



LIQUID AND GRIT

Social Casino Slots Report

Competitive research and data insights for slots designers

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2017

INTRODUCTION



Dear Slots Designers,

Alfred Hitchcock believed, “There is no terror in the bang, only in the anticipation of it...whenever possible, the public must be informed. Except when the surprise is a twist, that is, when the unexpected ending is, in itself, the highlight of the story.”

Well-designed slots machines are like great Alfred Hitchcock movies—they entertain through story, suspense, and surprise.

The **Market Watch** section summarizes how top games provide players with stories through classic, video, premium and IP games. The **New Innovations** section includes the latest mechanics that incorporate suspense into game play. And, the **Deep Dives** section breaks down three machines that add surprise—all had jackpots hit within 10,000 spins.

We help you create slots machines with compelling stories, meaningful suspense, and great surprises.

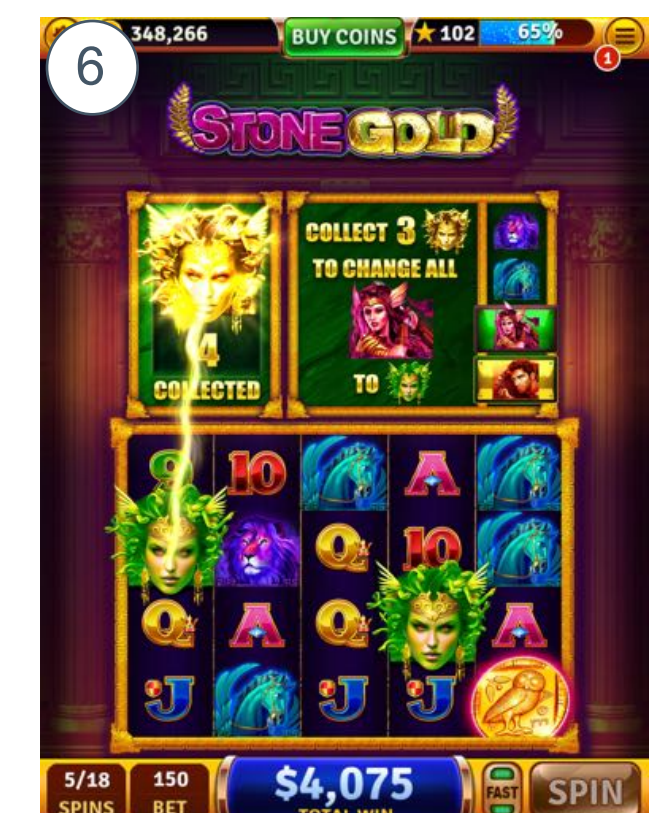
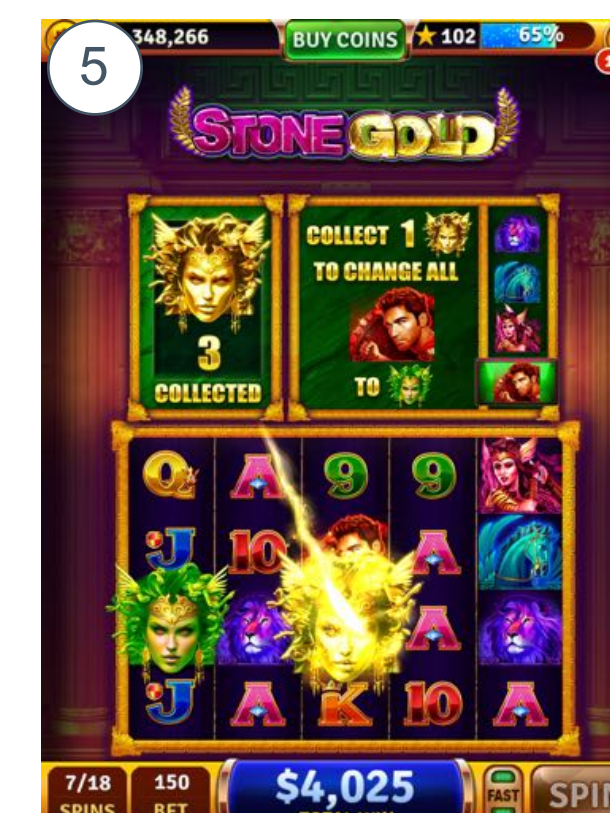
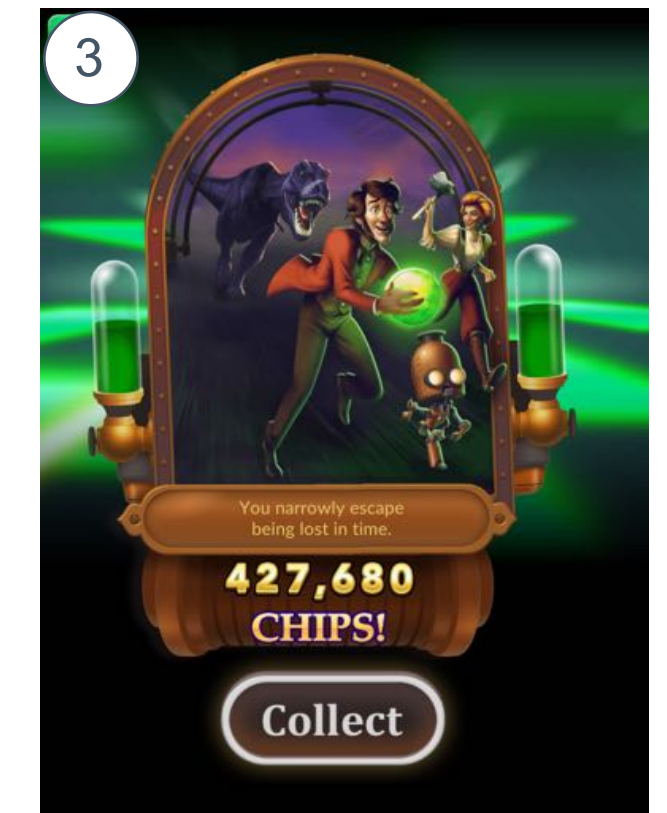
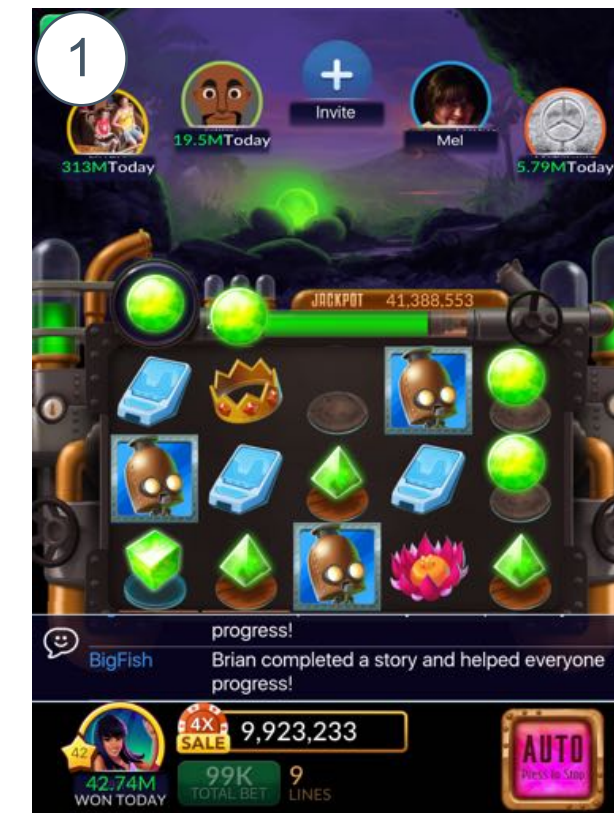
Brett Nowak
Editor-in-Chief

NEW INNOVATIONS

NEW INNOVATIONS I

Evolve stories further during game play.
Investigate 3D animation. Build on the reveal
symbol mechanic

- **Go deeper into stories during game play:** In Big Fish Casino's *Treasures in Time*, players must collect orbs to stay out of danger as they travel through time collecting treasures (images 1, 2, and 3).
- **Add 3D-like animation to games:** House of Fun's *Stone Gold* uses animation to turn the green face three dimensional (image 4).
- **Use vertical real estate for bonus mechanics:** Vertical machines in House of Fun place more UI, and therefore emphasis, on bonus mechanics (image 5).
- **Convert major symbols to wild during free spins with a collection mechanic:** Players in *Stone Gold* convert major symbols to wild during free spins after collecting golden symbols (image 6).
- **Expand on reveal symbols:** In House of Fun's *Celestial Riches*, reveal symbols are stacked and replaced by any symbol except specials (image 7).
- **Use bet dialogue to promote bet-based bonuses:** Bingo Blitz's *Penguin Party* clearly displays the extra bonus wheel multiplier with the bet dialogue (image 8).



NEW INNOVATIONS II

Test new machine-load dialogues, particularly with *Premium Play*. Add more mechanics to pick'em games. Build bonus wheels into reels

- **Change the machine-load for *Premium Play*:** In House of Fun's *5 Monkeys Gold*, there is new machine-load dialogue for *Premium Play* (image 1).
- **Adjust bet minimum for *Premium Play* based on prior bet behavior:** Bet minimums for *Premium Play* change player-to-player (image 2).
- **Consider different dimensions to the pick'em bonus:** Hit It Rich's *The Wizard of Oz: The Great Balloon* increases the multiplier when players pick winners in the pick'em game (image 3). Wizard of Oz's *Poppies*, *Poppies Everywhere* adds a fill meter to the pick'em game (image 4).
- **Consider placing the actual wheel within the reels:** Quick Hit Slots' *Peek-a-Boo Pixie* triggers a bonus wheel with a full stack of bonus wheel symbols, which looks like an actual wheel (image 5).
- **Try 'choose your free spin' combo mechanic:** Slotomania's *Grand Phoenix* lets players choose from four free spin options. One option is a mystery combo (image 6).



NEW INNOVATIONS III

Allow players to delete machines. Create themes based on popular TV shows. Award more spins when wilds land on non-winning spins

- **Allow players to save memory by deleting machines:** In Caesars Slots, players may delete unwanted machines. This is particularly important on Android devices; 43% of Android users uninstall apps vs. 13% on iOS, according to an AppsFlyer Report (image 1).
- **Release machines loosely based on popular entertainment for your audience:** Caesars Slots' *Celtic Dream* relates to the popular *Outlander*, a book and TV series about a Scottish warrior (image 2).
- **Sex may sell, but tread carefully:** Black Diamond Slots' *Fireman Fever 2* displays a bare-chested fireman on certain spins. This is risky as it might offend players—make sure your audience is receptive (image 3).
- **Expand on matching symbol mechanics:** In Wonka Slots' *Wonka's Office*, when two halves of a stacked symbol land on reels 3 and 4, the two symbols lock and trigger two free spins (image 4).
- **Consider progressions based on symbols that hit on each row:** In Scatter Slots' *Wings of Lust*, heart symbols must hit once on each row to trigger a free spin bonus (image 5).
- **Award additional spins when wilds land on non-winning spins:** Infinity Slots' *Mafia* gives one respin when wilds hit on non-winning spins (image 6).



