Game Risk Assessment for Article 13 slot machines

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1 The author

Dr. Michael Auer holds a PhD in Psychology from Nottingham Trent University and a Master's degree in statistics from the University of Vienna. He is a regular speaker at gambling conferences, collaborates with recognized scientists in the field, and has published numerous peer-reviewed papers on player tracking and Safer Gambling. Dr. Auer played a pivotal role in developing a player-centric and science-based Safer Gambling solution called mentor and he has evaluated a number of Safer Gambling features such as voluntary limit setting and dynamic pop-up messages. Originally a marketer (he still consults with several gambling marketing departments), Dr. Auer knows both sides of the coin and this experience has helped him to successfully implement many harm minimization strategies. He views Safer Gambling as a way of creating a fun and safe gambling environment. Dr. Michael Auer first authored more academic publications in the area of online and land-based gambling with real-world data than anybody else.

2 Purpose

The purpose of this report is a risk assessment of the games of chance under Article 13 of the Speelautomatenbesluit 2000. There are single player and multiplayer machines. Roulette is one type of multiplayer machine. Here several persons can bet on the outcome of one game on separate stations which are placed around a Roulette wheel.

There are several aspects which are specific to the gambling machines which are regulated in article 13 of the Speelautomatenbesluit 2000.

1. The gambling machines are not completely random, they have to meet certain criteria, one of them being a maximum average loss of € 40,00 over a 100h period or 100,000 games.
2. There is a maximum stake per game of € 0,20 per three seconds. This maximum stake per game can only be exceeded within the limitations described in 1.
3. The maximum Jackpot is € 2,500 and there is at most only one local Jackpot
4. The maximum price is € 200/400 times of the maximum basic stake of € 0,20. This results in a maximum average hourly loss of € 40,00.

The Netherlands have passed a new gambling law per 1 April 2021, which amongst others will also allow for licensed online gambling. The gambling law requires online as well as land-based operators to assess the risk of the games offered.

3 Challenges and Limitations

Gambling machines in one jurisdiction are not always comparable to gambling machines elsewhere given the varying situational and structural factors in other countries as regulatory, geographic and venue information differ. For example, scale of provision can be different; other differences include the combination of stake size and prize, frequency of wins, and speed of game. In addition, regulatory regimes are often different and in different stages of development. Moreover, it is not always clear to what extent machines considered in the available research are compensated or random (see Parke and Griffiths (2006) for an overview comparing random and non-random slot machines). Caution is therefore required when interpreting findings and implications from other jurisdictions to the situation in The Netherlands. Some of the research evidence relies on information collected in laboratory environments, which may have limited applicability in real life situations.

4 Introduction

Compared to other European countries, slot machine gambling and casino gambling are relatively popular in the Netherlands, whereas betting is relatively unpopular (Goudriaan, 2013). Goudriaan (2013) also reports the percentage of problem gamblers between 0.15% and 0.22%.

The report 'Gokken in Kaart' (2011) estimates the number of problem gamblers in the Netherlands between 20.000 and 59.000 adult players. The number of players at risk is estimated at the number of 92.000.

In 2016, a baseline assessment has been conducted and commissioned by the WODC. This assessment will have a follow-up after the Draft Bill has come into effect to evaluate the policy effects.

The assessment had shown an estimate of 8.4 million players, approximately 95.700 (between 52.700 and 124.800) risk players and approximately 79.000 (between 52.700 and 105.500) problem gamblers

