Joint Select Committee on Gambling Reform
Inquiry into
Poker Machine Harm Reduction ($1 Bets and Other Measures) Bill 2012

Introduction

My relevant qualifications are as follows:

1. B.A. (ANU), Grad.Dip.Econ.Hist. (UNE), M.Ec. (UNE), Ph.D. (Melb.). G.C.H.E. (Monash).
2. I am a member of the Public Health Association of Australia.
3. I am a Senior Lecturer in the Global and Social Health unit of the School of Public Health and Preventive Medicine at Monash University.
4. I have actively researched poker machine gambling since 1998. My PhD focused on the economic and social history of the Victorian EGM business, and social theory of EGM gambling.
5. I have undertaken considerable research into EGM gambling and related issues, including research funded by the Independent Gambling Authority of South Australia and the (then) Victorian Gambling Research Panel, and have published a number of scholarly articles and research and consultancy reports relevant to the Committee's current inquiry.
6. I am currently engaged in a research program which relates to aspects of the possibility of reducing the harm associated with EGM gambling, and my comments and evidence to the Committee are derived from my experience (as summarised above) and current research activity.

Why are $1 maximum bets likely to be an effective harm reduction measure?

The case for reduction of maximum bets as a harm reduction measure is set out quite clearly and in my opinion persuasively in the 2010 report of the Productivity Commission at Chapter 11. Further, the Speech by PC chairman Gary Banks in March 2011 sets out clearly the evidentiary basis of triangulation utilised by the PC in reaching its conclusions on the most effective policy for reduction of the harms associated with EGM gambling.

I also note that interesting and persuasive evidence in support of the introduction of a $1 maximum bet arose from research funded by the NSW Gaming Industry Operators Group and conducted by Blaszczynski and colleagues in 2001 and reported both via a consultancy report (Blaszczynski et al 2001) and academic papers (see Sharpe et al 2005). To my knowledge, this research remains the sole trial of such modifications undertaken in an Australian context in a field setting.

I do not propose to cover the same ground as that covered by the PC or Prof. Blaszczynski's team but in this evidence my intention is to highlight some other issues and aspects of the effects of introducing a $1 maximum bet (and, preferably, a reduced maximum prize) and how some of these issues might be addressed.

Relevant EGM structural characteristics

One important element of EGM design is comparative game volatility, or the extent to which the game's theoretical outcomes actually occur over the relatively short sessions of actual use. This characteristic is related to the existence of large prizes in the game's reinforcement structure. Highly volatile games generally have a smaller number of modest prizes but more large prizes (although the largest of the latter category remain very unlikely, with odds of achieving them in the order of 1:10,000,000 or more). However, the existence of large prizes tends to skew game outcomes so that in combination with the remainder of the reinforcement schedule, it is more likely that user credits will be depleted quite quickly, relative to less volatile games, which are known in industry circles as 'drip-feeders'. Game volatility is a game characteristic which is regularly referred to in industry marketing material and appears to be associated with the popularity of, and possibly the relative harm associated with specific EGM games, although there is a clear market for 'drip-feeder' games amongst (apparently) more risk-averse gambling segments.

The design goals of EGMs are essentially to achieve persistence amongst users, with the effect of maximizing returns to operators. This is known in industry circles as the maximization of 'time on device' and 'revenue per available customer' (TOD and RevPAC). Achievement of these design goals having regard to the differing characteristics of EGM users has resulted in the diversity of EGM games available in all EGM venues in Australia and elsewhere in the world.

EGM games will have varying volatility depending on the market segment at which they are targeted, but all EGM games display this characteristic to some degree, it being a key characteristic of the key principle of EGM game design, (derived from the well established principle of operant conditioning); the observable fact that an unpredictable schedule of rewards is more likely to result in habituation than would occur with a predictable pattern of rewards. Achieving some level of reward after every three spins is unlikely to result in persistence; but a pattern of essentially random rewards resulting in prizes after 5, 8, 21, 9, 12, 6 and 14 spins (for example) will be more likely to produce the operant conditioning effects sought by EGM game designers, that is persistent patterns of use that are difficult to extinguish.

When these design characteristics are associated with relatively high maximum bet and prize limits, the effect is an increased likelihood that users will exhaust their resources quickly, and in the case of EGM users whose motivation is modified by dependency, to continue to utilise the EGM until all available resources are depleted. At average maximum expenditure of $120 per hour (for EGM games of $10 maximum bet value, as available in NSW) this depletion can occur rapidly. I have observed EGM users expending hundreds of dollars in much shorter time periods – another consequence of high EGM game volatility.