MARKET WATCH

1/1/17 - 1/31/17

TRENDS: TOP 30 GROSSING GAMES

New reels trends: 2 x 5 (5%) and 4 x 6 (5%). Popular January themes: Asian (16%) and Animal (14%). Down trending MoM: less IP (19% to 10%). New mechanic: Added wilds (5%)



REELS		THEMES		MECHANICS*		IP	
3 x 5	34%	Asian	16%	Stacked symbols	13%	DoubleDown	Wheel of Fortune: Big Money
4 x 5	22%	Animal	14%	Progressive jackpots	12%	Hit It Rich	The Wizard of Oz
2 x 3	8%	Classic	13%	Multipliers	11%	Hit It Rich	Willy Wonka & The Chocolate Factory
2 x 5	5%	IP	10%	Added wilds	5%	Wizard of Oz	All Together Now
4 x 6	5%	Mythology	9%	Jackpot(s)	5%	Wizard of Oz	Poppies, Poppies Everywhere

*22% of machines had free spins as a mechanic but this was omitted from the summary

TRENDS: FEATURED GAMES

Similar reels trends continue: Standard reel sets of 3 x 5 (38%) and 4 x 5 (33%). New popular mechanics: Stacked symbols (13%) and added wilds (9%). IP releases are in DoubleDown and Hit It Rich*



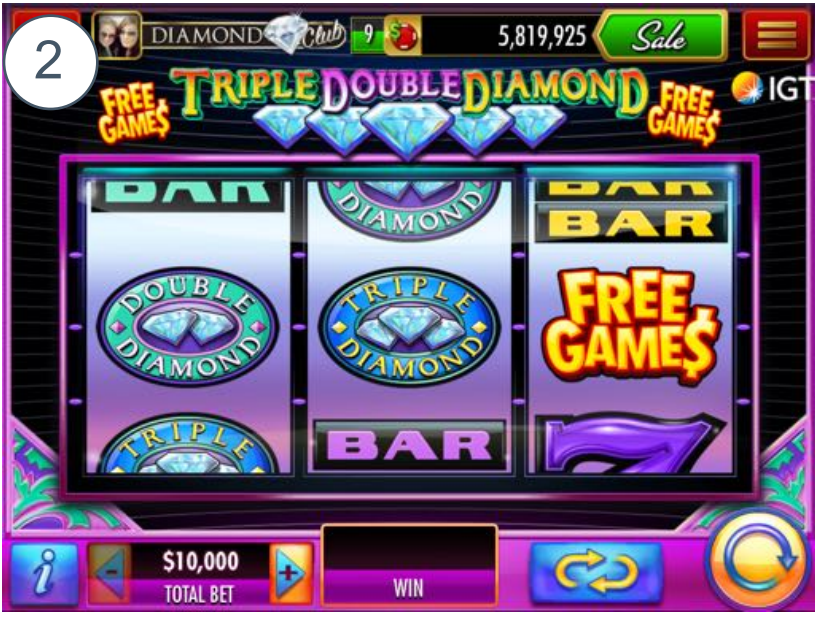
REELS**		THEMES		MECHANICS		IP	
3 x 5	38%	Asian	16%	Progressive jackpots	15%	DoubleDown	Wheel of Fortune: Big Money
4 x 5	33%	IP	16%	Stacked symbols	13%	Hit It Rich	The Wizard of Oz: The Great Balloon
4 x 6	4%	Animal	11%	Multipliers	11%	Hit It Rich	Willy Wonka: Imagination Room
2 x 3	4%	Mythology	11%	Added wilds	9%		

*Featured games include: DoubleDown Casino, Heart of Vegas, House of Fun, Slotomania, Hit It Rich, Caesars Slots, Quick Hit Slots, Gold Fish, and Hot Shot Casino

**21% of machines were locked

DETAILS: FEATURED GAMES

GAME	MACHINE	REELS	LINES	THEME	TYPE	NOTABLE FEATURES
DoubleDown Casino	Wheel of Fortune: Big Money	3 x 5	30	IP	Premium	Bigger bets add additional pointers to bonus wheel (image 1)
	Triple Double Diamond: Free Game\$	2 x 3	20	Classic	Classic	Free games symbols on any pay line award 12 free games (image 2)
Heart of Vegas	Brazil	3 x 5	20	Other	Core Video	Free Games Repeat Win Feature repeats each free game win by the number of special symbols that appear on the reels (image 3)
	Wonder 4: Stars	Other	Other	Other	Premium	Play four different machines at once (50 Lions, Wicked Winnings II, 5 Dragons Deluxe, and Timber Wolf). All machines offer free games, and Super Free Games
	Genie's Riches	3 x 5	30	Mythology	Core Video	Players collect lamp symbols during free spins to add the same number of wilds to the Genie Spin. The Genie Spin is one free spin added after all the free spins are complete (image 4)



DETAILS: FEATURED GAMES

GAME	MACHINE	REELS	LINES	THEME	TYPE	NOTABLE FEATURES
House of Fun	<i>Riches of Oz</i>	4 x 5	40	Fairy	Premium	The <i>Glinda</i> feature may trigger randomly during any spin, expanding the reels one or more spaces up to a 8 x 5 reel set (see Deep Dives)
	<i>Stone Gold</i>	4 x 5	1024 ways	Mythology	Core Video	Players collect golden symbols during free games to change majors into wilds for the remainder of free games (see New Mechanics)
	<i>Celestial Riches</i>	3 x 5	243 ways	Mystical	Core Video	<i>Celestial Riches Jackpot Bonus</i> triggers grand, major, minor, or mini jackpots based on a pick'em game (image 1)
	<i>5 Monkeys Gold</i>	3 x 5	Unknown	Asian	Core Video	Bet options; lower bets for regular play with single wilds and higher bets for <i>Premium Play</i> with stacked wilds (see New Mechanics)
Hit It Rich	<i>The Wizard of Oz: The Great Balloon</i>	4 x 5	40	IP	Premium	U-pick bonus (image 2) leads to a pick'em bonus with multipliers (see New Mechanics)
	<i>Freaki Tiki 2</i>	4 x 5	178	Other	Core Video	U-pick bonus awards free spins or a bonus wheel. Bonus wheel decides which character is included in a pick'em bonus feature (image 3)
	<i>Stupid Cupid</i>	-	-	-	-	Locked
	<i>Willy Wonka & The Chocolate Factory: Imagination Room</i>	4 x 6	40	IP	Premium	Pick'em bonus game reveals coin amount and each correct pick increases multiplier (image 4)



DETAILS: FEATURED GAMES

GAME	MACHINE	REELS	LINES	THEME	TYPE	NOTABLE FEATURES
Quick Hit Slots	<i>Carnivore Cash</i>	4 x 5	40	Prehistoric	Core Video	<i>Mystery Wilds</i> trigger at the end of any spin and randomly adds 4 to 16 wilds (image 1)
	<i>Peek-a-Boo Pixie</i>	4 x 5	40	Fairy	Core Video	Pick'em bonus game awards 7 to 15 free games or triggers a spin on the bonus wheel for 2 or 3 spins. Wheel awards credits, then multipliers (image 2)
Slotomania	<i>Rhino Deluxe</i>	4 x 5	1024 ways	Animal	Core Video	<i>Golden Stampede</i> feature converts major symbols into high-paying symbols during free spins based on collection mechanic (image 3)
	<i>Grand Phoenix</i>	3 x 5	243 ways	Asian	Premium	Bet level determines the number of gold symbols in play (see Deep Dives and image 4)
Gold Fish	<i>Colossal Vikings</i>	-	-	-	-	Locked
	<i>Shadow Princess</i>	-	-	-	-	Locked



DETAILS: FEATURED GAMES

GAME	MACHINE	REELS	LINES	THEME	TYPE	NOTABLE FEATURES
Caesars Slots	<i>Celtic Dream</i>	3 x 5	50	Cultural	Core Video	All symbols are stacked. Theme loosely based on the TV show <i>Outlander</i> (image 1 and New Innovations)
	<i>Sweet Devil</i>	3 x 5	80	Other	Core Video	<i>Wheel of Destiny</i> awards coins, or 1 of 4 free spin bonus games (image 2)
	<i>Wild Howl</i>	3 x 5	50	Animal	Core Video	<i>Howling Respins</i> trigger when six or more moon symbols land. During respins, all moon symbols lock into place and any additional moons that land reset the remaining respins to three. At the end of the feature, players are awarded the coin amount that appears on each moon, including any progressive jackpots (image 3)
Hot Shot Casino	<i>Lantern Festival</i>	4 x 5	40	Asian	Core Video	During free spins, colossal reels and 2x pay lines of the initiating spin are used (see Deep Dives and image 4)

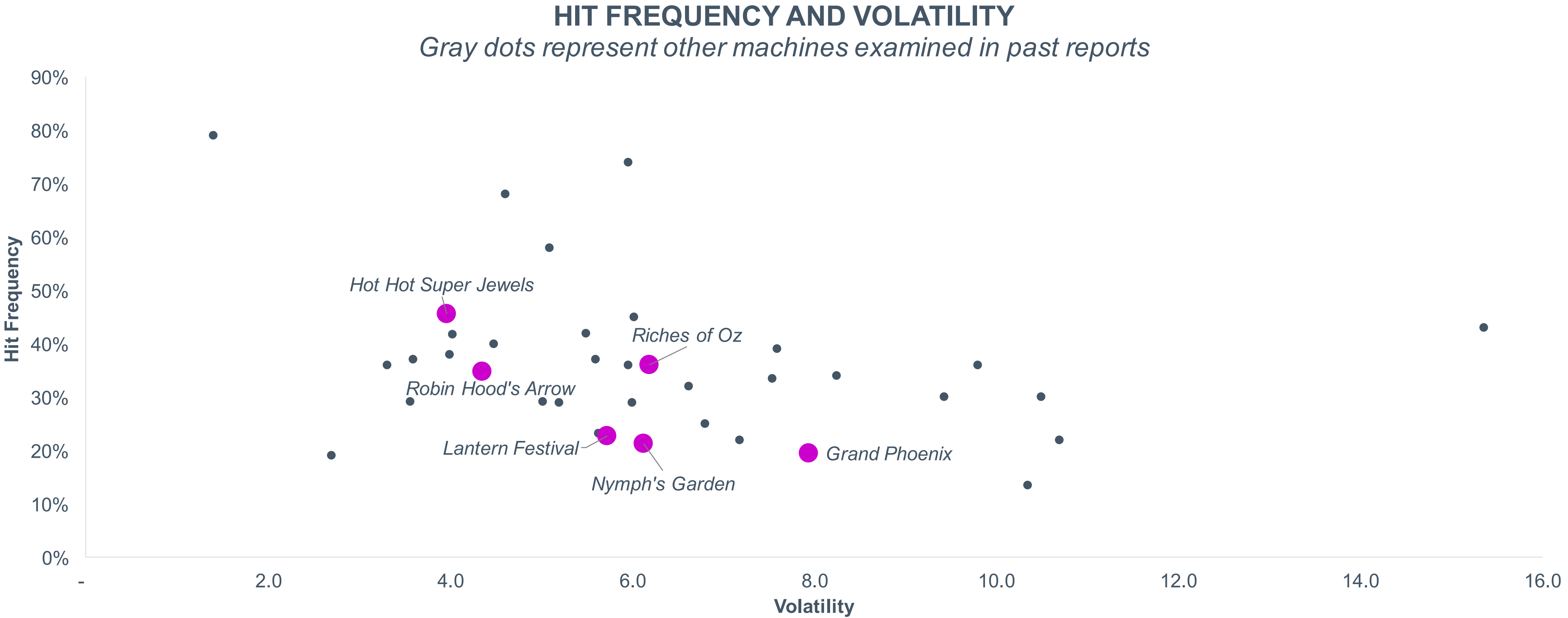


DEEP DIVES

- *Grand Phoenix* – Slotomania
- *Hot Hot Super Jewels* – Vegas Downtown Slots
- *Lantern Festival* – Hot Shot Casino
- *Riches of Oz* – House of Fun
- *Nymph's Garden* – Jackpot Party
- *Robin Hood's Arrow* – DoubleU Casino