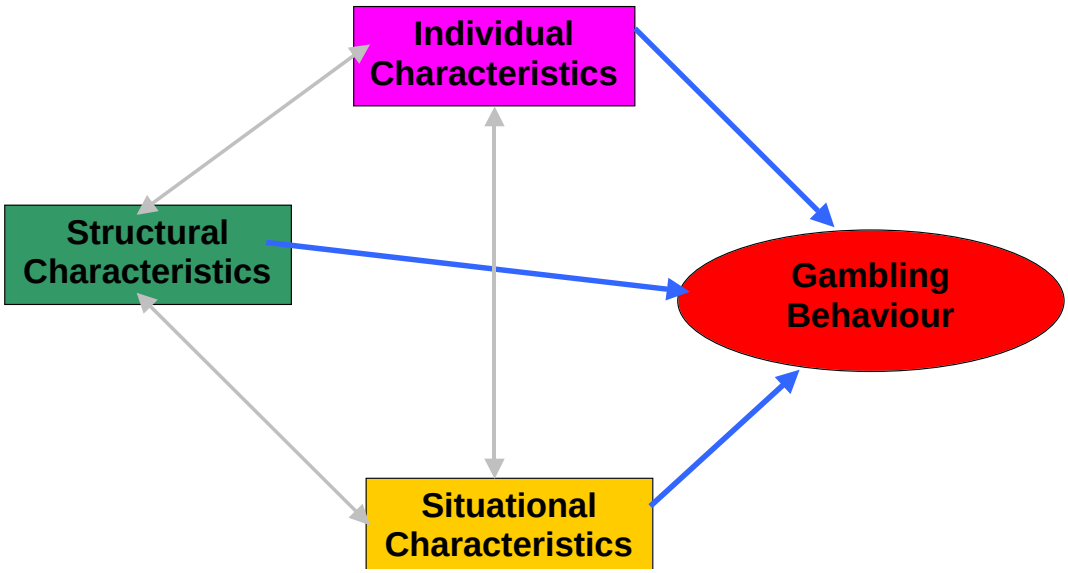
DeFuentos-Merillas et al. (2003) studied Dutch scratch card buyers and found that 0.24% met problematic gambling criteria. Out of the 0.24%, 0.15% were also addicted to other games of chance.

Gambling is a complex, multidimensional activity that is unlikely to be explained by any single theory. Gamblers are first influenced by sociological factors; for example, the availability of gambling opportunities, attitudes and habits of parents, friends and peer groups as well as a lack of alternative activities.

Research has consistently shown a positive relationship between the availability of gambling and both regular and problem gambling (Custer, 1982; Dickerson, 1989, 1995; Dielman, 1979; Kallick-Kaufmann, 1979; McMillen, 1995; Marcum & Rowen, 1974; Skolnick, 1978; Weinstein & Deitch, 1974).

The more gambling industry infrastructure that is established (e.g., new venues), the larger the range of gambling products (e.g., through the application of new technologies), and the greater the industry's marketing efforts, the more likely people will be to gamble in the first place.

The observable gambling behaviour is the consequence of a number of more or less observable factors. Individual characteristics such as personal traits, biopsychological aspects and possible underlying mental illnesses are important factors which influence gambling behaviour.



Situational characteristics to the circumstances under which a person is gambling. In land-based settings this might partly be observable by the staff. A persons' appearance and demeanour might shed some light on those factors.

5 Structural Characteristics Research

Gambling machines are associated with greater loss of control, a central feature of problem gambling (May-Chahal et al, 2007).

Focal Research (2001) report that problem gamblers find it especially hard to stop playing once a gambling session has begun. This lack of control is confirmed with gamblers who are considered to be high frequency players playing at least once per week (Dickerson 2003). However, what is lacking in available research is why gambling machines are related to a loss of control.

Irrational cognitive beliefs and perceptions have been reported to be important. For example, players may feel that the longer they play, the greater the chances of winning – because of probability and/or compensation – or because they do not want anyone skimming their machine (Griffiths, 1994). Alternatively, gamblers may be engaged in 'positive thinking' where losses are turned into 'near wins' regardless of outcome (Parke, Griffiths & Parke, 2007). It is not clear to what degree and which structural and situational factors encourage chasing and excessive play and to what degree this is dependent on players' personal characteristics (e.g., discipline, sensation seeking, etc.).

Weinstein and Deitch (1974) and Griffiths (1993) have shown that gambling activities vary considerably in their structural characteristics, including the probability of winning, the amount of gambler involvement, the amount of skill that can be applied, the length of the interval between stake and outcome and the magnitude of potential winnings.

Structural variations are also observed within certain classes of activities such as slot machines, where differences in reinforcement frequency, colours, sound effects and machines' features can influence the profitability and attractiveness of machines significantly (Griffiths, 1993). Each of these structural features may (and almost certainly does) have implications for gamblers' motivations and the potential "addictiveness" of gambling activities.