Again, the capacity of EGMs to bring this about is compounded by the capacity of contemporary EGM games to encourage users to bet on multiple lines (50 line EGM games are common) in order not to 'miss' a prize being won on a line that is not being used. It is well established that EGM users tend to utilise the Min-Max strategy in response to the availability of multiple betting lines – that is, they tend to bet the minimum on the maximum number of lines (Dixon et al 2010). This means that even a 50-line one-cent credit value EGM game can effectively create a 50-cent minimum bet if the Min-Max strategy is followed, as it almost invariably is by experienced EGM users. This is often accompanied by variations in the minimum bet, so that a one-cent 50-line game can readily operate at $1 per spin or more, if all lines are selected and two credits or more wagered per line. This is often the case, as gamblers commonly report using 'strategies' such as increasing the amount wagered to induce prizes from the game (a function of the erroneous beliefs common amongst EGM users).

In research undertaken for the Independent Gambling Authority of South Australia we obtained data from the regulator on the average bet value for four of the most prominent EGM games operating in that state. These can be related closely to the number of lines (or in the case of reel betting EGM games, the number of 'ways' of winning). Thus, multi-line betting is a highly successful technique to leverage high average bet values from even low credit value EGM games.

Table 1: Selected characteristics of EGM games, SA (2006)

Game name	Multi-line or 'ReelPower ™'	Credit value	Theoretical RTP	Average bet size	Average bet as multiple of credit value
Shogun	Multi	$1.00	92.75%	$3.01	3.01
Shogun 2	Multi	$1.00	92.75%	$3.04	3.04
Indian Dreaming	ReelPower ™ 243 'ways'	$0.01	87.15% or 90.14%	$0.50	50.0
Indian Dreaming	ReelPower ™ 243 'ways'	$0.02	87.15% or 90.14%	$0.79	39.5
Dolphin Treasure	Multi	$0.01	87.87%	$0.33-$0.43	33.0-43.0
Dolphin Treasure	Multi	$0.02	87.87%	$0.47-$0.64	23.5-32.0
Dolphin Treasure	Multi	$0.05	87.87 or 90.31%	$0.77-$1.18	15.4-23.6

Source: OLGR (from Livingstone, Woolley et al 2008)

Effects of bet and prize reduction on EGM operations

In submissions to a previous inquiry undertaken by this Committee Prof. Kevin Harrigan of the University of Waterloo and I submitted the results of EGM simulations we undertook using the game characteristics of a popular Australian EGM game, set to a theoretical RTP of 87.7% with credit value of one cent and a maximum of nine lines. The original submissions relating to these simulations are attached to this document.

In undertaking these simulations, we set out to model the effects on duration of user sessions caused of a reduction in the maximum bet and prizes in this game. In summary, we simulated a multiple series of game outcomes (100,000) and then modified these outcomes to reflect a reduced maximum bet and reduced maximum prizes, redistributing maximum prizes to more regular small prizes. This has the effect of reducing the volatility of the game, that is, making outcomes less likely to be characterised by rapid depletion of user credits, as a concomitant of the removal of large (but unlikely) prizes.

As noted in the tables below, reductions in the maximum bet level on this popular Australian EGM game reduce the average hourly loss rate significantly. This is because both the average session duration with a specific stake (in this case, $40) is extended but even more significantly the median session duration is also extended and moves closer to the mean. The median value is the point at which exactly half the sessions are of lesser duration and half of greater duration, and is arguably a more accurate reflection of user experiences than the average or mean value. Lower maximum bet values enable users to 'ride out' adverse game results rather than depleting the available resources (in this case, the budget of $40 we set as the user's stake).

Table 2: Mean and median session duration at various bet levels – average 12 spins/minute - $40 stake

Bet level per spin	Mean session duration	Median session duration	Median as % of mean	Mean cost per hour	Median cost per hour
$1.80	12.7 min	4.0 min	31.5%	$189	$600
$0.90	27.5 min	10.9 min	39.6%	$87	$220
$0.45	55.3 min	27.0 min	48.8%	$43	$89

Source: Game simulations by Livingstone & Harrigan

In another set of simulations we also imposed lower limits on maximum prizes. The results of these simulations are set out in Table 3.