HIT FREQUENCY AND VOLATILITY

Jackpots were removed from Slotomania’s *Grand Phoenix*, Vegas Downtown Slots’ *Hot Hot Super Jewels*, and Hot Shot Casino’s *Lantern Festival*. Including jackpots, their volatilities would be 1,577, 576, and 31, respectively*



* Jackpots are payouts equal to or larger than 1,000x the bet

GRAND PHOENIX

Slotomania's *Grand Phoenix* offers choices: players pick the number of gold symbols, the feathers in a progressive jackpot pick'em game, and the number of free spins and ways to win

- Upon machine-entry, a bet dialogue displays both the different bet levels and the number of gold symbols for each bet (image 1).
- Active gold symbols for the selected bet are shown at the bottom of a 3 x 5 reel set. Four progressive jackpots are shown at the top (image 2).
- During play, wild symbols that appear on the reels may wake the *Phoenix* at the top of the reel set and trigger the *Lucky Feather Bonus* (image 3).
- Once the *Lucky Feather Bonus* has been triggered, players must pick from 12 feathers (image 4).
- Each feather reveals a color. Matching three colors awards the corresponding progressive jackpot (image 5).
- Three or more consecutive scatter symbols, including wild symbols, triggers the *Mystical Gong Free Spins* (image 6).
- The *Mystical Gong Free Spins* offers the choice of four different free spins: 12 free spins with 243 ways to win, 10 free spins with 1024 ways to win, 7 free spins with 3125 ways win, or a mystery combo (image 7).
- The 7 free spins with 3125 ways to win choice option is played on a 5 x 5 reel set (image 8).

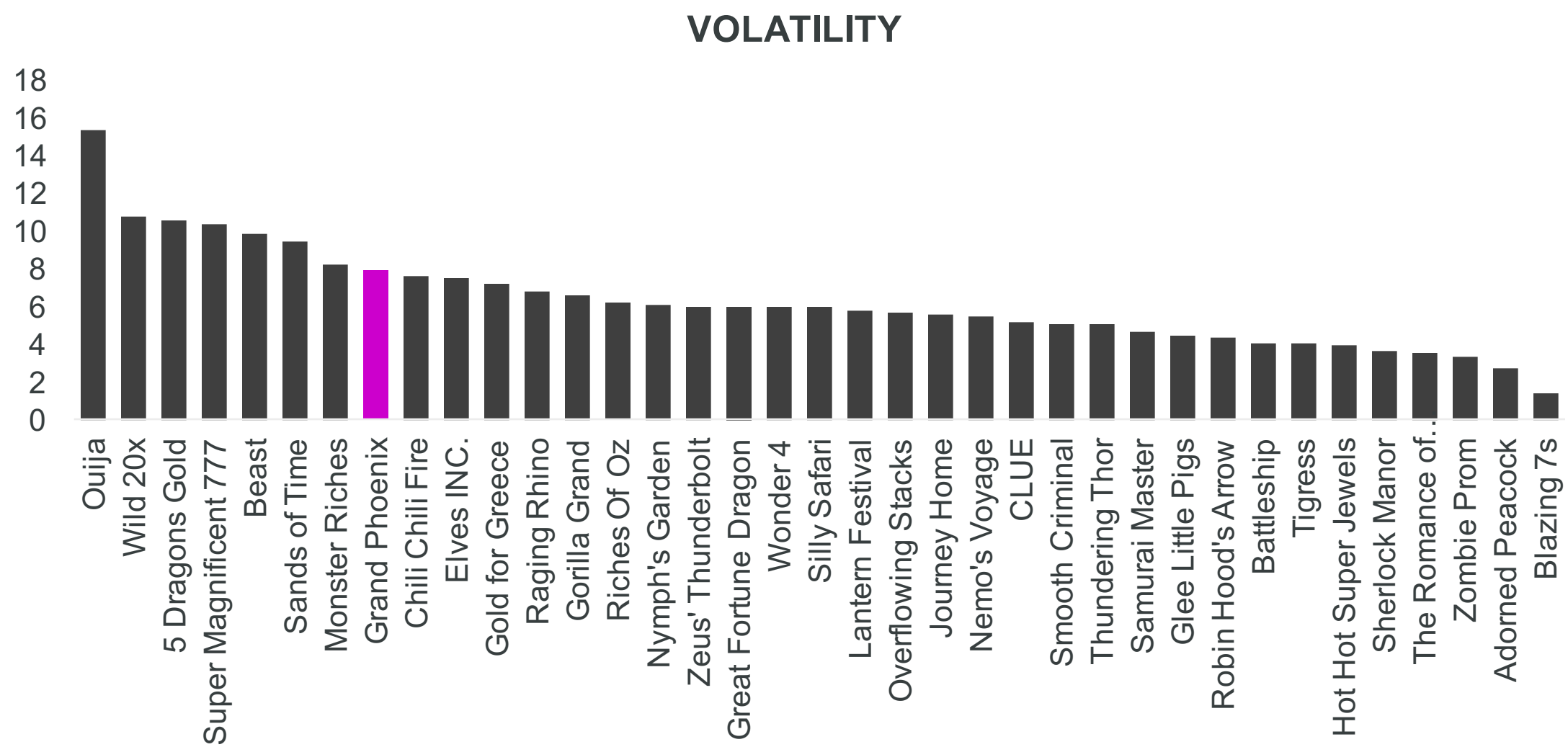
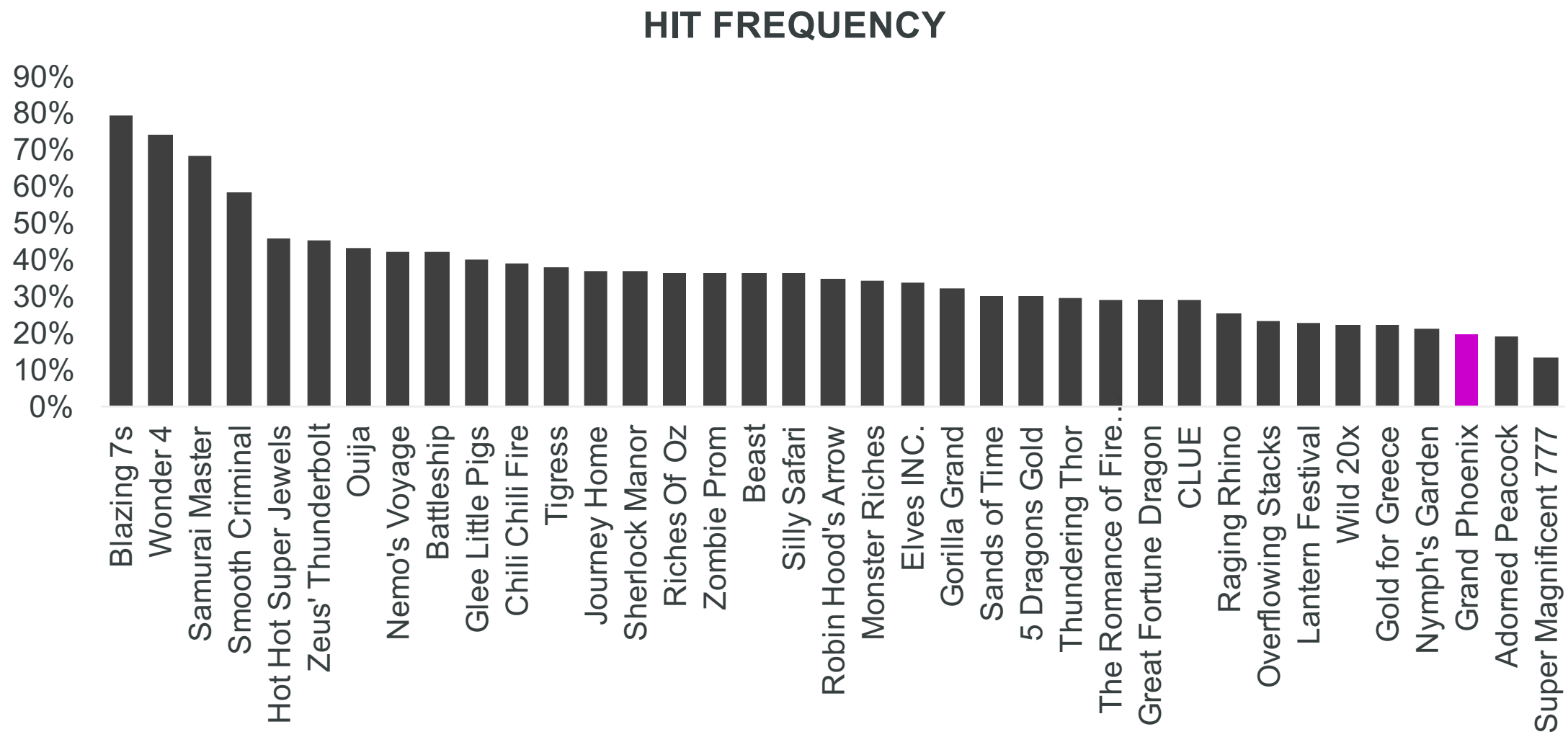


GRAND PHOENIX STATS

Slotomania’s *Grand Phoenix* awarded two jackpots in 10K spins. Hit frequency is low while volatility is above average, less jackpots

Game play ^I	
Hit frequency	20%
Volatility	7.9
Spins until a bonus	196
Distribution of RTP as % of total RTP ^{II}	
Base game	60%
Bonus game	40%
RTP range ^{III}	
Minimum range	67%
Median	80%
Maximum range	93%
Jackpots ^{IV}	
Number of jackpots	2
Multiple of bet	140.4K, 71.9K

