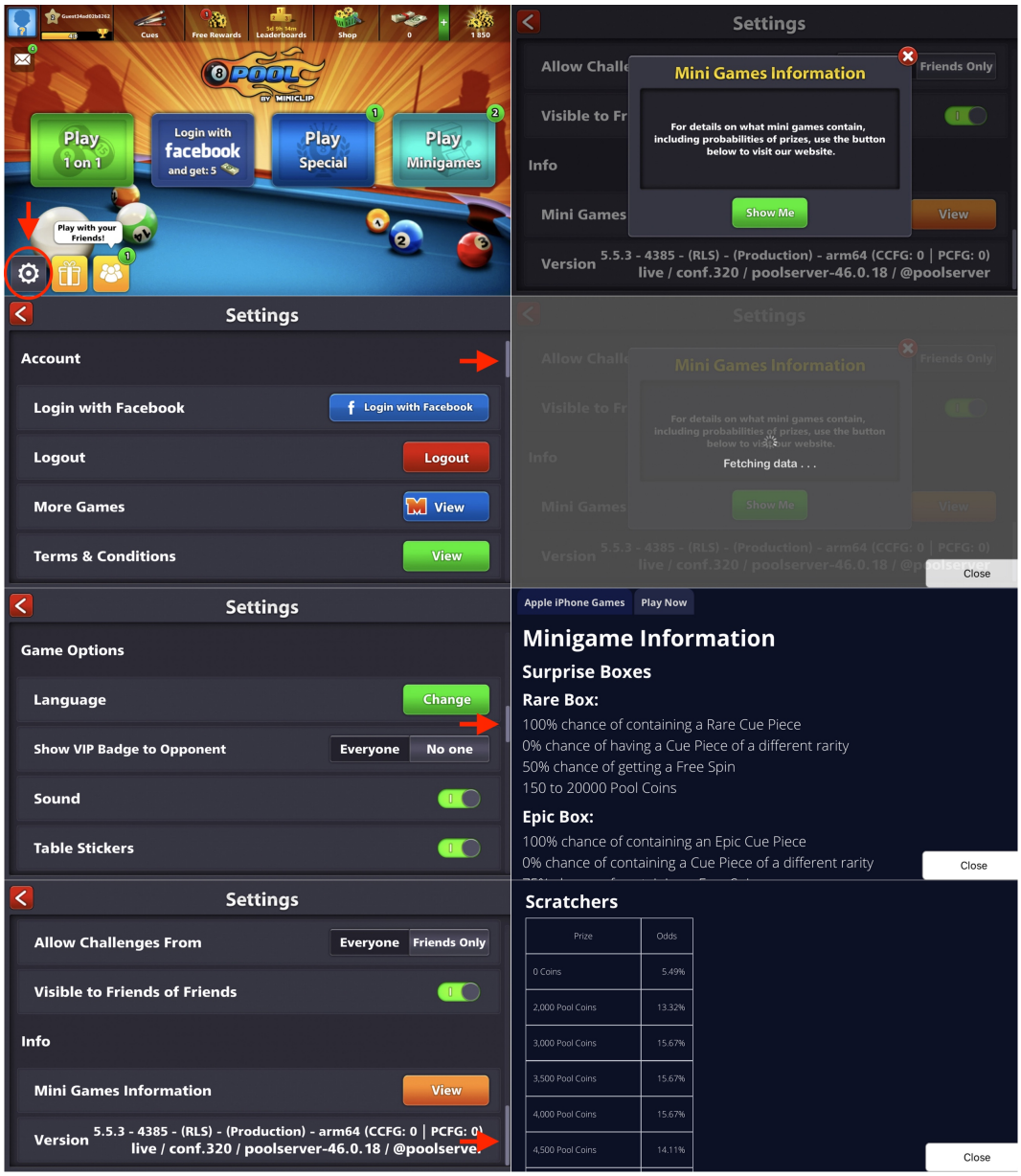

Figure 1. The four screenshots on the left half should be read from top to bottom (respectively numbered left 1–4) before those on the right half should be read from top to bottom (respectively numbered right 1–4). Game 14's (*8 Ball Pool*) in-game disclosure was accessed by entering the settings menu by tapping the gear icon at the bottom left-hand corner of the game's home screen (left 1; annotated), scrolling down to the very bottom (the annotation arrows in left 2–4 highlighting the scroll bar demonstrate that a significant amount of scrolling was required to arrive at the end of the setting menu), tapping the 'View' button (left 4), and then tapping the 'Show Me' button (right 1), which opens an in-game internet browser (right 2) that redirects to the official website disclosure (which itself was inaccessible from the website's homepage) that requires players to scroll further in order to view the disclosure for specific loot boxes (right 3–4).

Figure 2. Game 98's (*Dragon City Mobile*) in-game loot box probability disclosure was automatically shown on the purchase screen without requiring the player to perform any action (annotated).

ENDNOTES

[1] In this paper, the PRC refers to Mainland China and excludes the Special Administrative Regions of Hong Kong and Macau, and Taiwan, as the applicable laws in these areas are different.

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