Table 3: Mean and median session duration at various prize and bet levels – average 12 spins/minute - $40 stake

Max Bet	Max prize (credits)	Mean session duration	Median session duration	Median as % of mean	Mean cost per hour	Median cost per hour
$0.90	27,000	21.6 mins	6.8 mins	31.5%	$111	$353
$0.90	9,000	27.5 min	10.9 min	39.6%	$87	$220
$0.90	500	25.9 min	13.5 min	52.1%	$93	$178
$0.45	27,000	43.4 mins	16.3 min	37.6%	$55	$147
$0.45	9,000	55.3 min	27.0 min	48.8%	$43	$89
$0.45	500	51.9 min	33.5 min	64.5%	$46	$72

Source: Game simulations by Livingstone & Harrigan

The effect of the imposition of low levels of maximum prizes is to extend both mean and median session times, particularly where both maximum bets and

maximum prizes are set at comparatively low levels. Average cost per hour of EGM use is also significantly reduced, as is median cost. Median cost per hour may be a more accurate assessment of the impacts of these changes on the experience of EGM users.

These simulations indicate that reducing maximum bets and maximum prizes will have a direct impact on the expenditure of EGM users, thus reflecting the Productivity Commission's argument that bet levels in local EGM venues are currently set at relatively high levels resulting in costly consequences for those who use them to excess.

Put simply, the cost of EGMs is currently set at very high levels. In the case of the relatively 'low-impact' EGM game we simulated, the median session duration for an individual betting 90 cents per spin with a relatively large maximum prize of 27,000 credits ($2,700) would have been 6.8 minutes. Bets of 45 cents per spin are commonplace. In fact, they are close to average values, as can be gleaned from Table 1, which actually includes data on the average bet size for the specific game we simulated.

The consequence of this is that an individual seeking some time on the game would be very frustrated by such an outcome, and would be likely in such circumstances to insert more funds into the machine, both to extend their time on the game and to 'chase' losses. This is a very common early step in the development of a gambling problem.

In any event, reductions in maximum bet levels would result in significant reductions in hourly rates of EGM expenditure, in close accordance with the Productivity Commission's estimates of the effect of such reductions.

Evidence from the United Kingdom

In the United Kingdom, EGMs are accessible at a number of locations including 'High Street' betting shops, casinos, amusement arcades and local pubs and clubs. However, the numbers of such devices available in such locations are quite limited by Australian standards, and each location is constrained as to the type of game it may offer. Table 4 sets out the characteristics (maximum bet and prize limits) of each such type.

Type B2 machines are also known as fixed odds betting terminals and almost all examples of this type in the UK are located in Betting Shops. Gambling researchers in the UK have advised me that FOBTs constitute the single largest area of concern about gambling at present, and the data set out in Table 5 illustrates why this is the case. Note that at this stage the UK Parliament has not approved a regional casino and thus Type A machines are not operated in the UK.

Table 4: UK gambling machine types and characteristics

Machine category	Maximum stake (from July 2011)	Maximum prize (from July 2011)
A	Unlimited	Unlimited
B1	£2	£4,000
B2	£100 (in multiples of £10)	£500
B3	£2	£500
B3A	£1	£500
B4	£1	£250
C	£1	£70
D non-money prize (other than crane grab machine)	30p	£8
D non-money prize (crane grab machine)	£1	£50
D money prize	10p	£5
D combined money and non-money prize (other than coin pusher or penny falls machines)	10p	£8 (of which no more than £5 may be a money prize)
D combined money and non-money prize (coin pusher or penny falls machine)	10p	£15 (of which no more than £8 may be a money prize)

Source: Gambling Commission (UK)

I obtained the 'industry statistics' report of the UK Gambling Commission for the period 2008-2011 in order to determine the average annual revenue derived from each type of EGM operated in the UK. The results of this exercise are set out in Table 5. It is clear that Type B2 machines yield very high average revenue per machine (more than 10 times that of Type C machines, for example), and currently produce about 65% of total gambling machine revenue in the UK.