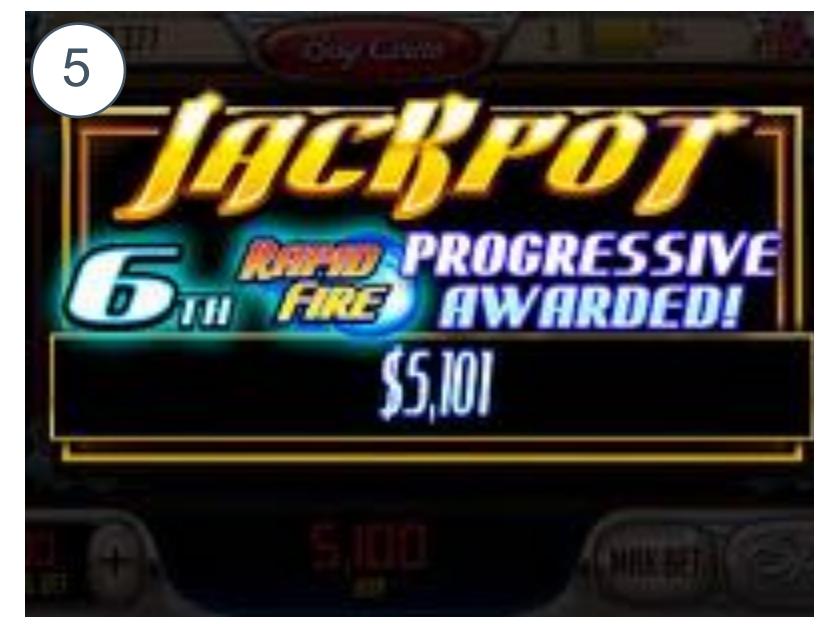
^I Volatility is based on the standard deviation of the 10,000 payouts from this machine
^{II} The distribution of RTP equals the RTP of the base or bonus game over the total RTP
^{III} RTP range is 90% confidence with 10,000 spins of this machine. More info on this process in the Appendix
^{IV} Jackpots are payouts equal to or larger than 1,000x the bet. Jackpot results are obviously not significant



HOT HOT SUPER JEWELS

Vegas Downtown Slots' *Hot Hot Super Jewels* is a classic machine offering five progressive jackpots and a bonus wheel for free spins

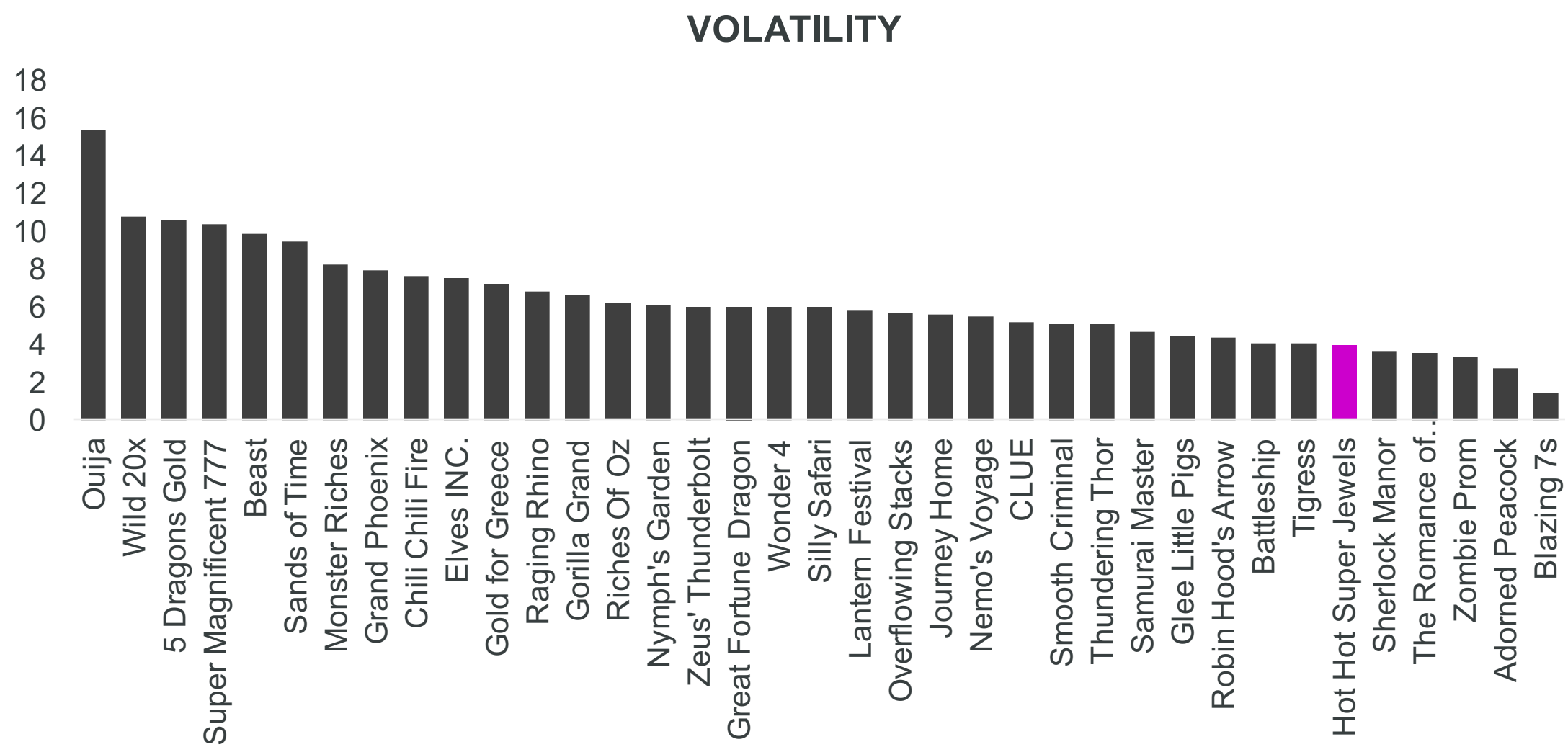
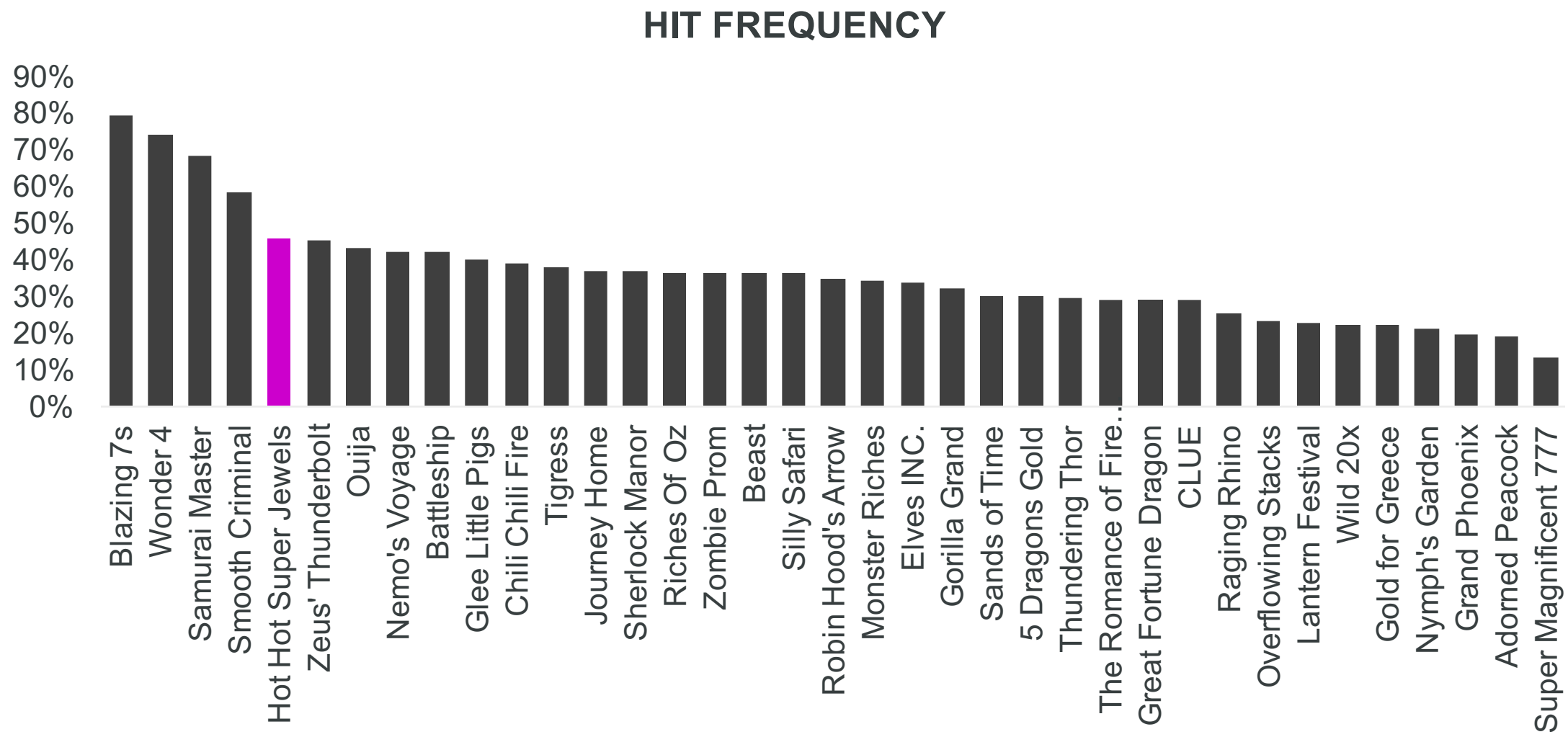
- A new game notification upon app-launch informs players that the machine is open to all (image 1).
- After machine selection, a bet dialogue prompts players to: “Pick your total bet to activate progressives!” (image 2).
- Five progressive jackpot amounts are displayed on top of a classic 3 x 5 reel set. Eligible jackpots are displayed in color, while non-eligible jackpots are greyed out (image 3).
- During regular play, five or more scatter symbols that land anywhere on the reels awards the corresponding progressive jackpot amount (images 4 and 5).
- A bonus is triggered when three bonus symbols hit on reels 2, 3, and 4 (image 6).
- A notification alerts players that the bonus was triggered (image 7).
- Players are then presented with a large two-part wheel. The outer wheel spins first to award players with 5 to 25 free spins. Then, the inner wheel spins to award a 2x or 3x multiplier (image 8).
- During free spins, scatter symbols pay at 10x the bet amount for five scatters and up to 2,500x the bet amount for nine scatters. Additional free spins may be awarded with three bonus symbols landing on reels 2, 3, and 4.