For example, skilful activities that offer players the opportunity to use complex systems, study the odds and apply skill and concentration appeal to many gamblers because their actions can influence the outcomes. Such characteristics attract people who enjoy a challenge when gambling. They may also contribute to excessive gambling if people overestimate the effectiveness of their gambling systems and strategies (see discussion of cognitive theories below).

Chantal and Vallerand (1996) have argued that people who gamble on these activities (e.g., racing punters) tend to be more intrinsically motivated than lottery gamblers in that they gamble for self-determination (i.e. to display their competence and to improve their performance).

People who gamble on chance activities, such as lotteries, usually do so for external reasons (i.e. to win money or escape from problems). This was confirmed by Loughman et al. (1996) in a clinical survey of problem gamblers wherein racing punters emphasised the importance of skill and control considerably more than slot machine players.

Although many slot machine players also overestimate the amount of skill involved in their gambling (e.g., Walker, 1992), other motivational factors (such as the desire to escape worries or to relax) tend to predominate (Walker, 1985). Thus, excessive gambling on slot machines may be more likely to result from people becoming conditioned to the tranquilising effect brought about by playing rather than just the pursuit of money.

On the other hand, racing punters tend to be more likely to gamble for excitement (Blaszczynski, McConaghy & Winter, 1986). This has important implications for the psychological study of ongoing gambling behaviour.

Another vital structural characteristic of gambling is the continuity of the activity; namely, the length of the interval between stake and outcome. In nearly all studies, it has been found that continuous activities (e.g., racing, slot machines, casino games) with a more rapid play-rate are more likely to be associated with gambling problems (Dickerson, 1989; Dickerson, 1995; Dickerson et al., 1996; Griffiths, 1995; Walker, 1992; Walker & Dickerson, 1996).

The ability to make repeated stakes in short time intervals increases the amount of money which can be lost and also increases the likelihood that gamblers will be unable to control spending (O'Connor, Dickerson & Phillips, 1995). Such problems are rarely observed in non-continuous activities, such as lotteries, in which gambling is undertaken less frequently and where outcomes are often unknown for days.

Consequently, it is important to recognise that the overall social and economic impact of expansion of the gambling industry will be considerably greater if the expanded activities are continuous rather than non-continuous.

Both laboratory studies and self-reports have examined the relationship between the reward characteristics of a game and gambling behaviors (e.g., Coates and Blaszczynski 2012; Dixon et al. 2006; Haw 2007; Livingstone and Woolley 2008; McCormack and Griffiths 2013; Weatherly and Brandt 2004).

Results indicated that reward characteristics (size and frequency of wins) and free games (such as free spins) were the most attractive structural characteristics of a game.

Some studies found that gamblers prefer games with more frequent but smaller wins to games with less frequent and big wins. In line with these findings, Coates and Blaszczynski (2012) found that individuals prefer games with more frequent wins and higher payback percentages. These findings suggest that players will prefer games with more frequent wins and higher payback percentages when they are able to discriminate and choose between games with different reward characteristics.

In-session gambling behaviours appear to slow down after larger wins but continues unchanged by smaller wins (Delfabbro and Winefield 1999).

Overall, findings suggest that reward characteristics influence gamblers; in particularly, gamblers appear to prefer games with more frequent small wins and/or a higher payback percentage. Furthermore, games with a smaller average win size appear to be associated with a higher degree of gambling responses, such as bets made.

Individuals also appear to be motivated to vary the odds and stakes of a bet. For example, Livingstone and Woolley (2008) found that the majority of participants (86 %) bet on multiple or maximum pay lines independent of bet size, whereas approximately half (52 %) of the participants had a strategy that involved a minimum bet on multiple lines or the maximum number of pay lines.

Very few studies have actually examined gambling behaviour in an ecological valid setting. Leino et al. (2015) have studies the relationship between betting intensity and structural characteristics on VLTs in Norway. Their results show that the number of bets is positively associated with payback percentage, hit frequency, being female and age, and negatively associated with size of wins and range of available betting options.