Table 5: EGM revenue (gross gaming yield) by EGM type, UK, 2010-11

	N	£m GGY	£/Game
B1	2,477	£116.98	£47,226.48
B2	32,007	£1,296.70	£40,513.01
B3	11,556	£152.27	£13,176.70
B4	430	£2.48	£5,767.44
C	45,476	£152.53	£3,354.08
D	42,894	£88.24	£2,057.16
Cat not spec		£195.52	-
Total	134,840	£2,004.72	£14,867.40

Source: Gambling Commission (UK) Industry Statistics

Type B2 machines are high impact with high maximum bet levels and although maximum prizes are relatively low the effect of high bet values is clear, especially when compared to the revenue per machine achieved by low intensity machines generally available in clubs, pubs and arcades.

Effects of $1 maximum bets on gambling venue revenue and state gambling tax revenue

Two previous studies have attempted to model the revenue impacts of a $1 maximum bet. The Parliament of Tasmania recently conducted an investigation into the likely impact on revenue for gambling operators and the Tasmanian government tax base (Parliament of Tasmania 2010). Data obtained from the gambling industry for the purposes of this inquiry revealed that 82-85% of gamblers bet at or below $1 per spin, with an average of 64 cents, and that most gamblers selected a minimum bet with maximum lines as found in previous studies (see Dixon et al 2010). Around 37% of revenue was derived from bets above $1 per spin. The decline in revenue in Tasmania should a $1 maximum bet be introduced was estimated at 20%, with differential effects on club (10% reduction) and hotel (20% reduction) venues. Although the Chair of this committee did provide a dissenting statement, the committee ultimately recommended not to proceed with $1 bets, citing federal reforms initiatives in the 2012 National Gambling Reform Bills.

In 2001, the Centre for International Economics (CIE 2001) investigated the potential effects of introducing $1 maximum bets for the NSW Gaming Industry Operators Group. Using a sample of data from 22 clubs and 7 hotels, CIE estimated that restricting bets to a maximum of $1 would have a greater impact on hotel revenue (39% decline), compared with that of clubs (17% decline). However, this model assumes that all bets above $1 would be lost; that is, that gamblers who bet above $1 would not gamble at reduced intensity. This assumption is implausible to the extent that it discredits the estimates provided in this report.

Because data for net gambling revenue (NGR) and EGM numbers are published regularly by the Victorian Commission for Gambling and Liquor regulation, it is possible to estimate the impact of a reduction in NGR, both on venues and on state tax revenues for Victoria, having regard to the progressive tax rates operating in that state.

A colleague and I modified the findings of the Tasmanian Parliamentary committee referred to above for the purposes of assessing the likely impact of $1 maximum bets.

The basis on which we modified the Tasmanian impact estimate is that instead of categorising EGM venues into club and hotel categories for the purposes of assessing impact, we argue that it would be more appropriate to categorise venues on the basis of NGR per EGM. Under the Victorian regulatory regime, EGM venues are permitted to operate relatively large numbers of EGMs (up to 105) and, largely as a consequence of jurisdictional and regional 'caps' on EGM numbers, generate far higher average NGR per EGM than is the case in other Australian jurisdictions. Although the average club EGM venue in Victoria generates NGR per EGM at about half that of the average hotel venue, some hotels generate relatively low NGR per EGM and some club venues generate relatively high NGR per EGM. In fact, field examination of 'high performing' club venues suggest that they are managed and operated in a manner similar to hotel venues, so that the distinction between the venue types can sometimes be unclear.

Given this, we believe that it is more realistic to suggest that venues generating relatively high NGR per EGM are more likely to experience a significant impact from the introduction of $1 maximum bets, and those operating at less intensity (i.e., lower NGR per EGM) are likely to experience a lesser impact.

We calculate the median venue level NGR per EGM across Victorian EGM venues at about $83,000, and for the purposes of this paper have estimated that the impact of the introduction of $1 maximum bets would be lowest in venues generating less than median NGR per EGM, and highest in venues generating NGR per EGM in excess of that median. More than three quarters (76.7%) of club EGM venues in Victoria in 2011-12 generated NGR per EGM at less than $83,000 p.a., compared to a little more than a fifth of hotel venues (21.9%).

We therefore assume that 78.1% of hotel venues and 23.3% of club venues would experience a decline of 20% in NGR following the introduction of $1 maximum bets, and the balance would experience a decline of 10%, in line with the findings of the Tasmanian Treasury estimate and Parliamentary committee.