HOT HOT SUPER JEWELS STATS

Vegas Downtown Slots’ *Hot Hot Super Jewels* has a high hit frequency and low volatility. Two jackpots hit in 10K spins

Game play	
Hit frequency	46%
Volatility	4.0
Spins until a bonus	64
Distribution of RTP as % of total RTP	
Base game	63%
Bonus game	37%
RTP range	
Minimum range	82%
Median	89%
Maximum range	95%
Jackpots	
Number of jackpots	2
Multiple of bet	56.3K, 12.5K



LANTERN FESTIVAL

Hot Shot Casino's *Lantern Festival* doubles pay lines on an extended colossal reel set during free spins. *Bonus Guarantee* awards a minimum of 10x bet on free spins

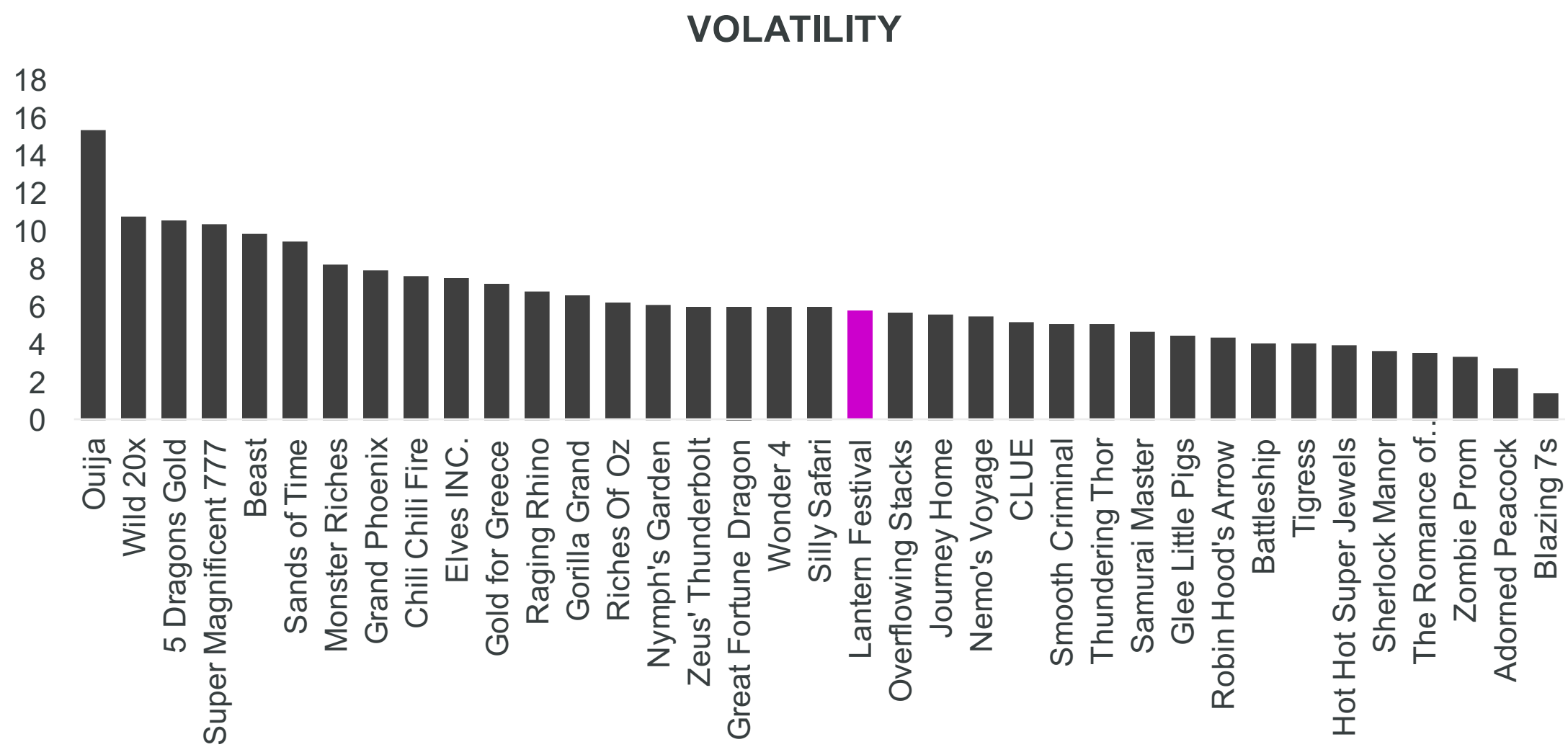
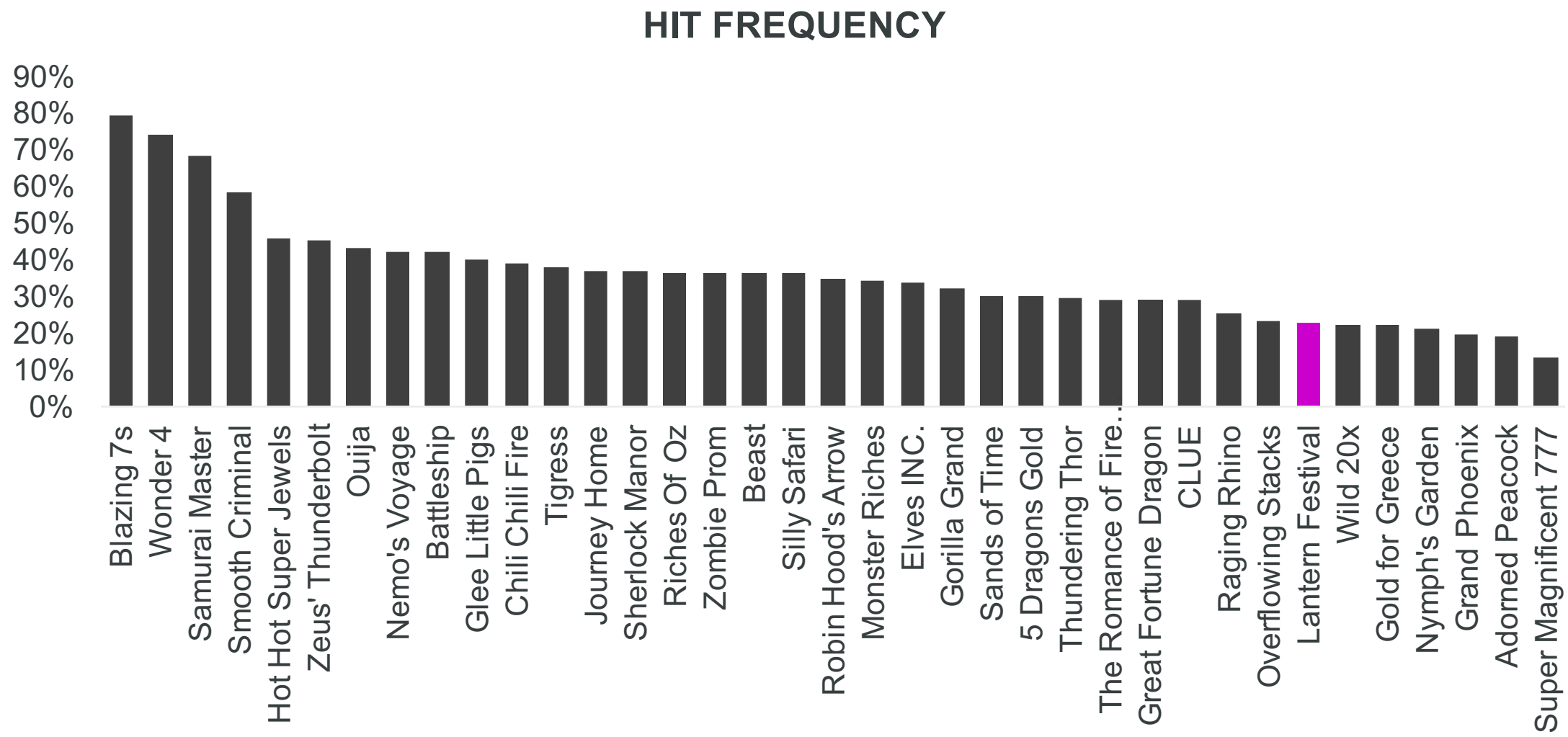
- Qualifying bets are displayed upon machine-entry (image 1).
- Three progressive jackpot amounts are displayed on the top of a 4 x 5 reel set. When a qualifying bet has been selected, a notification of jackpot eligibility appears at the top of the screen (image 2).
- After a win, the reels shrink to display a win-notification that includes a diagram of wins, lines, and pays (image 3).
- Three or more bonus symbols trigger a free spins bonus with up to 50 free spins (image 4).
- The free spins bonus is played on a colossal 8 x 5 reel set with double the pay lines (image 5).
- Any free spin may trigger up to 50 more free spins with three or more bonus symbols appearing on the reels (image 6).
- The free spin bonus has a *Bonus Guarantee* that awards a minimum of 10x the bet. If a player does not win 10x during a bonus round, a *Bonus Guarantee* notice appears and the guaranteed amount is awarded (image 7).
- One of the three progressives may randomly be awarded after any spin. In the example, the bet was a non-qualifying bet, so a lower jackpot amount was awarded (image 8).



LANTERN FESTIVAL STATS

Hot Shot Casino’s *Lantern Festival* has a low hit frequency but average volatility. One jackpot hit in 10K spins

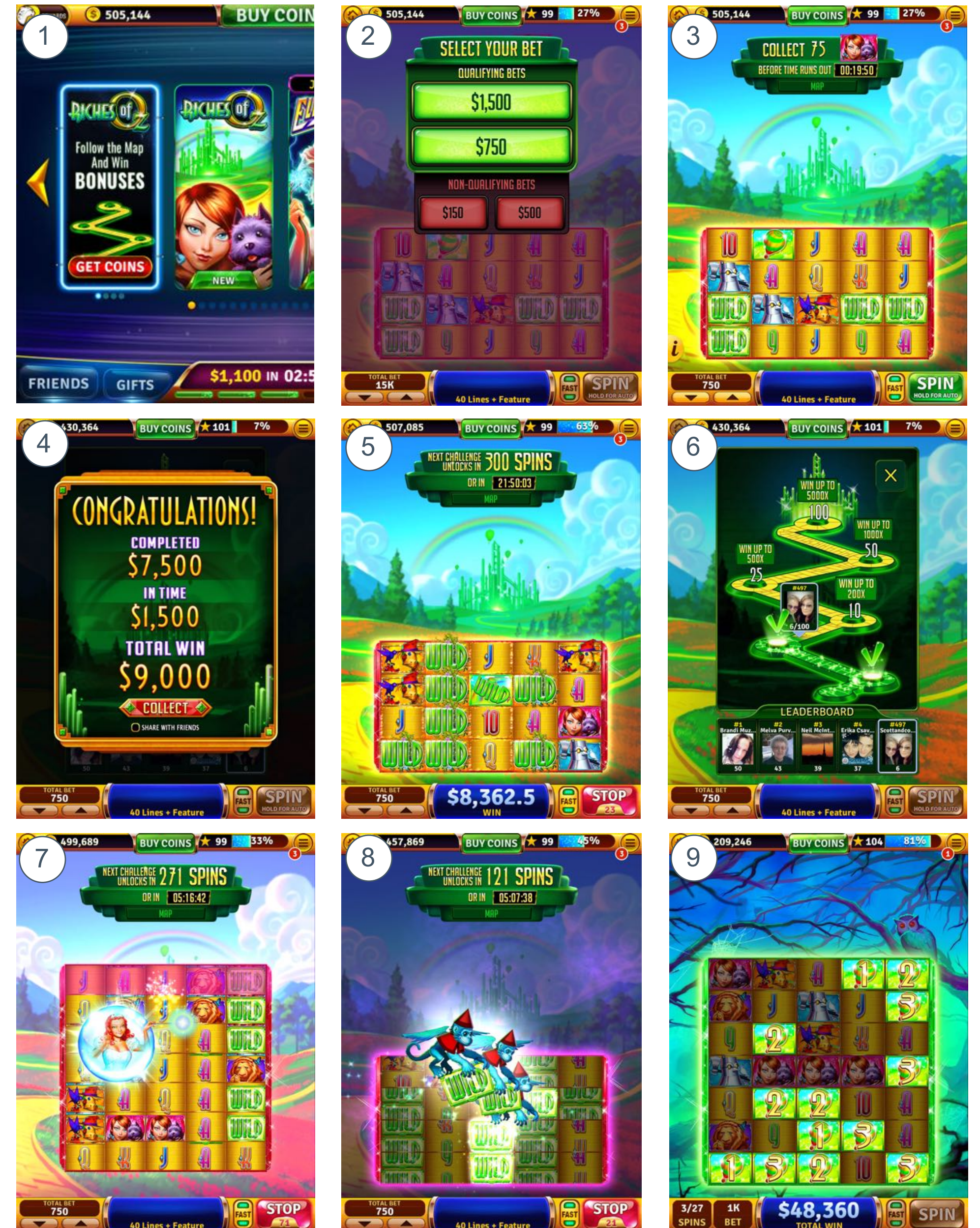
Game play	
Hit frequency	23%
Volatility	5.7
Spins until a bonus	103
Distribution of RTP as % of total RTP	
Base game	66%
Bonus game	34%
RTP range	
Minimum range	78%
Median	87%
Maximum range	97%
Jackpots	
Number of jackpots	1
Multiple of bet	3.0K