A traditional approach to game risk assessment follows a top-down process during which an expert evaluates a game based on the generally agreed game-characteristics such as event-frequency, the frequency of game results, the duration between staking and payment, Jackpot size, the possibility of a variety of stakes, channel, audio-visual aspects.

An approach like this can differentiate between game groups such as lottery draw, lottery instant, slots, table games, bingo.

It will come to the conclusion that land-based slots are riskier compared to bingo, because the latter amongst others has a lower event frequency and is less attractive from an audio-visual point of view. Furthermore land-based slots are less risky compared to online-slot simply because online gambling is more easily accessible. Online casinos can be accessed via the mobile phone and other devices from anywhere at any time.

6 Structural Characteristics of article 13 machines

6.1 Return to Player (RTP)

The Return to player is the percentage of the amount wagered with is paid back in the form of winnings. There is limited evidence that clarifies the potential implications of the RTP for gambling-related harm or risk. The implications are not necessarily intuitive either. On one hand, a higher RTP offers better value to the customers since they are receiving more money back as prizes. On the other hand, such value is appealing to the customer, allows the customer to spend more time playing the machine and permits stronger reinforcement through the ability to offer more prizes.

The average RTP on Article 13 machines is about 85%. However, the evidence is too weak to draw conclusions regarding the game risk assessment.

6.2 Speed of play

The speed of play, often also called event frequency, is the time it takes from the start of the gamble when the stake is paid (or credit is played) until the outcome of the gamble is revealed. The minimum speed of play on article 13 machines is 3 seconds. However, the multiplayer roulette machines have a much longer speed of play. One roulette round lasts for about one minute. In terms of speed of play the article 13 machines have a higher risk. The roulette machines' longer speed of play creates a lower risk.

6.3 Average loss per hour

Having an average low loss per hour of € 40,00 for any gambling machine will ultimately mean that 'at-risk' or problem gamblers will be limited in how much financial harm they can incur per hour. However, it may still be possible to spend significant sums of money during longer periods of time playing (Blaszczynski et al, 2001).

Compared to gambling machines in other jurisdictions and online, the limited hourly loss limits the potential risk of the article 13 machines. The limited accessibility compared to online casinos is another risk limiting factor.

6.4 Stake size

This characteristic refers to the maximum amount of money that can be wagered on the outcome of any one spin of the reels (and subsequent bonus or feature rounds). The maximum stake size is €0.20 per game (or spin) per 3 seconds and the stake level is fixed.

The important aspects of stake size for consideration are (a) the maximum level of stake permitted per game or spin, and (b) whether stake size is fixed or variable. Fundamentally, a higher stake level allows players to spend more money per hour (see average loss per hour), and therefore, financial risk and harm may increase as stake level increases. Like much of the material under consideration here, the relationship between stake size and problem gambling is not straightforward and there is a lack of compelling evidence to support this relationship.

It seems that despite the paucity of empirical evidence, that there may be a curvilinear relationship between stake size and problem gambling; that increased stake size may increase potential for risk and harm up to a certain point, after which if the stake size is too high, this may not attract the majority of problem gamblers (especially those on average incomes) since such machines may not meet their needs as previously noted. The extent to which stake is variable or fixed may have implications for facilitating chasing behaviour. For example, if a player is playing at a lower stake level and is experiencing a losing period that leads to an impulse to chase losses, it will be tempting for that player to increase stake size on the same machine in an attempt to expedite the chasing process. However, regarding these proposed machines stake sized will be fixed at € 0,20.

The maximum stake level for the proposed machine is very low and the maximum stake size in this case is only limited variable. Even though a curvilinear relationship may exist between stake size and gambling-related risk and harm, the author feels that the proposed stake size

is so low that it would definitely have a positive impact on responsible gambling, would reduce the potential for financial harm and would inhibit chasing behaviour.

In the author's view, the stake level is one of the most 'protective factors' of all the factors under review and the low stake level will play an important role in minimizing harm and risk.