Table 6: Estimated impacts of $1 maximum bet on Victorian EGM NGR

	Current NGR	Est. NGR	Impact ($)	Impact (%)
Club	$919,426,792	$786,164,413	$133,262,379	14.5%
Hotel	$1,762,024,923	$1,422,130,541	$339,894,382	19.3%
Total	**$2,681,451,715**	**$2,208,294,954**	**$473,156,761**	**17.6%**

Source: VCGLR, calculations by author & colleague

On the basis outlined above, we estimate that club venues would experience an aggregate decline in NGR of 14.5% (from $919.4 million to $786.2 million).

We estimate that hotel venues would experience an aggregate decline in NGR of 19.3% (from $1,762 million to 1,422.1 million). Overall, NGR from club and hotel venues would decline by 17.6%, from $2,681.4 million to $2,208.3 million.

The impact of this on state tax revenues would be as set out in Table 7.

Table 7: Effects on EGM tax of introduction of $1 maximum bet under current tax arrangements

	Current arrangements		Current tax rates, $1 max bet		Reduction	
Venue type	**NGR $m**	**EGM tax $m**	**NGR $m**	**EGM tax $m**	**%**	**$m**
Clubs	$919.4	$215.5	$786.2	$159.9	25.8	$55.6
Hotels	$1,762.0	$721.4	$1,422.1	$541.6	24.9	$179.8
Total	**$2,681.5**	**$936.9**	**$2,208.3**	**$701. 5**	**25.1**	**$235.5**

Source: VCGLR, calculations by author & colleague

We also calculated the effects of introducing a new, more progressive EGM tax structure to offset the effects of this decline in state tax revenues. Although we are yet to finalise all details of this proposal we can advise that its application (in its current form) would produce the results set out in Table 8

Table 8: Application of proposed EGM tax structure to Victorian EGM venues

Venue type	NGR	EGM tax	% of NGR as tax	% of NGR retained by venue
Clubs	$786,164,413	$196,424,844	25.0%	75.0%
Pubs	$1,422,130,541	$677,271,894	47.6%	52.4%
Sub-total	$2,208,294,954	$873,696,738	39.6%	60.4%

Source: VCGLR, calculations by author & colleague

Application of new tax rates to casino EGM revenue would also significantly offset any revenue decline occurring from the introduction of reduced maximum bets.

In any event, application of a more progressive EGM tax regime would maintain a significant tax-free threshold, and allow clubs to retain 75% of NGR, hotels to retain 52.4%, and to maintain almost all state tax revenue foregone by reductions in NGR. It should be noted that prior to the imposition of the new EGM ownership and taxation regime in September 2012, club venues in Victoria retained 33.3% of NGR and hotels 25%.

Conclusions

Imposition of a $1 maximum bet, preferably coupled with the introduction of low maximum prizes ($500 or less) would result in little inconvenience to gamblers, and could be introduced over a period of time that would permit venue operators to replace machines (or, more likely, game software)

gradually. It would also almost certainly result in significant reductions in the harm generating possibility of EGMs.

This is a feasible and reasonable reform which has foreseeable consequences and can be readily managed. It will result in revenue losses to industry and government; however the reduction in avoidable harm resulting from this would easily justify the reform, noting in particular that both the Productivity Commission and Victorian Commission for Efficiency and Competition inquiries into this issue have identified that the economic effects of gambling are not specific to that industry, and that gambling expenditure would be readily transferable to other economic purposes with the same, or better economic consequences flowing.

Further, this reform is likely to have the least impact on small local clubs which are associated with higher levels of community benefit. The largest impact would be on venues operating highly efficient and lucrative gambling operations at high intensity, which are also associated with the greatest level of harm generation.

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Attachment 1

JOINT SELECT COMMITTEE ON GAMBLING – PRE-COMMITMENT

FURTHER SUBMISSION

Charles Livingstone[1] PhD & Kevin Harrigan[2] PhD

Impacts of lowered bet limits on poker machines

Introduction

In previous submissions, Livingstone & Woolley proposed the introduction of a two-stream system for the implementation of universal pre-commitment for poker machines operated in Australia. This model would involve high-risk poker machines (i.e., machines currently available in Australia with high limits for bets and prizes) being accessible only in conjunction with use of a pre-commitment system. However, low-risk machines would be accessible without the necessity of utilisation of a pre-commitment system.

In order to provide some further insight into the practical effects of low-risk machines, we have undertaken some preliminary modelling of game outcomes using various parameters, and this submission provides the results of this modelling.