RICHES OF OZ

House of Fun's *Riches of Oz* offers timed challenges, a map with mega prizes, and a machine-specific leaderboard

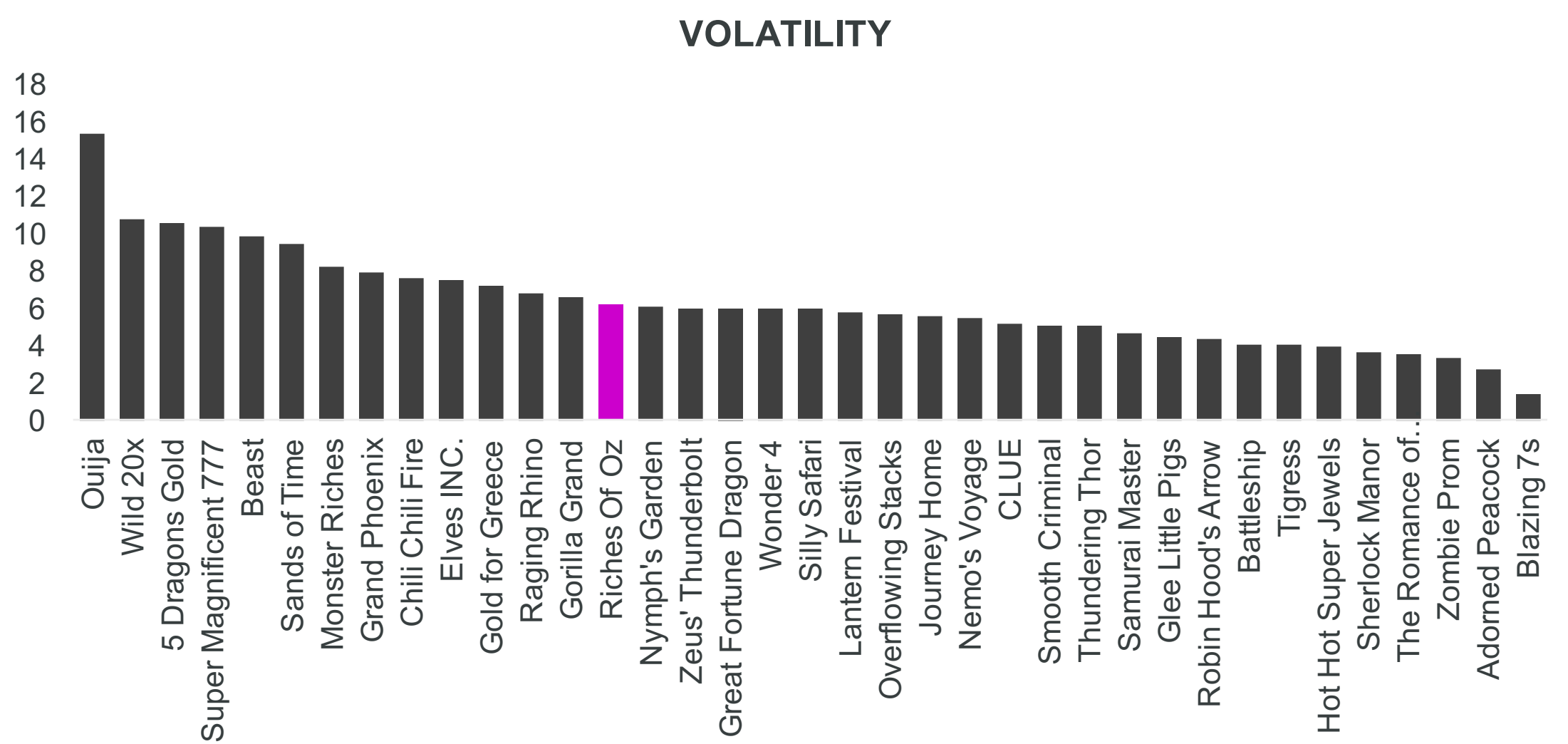
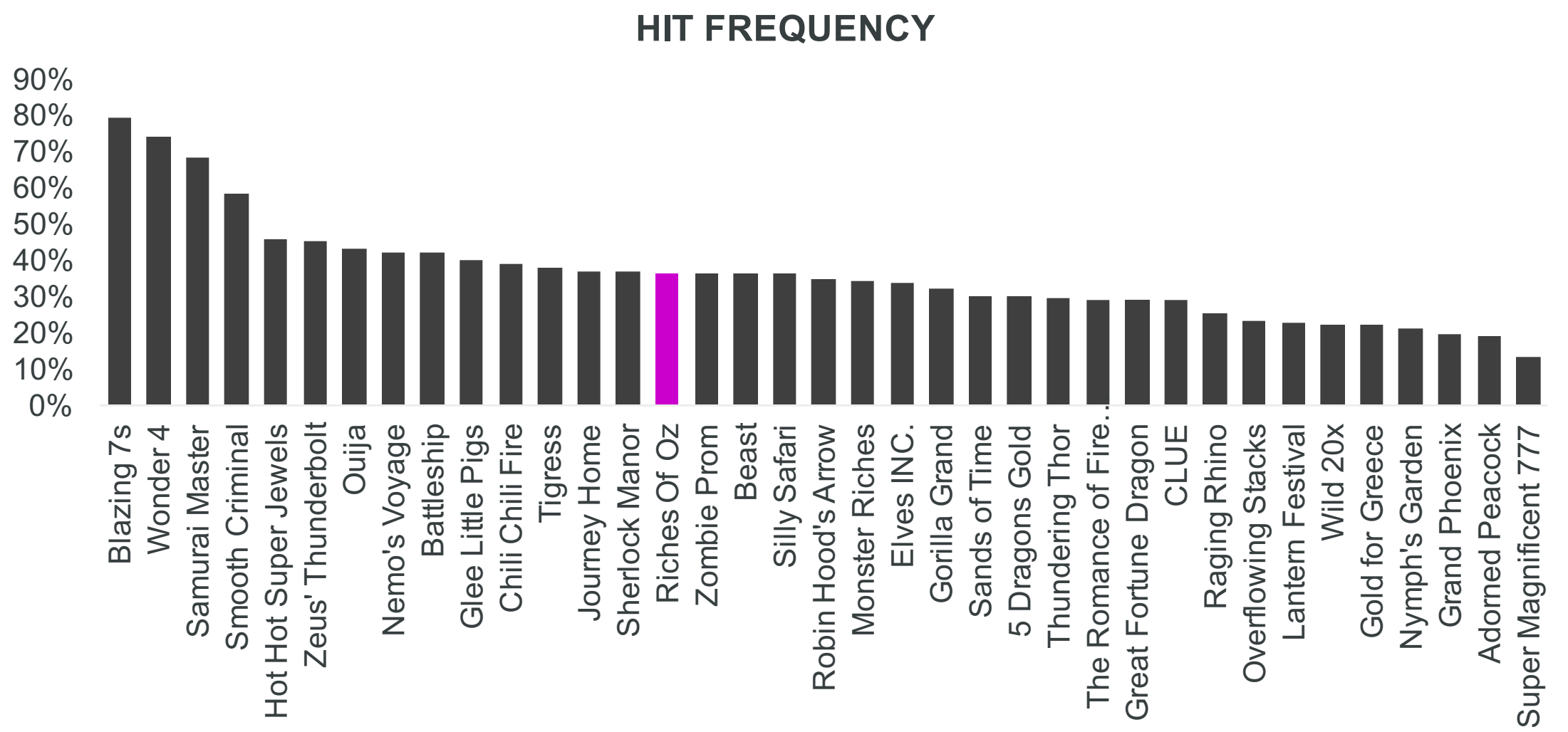
- Upon app-entry, *Riches of Oz* is featured on the main lobby screen (image 1).
- A dialogue indicates qualifying bets for the map (image 2).
- A 4 x 5 reel set appears at the bottom of the screen. A challenges indicator, timer, and map button are found at the top of the screen (image 3).
- Completing the challenges awards players with a credit prize. Additional credits are awarded for completion in the allotted time (image 4).
- Once a challenge is completed, players may unlock the next challenge by spinning 300 times or waiting for a countdown timer to finish (image 5).
- For every challenge completed, players move one step on a map. Additional prizes are given to players for arriving at special spaces along the path. Current rankings for the map challenge are displayed in the leaderboard area (image 6).
- The *Glinda* feature may trigger randomly during any spin, expanding the reels one or more spaces up to an 8 x 5 reel set (image 7).
- Two features add additional wilds on any spin: *Wicked Witch* adds one to five full reel wilds and *Flying Monkey* randomly adds wilds to the reels (image 8).
- The free games bonus feature is triggered when five or more balloons land anywhere on the reels. Each balloon that appears on the reels will reveal a number one to nine and the sum of all balloons is the number of free games awarded. During free games, all features may trigger and additional free games may be won (image 9).