6.5 Maximum Price

The maximum prize players can win is 200/400 times of the maximum basic stake of € 0,20. This results in a maximum average hourly loss of € 40,00. This is a much lower value compared to most other jurisdictions. Prize size is of course not be viewed independently of other gambling machine features. Lower prizes generally go along with more frequent winnings and thus a smaller hit frequency. There is little academic research on the effects of prize size on problem gambling. However, it is generally acknowledged that larger prizes are likely to create more gambling independent of other game characteristics. Crewe-Brown et al. (2014) report that larger prize sizes influence the propensities to gamble and level of bets.

6.6 Cashless and Card-based Technology

Players can use a card which they can top up on dedicated machines in the arcade.

There is very little research regarding the risk potential of such cashless technologies. It is however generally acknowledged that gambling with credit cards can have a negative impact. Gambling with credit cards is not possible directly on a gambling machine. This is a risk minimizing factor. If the credit meter shows € 50 or more, the bill acceptance is disabled. The player can only insert coins into the machine during that time. As soon as a player inserts a bill there is a waiting time based the bill inserted. The maximum waiting time is 15 seconds. The restriction to lower denominations as well as the waiting period are mitigating factors with respect to the gambling related risk. Several studies have shown that breaks in play can have beneficial effects on subsequent gambling intensity (Auer et al., 2019, Blaszczynski et al., 2016).

6.7 Jackpot size

The maximum Jackpot size on Article 13 is € 2,500,00. If there is a Jackpot it is limited to one establishment. The Jackpot is not triggered via winlines. It is based on a random number which selects a machine.

While it is acknowledged that there is currently little research exploring structural factors generally, it is perhaps most surprising that there is a paucity of empirical research into the effect of jackpot size on gambling behaviour. There is some evidence to suggest that a higher jackpot will attract more participation for lottery games. For example, Griffiths and Wood (2001) reported that more lottery tickets are bought when there is the promise of particularly high jackpot (e.g., rollover jackpots where the top prize has not been claimed in previous weeks). However, what is less clear is the motivation behind such a trend. Although, this might be explained by the obvious appeal of getting "more money", other more subtle factors may be at work. It could be the case the higher jackpots attribute higher status to gambling activity and that higher jackpots offer more opportunity for chasing losses.

Furthermore, as argued for the case of unlimited stake sizes, higher jackpots may facilitate chasing up to a certain size, after which players may feel that the chances of winning that prize is too low, and therefore may rationalize that such machines would not present a good strategy for chasing losses.

The author believes that higher jackpots would be more likely to facilitate chasing and gambling-related risk and harm if they were also associated with an increase in stake size (i.e., leading the player to believe they have a better chance of actually winning the jackpot).

While the higher jackpot may entice a broader range of customers to play these machines, the author believes that it will have a limited effect if any at all on facilitating gambling-related risk and harm, particularly if the jackpot is high in relation to the stake size (as is the case for the proposed machine). Finally, it is important to consider that the jackpot size of the proposed machines is still much lower than that of some machines in many other jurisdictions.

6.8 Animation, Sound and Gamification

There is limited research into the correlation between structural characteristics of games and problem gambling. Only one empirical study (Leino et al., 2015) is based on player tracking data.

All other studies have relied on self-reported information. However, it is well known that players often wrongly assess their own gambling. Auer and Griffiths (2017) reported that players underestimate their losses and overestimate their winnings. This bias between actual and estimated spent increases with the event frequency of the games.

The author of this study recently conducted a behavioural tracking analysis of online casino players. In this analysis a player's session length and loss was correlated with the structural characteristics of the games played. Among those were the games event frequency, average bet, average win, RTP and volatility. The results showed that only about 6% of the session behaviour could be explained by the games structural characteristics. The remaining 94% were independent of the game.

This means that the intensity of play results mostly from the individual experience in a session (e.g. the maximum win in a session, the average bet a player makes) or previous session experiences. The results are scheduled for publication in 2021.

Annually hundreds of game studios develop thousands of slot games. But what are the distinguishing attributes? Most slot machines have a very similar event frequency and the RTP is typically at least 90%. But there are only so many mathematical aspects which can be varied to meet the necessary commercial goals.

Obviously, there is no one silver bullet approach, otherwise game studios would not continuously produce so many different slots.

The main difference lies in the theme, the animations, the gamification elements and sounds. Virtually each popular TV series or movie character has been licensed. Other popular topics are animals, medieval and Egyptian designs.