RICHES OF OZ STATS

House of Fun’s *Riches of Oz* has an average hit frequency and volatility. Bonus games are 1 in 118 spins

Game play	
Hit frequency	36%
Volatility	6.2
Spins until a bonus	118
Distribution of RTP as % of total RTP	
Base game	77%
Bonus game	23%
RTP range	
Minimum range	79%
Median	89%
Maximum range	99%



NYMPH'S GARDEN

Jackpot Party's *Nymph's Garden* uses two 2 x 2 reels and a 6 x 3 reel column, generating unique ways to trigger free spins

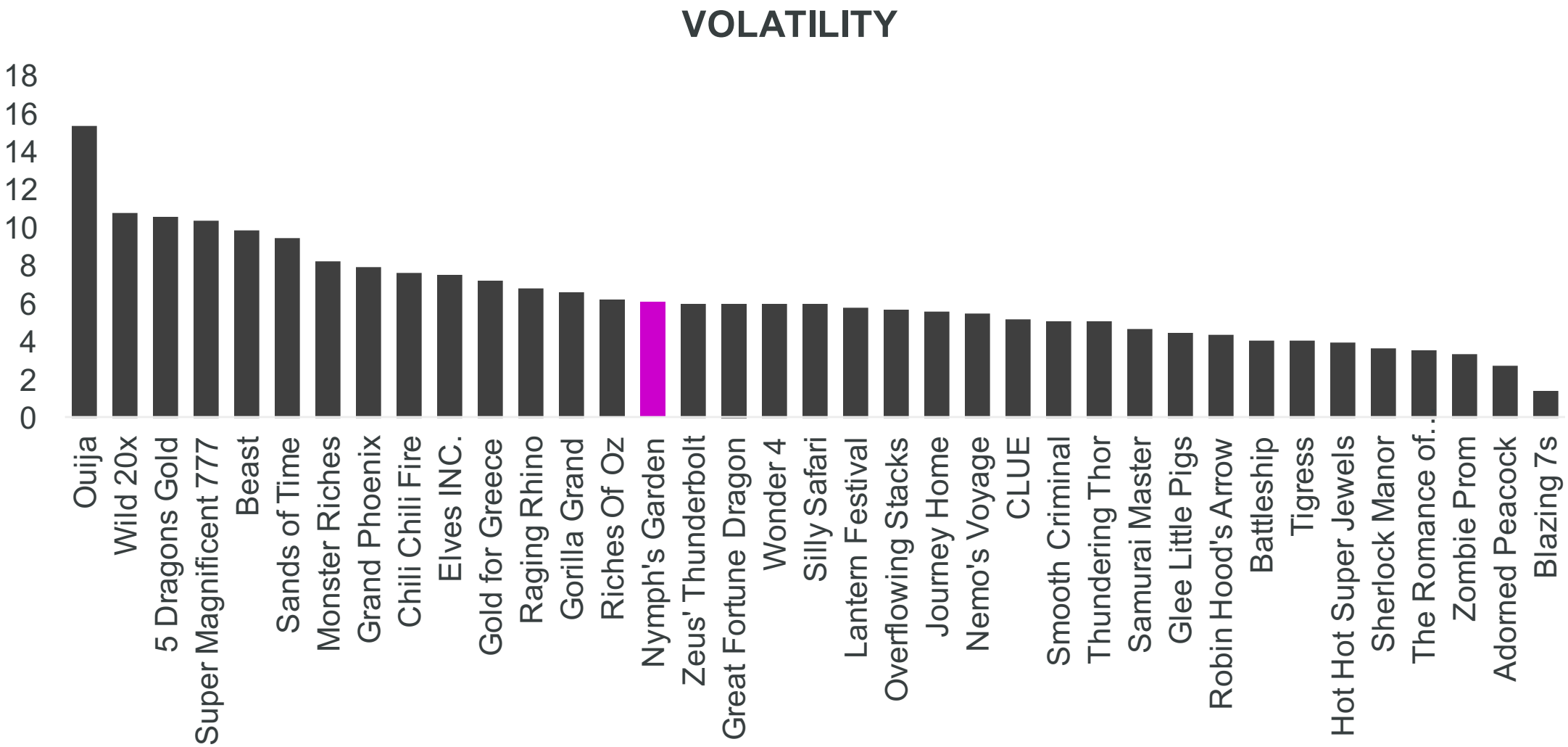
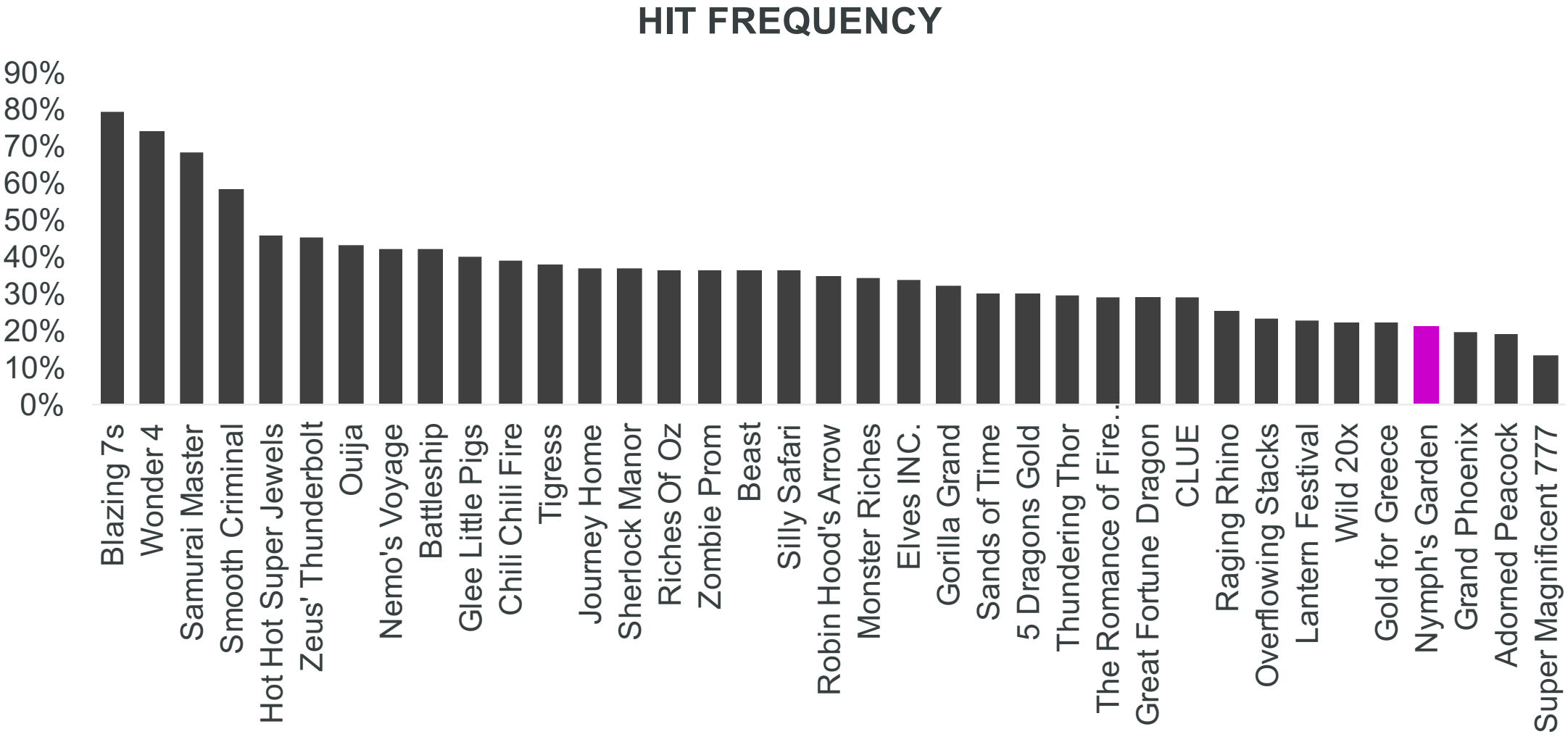
- A bet dialogue appears after machine selection with qualifying bets for the progressive jackpot (image 1).
- The progressive jackpot is displayed at the top of the reel set (image 2).
- The reel layout is two 2 x 2 boxes (each considered a column) attached to a colossal 6 x 3 box for a total of 11 reels and 100 pay lines (image 3).
- Free spins may be triggered when four alike symbols with or without wilds land on either 2 x 2 reel column (image 4).
- Players are awarded seven free spins with the triggering symbols held on the reels and mega symbols appearing in the other 2 x 2 box (image 5).
- Free spins are also triggered when three bonus symbols appear on the 6 x 3 box (considered reels 9, 10, and 11) (image 6).
- 20 free spins are awarded when three bonus symbols appear on the reels and four matching symbols appear in either column.
- During free spin play, wilds that appear above or below a tree symbol on reels 9, 10, or 11 become multiplier wilds for that spin (image 7).
- Additional free spins may be won during any free spin play (image 8).



NYMPH’S GARDEN STATS

Jackpot Party’s *Nymph’s Garden* has a low hit frequency and average volatility. Bonus games are 1 in 137 spins

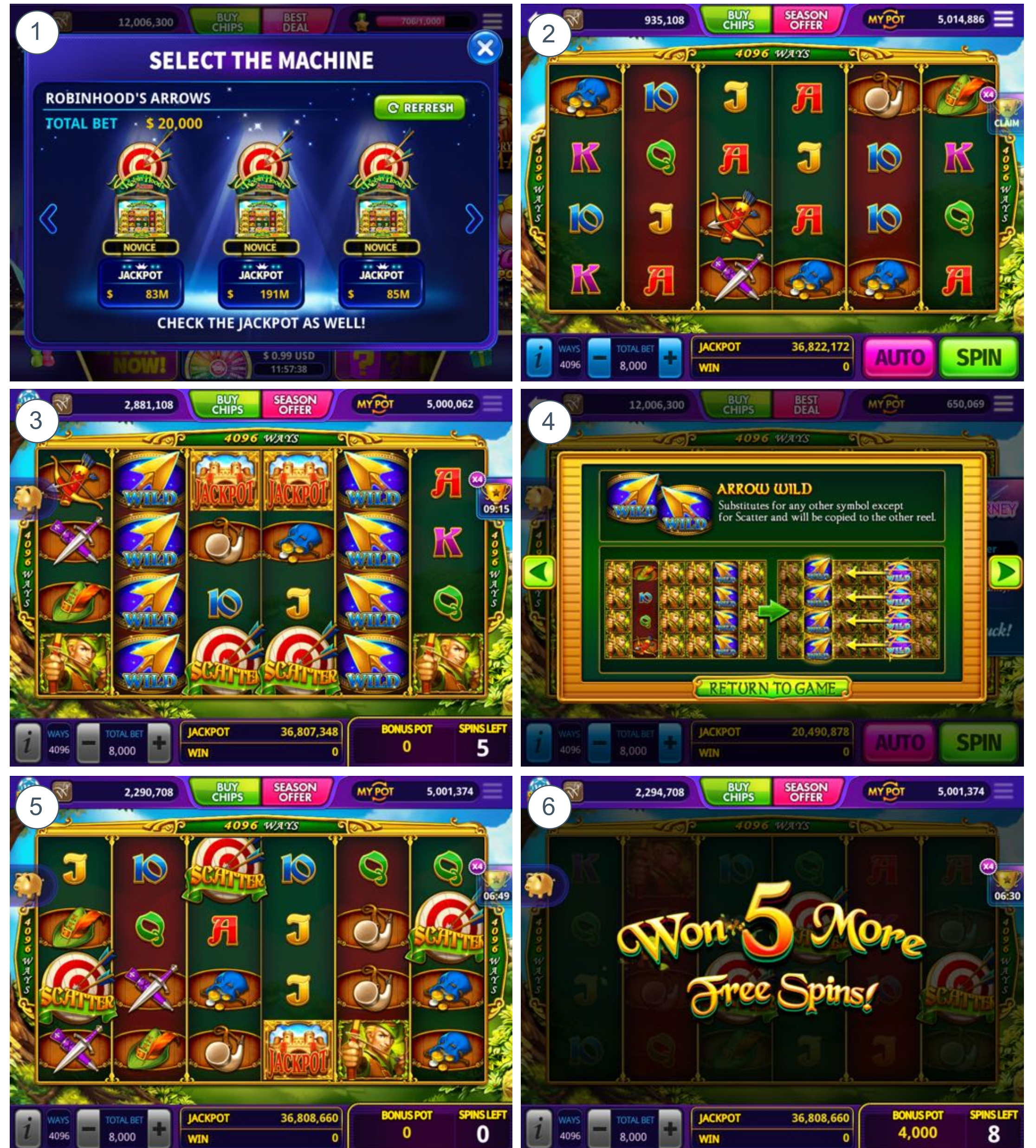
Game play	
Hit frequency	21%
Volatility	6.1
Spins until a bonus	137
Distribution of RTP as % of total RTP	
Base game	71%
Bonus game	29%
RTP range	
Minimum range	68%
Median	78%
Maximum range	88%



ROBIN HOOD'S ARROW

In DoubleU Casino's *Robin Hood's Arrow*, additional wilds are copied and shot over to another reel for additional wins

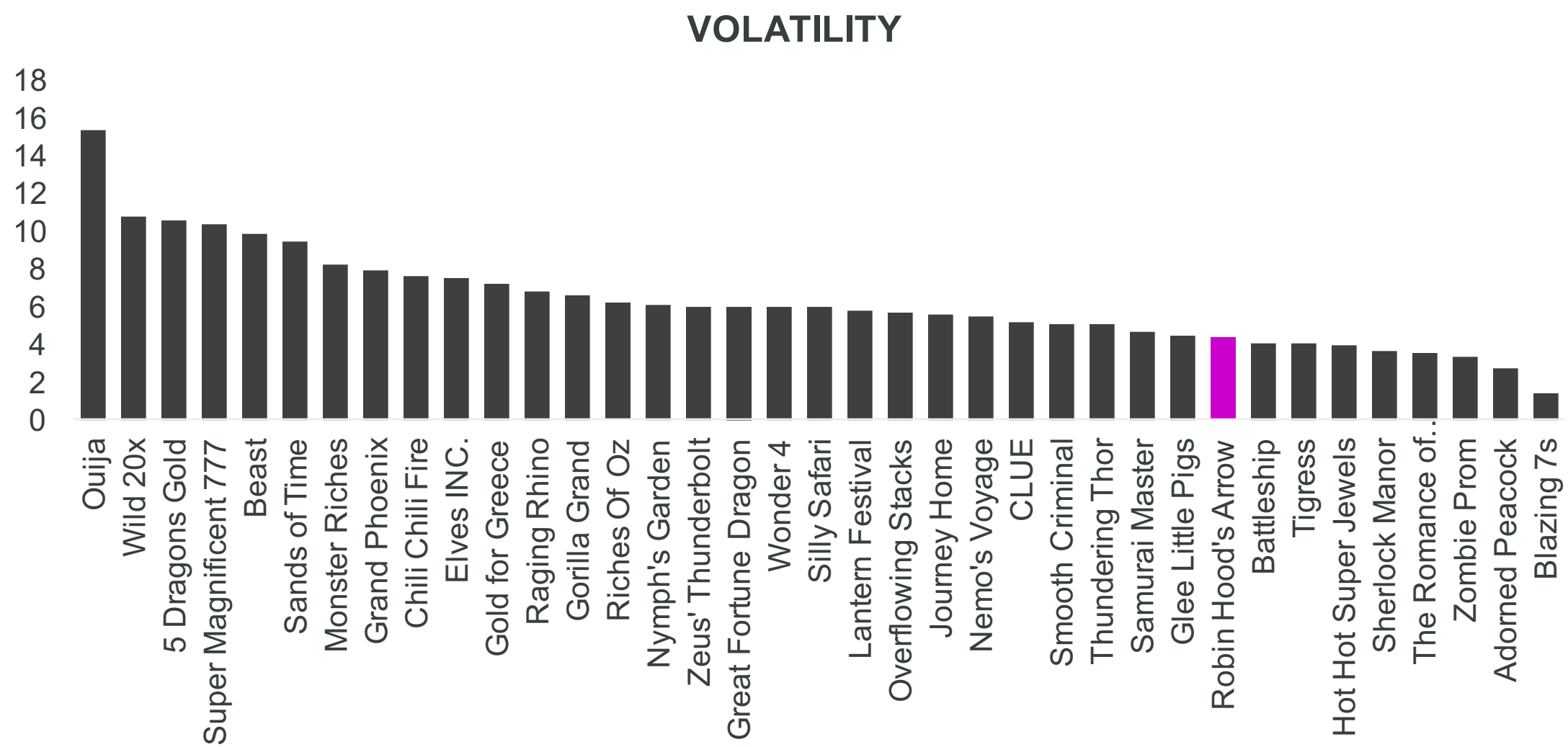
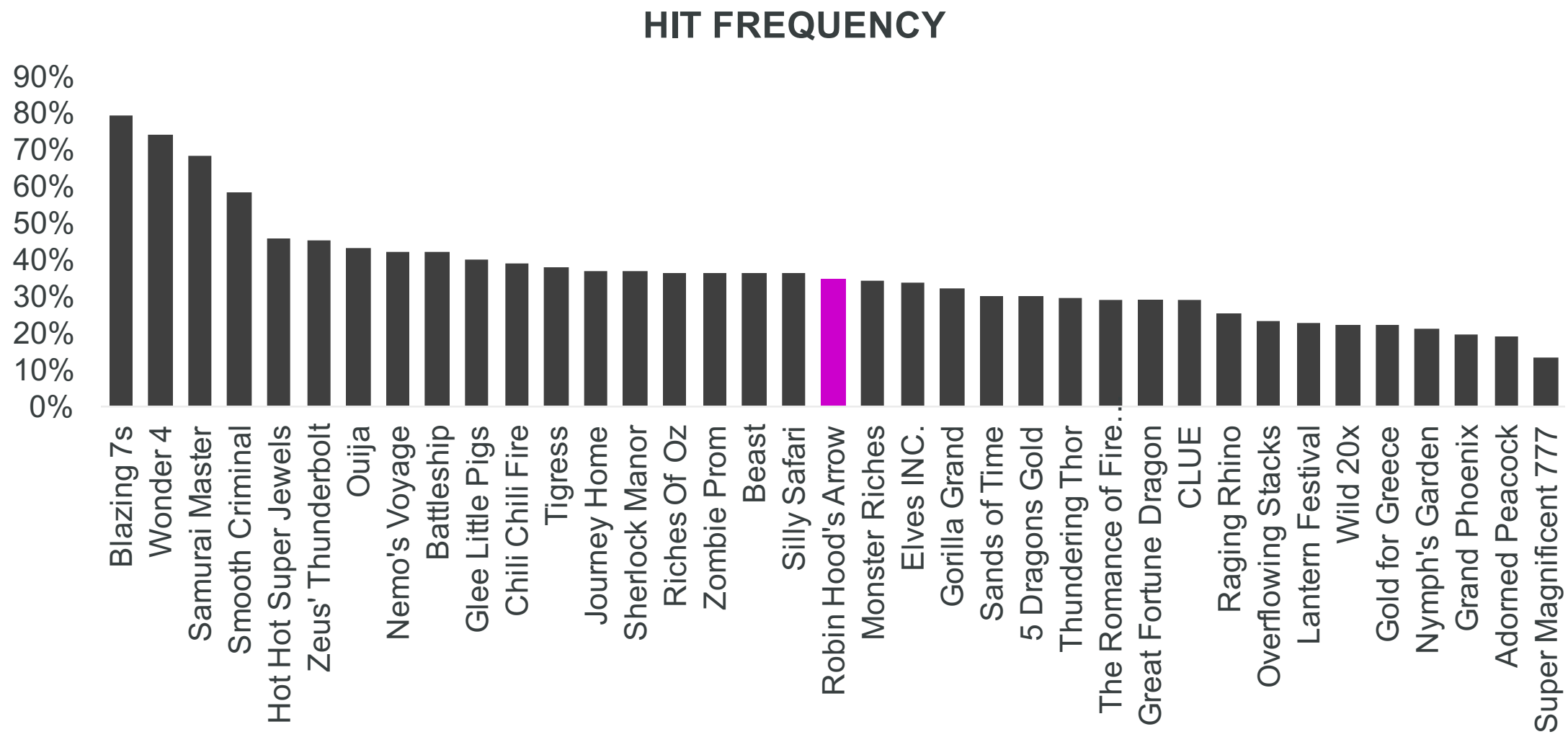
- A 'select the machine' dialogue opens with five levels of machines based on bet range from beginner to expert (image 1).
- *Robin Hood's Arrow* is played on a 4 x 6 reel set offering 4096 ways to win with the current progressive jackpot amount displayed at the bottom (image 2).
- Directional wild arrows may appear anytime during play on reels 2 and 5. Wilds that appear on reel 2 face reel 5 and vice versa (image 3).
- Wilds that appear on reel 2 or 5 copy and shoot over to the corresponding position of the other reel (image 4).
- Scatter symbols that appear only on reels 1, 3, 4, and 6 trigger the free spin bonus. Three scatter symbols award five free spins and four scatter symbols award seven free spins (image 5).
- Additional free spins may be won during free spins play (image 6).



ROBIN HOOD’S ARROW STATS

DoubleU Casino’s *Robin Hood’s Arrow* has an average hit frequency and moderately low volatility. Bonus games are 1 in 73 spins

Game play	
Hit frequency	35%
Volatility	4.4
Spins until a bonus	73
Distribution of RTP as % of total RTP	
Base game	74%
Bonus game	26%
RTP range	
Minimum range	68%
Median	76%
Maximum range	83%



APPENDIX

DATA COLLECTION PROCESS

Machine observations are from 10,000 spins and an RMG accepted statistical process to determine 90% confidence levels of a machine's RTP. Recommendations, information and data comes from market research, app intelligence tools and deep analysis of the games

Machine information

- The RTP range is found using a sample of 10,000 spins, which is approximately 20 hours of play.
- To find the RTP range with 90% confidence, the median payout of the 10K spin \pm (standard error) \times (z-score for 90% confidence) is calculated.
- The standard error is (standard deviation) $/ \sqrt{\text{sample size}}$ and the z-score for 90% confidence is 1.65.
- For example, the median payout for Zombie Prom after 10K spins was 103% with a standard deviation of 3.3.
- The standard error is $3.3 / (\sqrt{10,000})$, which equals 3.3%
- The RTP range for Zombie Prom is then 103% \pm (1.65 \times 3.3%).
- Based on this sample, the result is a 90% confidence that the real RTP of Zombie Prom falls between 97% and 109%.

Market research

- Each game is reviewed daily for updates, regardless of whether the game has been updated through the App Store.
- Transaction information comes from the iOS App Store's In-App Purchases tab. These transactions are ranked based on the number of transactions.
- Las Vegas player insights come from online sources, such as the Las Vegas Convention and Visitors Authority and the UNLV Center for Gaming Research.
- Progressive jackpot information comes from online research, specifically from wizardofodds.
- Trending revenue, downloads and package-rank data come from Priori Data, a Liquid and Grit partner.

Immature poets imitate; mature poets steal; bad poets deface what they take, and good poets make it into something better, or at least something different

– T.S. Elliot

LiquidandGrit.com



Brett.Nowak@LiquidandGrit.com