Just like in any other industry, developers know that products have to be individualised. One person might be attracted by penguins another by pharaohs. Modern slot machines often have a “collection element”. This leads to longer gambling sessions as players can only collect certain elements if they stay within the same game for an extended period of time.

Although there has been no academic research into the correlation between the theme, animations, sound, gamification elements and problem gambling it can be safely assumed that those elements have a major impact on the potential risk of a game. The author draws this conclusion based on the fact that there are so many different slot games and their main distinguishing factors are mostly audio-visual and topic related.

In terms of audio-visual and gamification aspects article 13 machines are far from contemporary games which are offered in land-based and online casinos. The themes are very basic, some machines are even showing the actual reels. Compared to typical online slot games there are also no accumulative features on Article 13. In contemporary slot games players often accumulate points or objects which can be redeemed over time. This increases money and time spent.

It can be safely argued that the lack of advanced features on article 13 machines reduce the potential risk related harm.

Furthermore, Article 13 machines are limited with respect to the number of games offered. This is an important aspect as research has shown that problematic gamblers tend to engage into a higher number of activities (Braverman et al., 2013; Welte et al., 2004).

7 Conclusion

First and foremost, and based on a comprehensive review of the international literature, the author must reiterate that he believes that slot machines, based on their structural characteristics (game speed and event frequency, in particular) are among the most ‘addictive’ of all of the gambling games.

There is a broad consensus that while high-stake, high-prize machines are attractive to ordinary gamblers, they are particularly attractive to those at risk of problem gambling and to those with a gambling problem. There is also consensus concerning the machine features that appeal to gamblers and which features are associated with higher levels of both gambling and gambling-related harm.

Research from national prevalence studies in other countries (especially in Europe, Australia and Canada), suggests that problem gambling is most likely associated with slot machine play. While the evidence may be inconclusive as to whether slots lead to problem gambling, there is consensus in the literature that slot machine use and problem gambling are strongly related.

Having reviewed the information available, the author concludes that Article 13 single player machines have a lower gambling-related risk and harm compared to online slot machine play and other international casino machines.

There are a number of mitigating factors which support this conclusion. The most notable difference is the low maximum stake size that also contributes to the low average loss per hour. The lack of credit card play on machines and the maximum prize as well as low jackpot size are also crucial limitations.

The Article 13 single player slot machines also lack otherwise typical audio-visual features and gamification elements. Given the easy accessibility of such more advanced slots on the internet it is more likely that problematic players will prefer those types of games over Article 13 machines.

Article 13 multiplayer machines such as automated roulette tables pose an even lower risk due to the shorter event frequency. A roulette draw typically lasts for about one minute. All mitigating factors mentioned above, also apply for multiplayer machines.

For a minority of players this may still lead to gambling-related risk or harm, particularly for low-income players or in terms of the potential for spending excessive amounts of time playing these machines. Nevertheless, the author feels that such games are much less problematic than they would be if the maximum stake size were significantly higher.

Figure 1 displays the risk rating with respect to the different game characteristics for single player/Short Odds multiplayer as well as for Long Odds multiplayer machines. Across all game characteristics the former types of games are rated **"medium risk"** and Long Odds multiplayer machines are rated **"low to medium risk".** Article 13 Long Odds multiplayer machines only pose a high risk with respect to the possibility of spending long hours gambling. This of course also holds true for the other types of machines. Single player/Short Odds Multiplayer machines naturally have a potentially higher speed of play and near wins are also a typical component of slot machines!

Figure 1: Game characteristic evaluation for Article 13 machines

	Single player/Short Odds Multiplayer	Long Odds Multiplayer
Event Frequency	high	low
Stake Size	low	low
Jackpot Size	low	low
Continuity of playing	high	high
Availability	low	low
Multiple playing-/stake opportunities	medium	medium
Variable stake amount	medium	medium
Sensory product design	low	low
Near wins	high	medium

This report has viewed Article 13 machines from a structural characteristics point of view and has come to the conclusion that the different types of Article 13 machines pose lower gambling related risks compared to land-based and online casino games in other jurisdictions.

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