Description of modelling

We accessed game data for a popular Australian poker machine game which we have seen operated in all Australian states. The specific game we have utilised for this exercise has been available for a number of years, and variants of the game remain available. We obtained reel configurations and pay tables and were thus able to accurately simulate game outcomes. For the present exercise, we simulated 100,000 'spins' of the game and applied various bet levels to these outcomes, for the purpose of assessing the average session duration for an individual user with a stake of $40 available.

The purpose of estimating session duration is to determine the relative entertainment time afforded to users under various parameter settings, and thus to determine bet limits which are focused on providing entertainment at reasonable cost focussed on the needs of 'recreational', intermittent, or, as we prefer to call them, 'entertainment' players. As the Productivity Commission reported, a significant number of users experience a shorter than anticipated duration of play, resulting in relatively high average hourly expenditure.

The bet levels we utilised were $1.80. $0.90 and $0.45, using 9 lines of this game. The game's theoretical RTP is 87.87%, close to the 85.88% achieved by the simulations. We applied these to the outcome of 100,000 game simulations and were able to assess the distribution of session duration, using an average spin rate of 5 seconds per game. It should be noted that the maximum rewards

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available under these bet limits were, respectively, $2,200, $2,200 and $1,350. These are relatively modest maximum prizes but still exceed levels we regard as advisable for limitation of volatility of game outcomes. Nonetheless, the game simulated is set at relatively modest game parameters and modelling bet limits provides a reasonable basis for assessing the cost of entertainment of a relatively low-risk poker machine.

Results

We assessed the median and mean session duration for the $0.90 and $0.45 bet levels, and have graphed the distribution of session times as shown in Figs 1 and 2.

Table 1 sets out the mean and median session duration for each of the three bet limits we modelled. The mean session duration is the average of all sessions and is heavily skewed by a small number of relatively large sessions times associated with quite irregular large rewards. The median session duration is the mid-point of all outcomes, such that 50% of users would experience a shorter duration, and 50% a longer session duration. The closer the median and mean are, the more likely that the game outcomes are less skewed. However, poker machine game outcomes will always be skewed to some extent by the existence of a small number of relatively large rewards.

Table 1: Mean and median session duration at various bet levels – average 12 spins/minute - $40 stake

Bet level per spin	Mean session duration	Median session duration	Median as % of mean	Cost per hour using median
$1.80	12.7 min	4.0 min	31.5%	$600
$0.90	27.5 min	10.9 min	39.6%	$220
$0.45	55.3 min	27.0 min	48.8%	$89

Source: Actual game simulation by the authors

It will be noted that although both mean and median game duration change significantly across the three bet limits, median session duration changes are much greater as a proportion than are changes to the mean session duration. As graphs 1-2 indicate, this is related to a less concentrated 'spread' of game outcomes as bet levels decline. With bets at $1.80, average hourly cost is $600 based on median game outcomes – that is, the mid point of game outcomes. However, median outcomes improve dramatically as bet level reduces, such that the hourly cost for a $0.45 bet (a quarter of the $1.80 bet) is less than one-sixth of that of the $1.80 bet.

It is also noteworthy that at $0.90 bet level, 48% of users would experience a session time less than 10.4 minutes, including 34.7% who would experience a game duration of less than 8.3 minutes. However, at the $0.45 bet level, only 1.2% of users would experience session duration of between 10.4 and 12.5 minutes, and none would expect to spend their entire $40 stake in less than 10.4 minutes.

Discussion

Lowering maximum bets clearly produces a considerable benefit for poker machine users by spreading the distribution of session times towards a greater likelihood of closer to average returns, resulting in longer session time and, importantly, reduced volatility of outcomes. The hourly cost for the 50% of users who achieve at least the median session duration is considerably reduced and is much closer to what many would agree is a reasonable cost for an entertainment product, albeit one coming at much greater hourly cost than, for example, a movie or football game.

Importantly, benefits increase in a better than linear relationship as bet limit declines.

We believe that median outcomes would tend more strongly towards mean outcomes as prize limits were reduced, further reducing the difference between mean and median outcomes. We are continuing to model this aspect of game characteristics and will be happy to inform the committee of the outcome of this research.

For poker machine users who seek entertainment from their use of EGMs, reduced bet levels offer a significant benefit, both in terms of player safety (by reducing the potential for significant costs of use) and by increasing the entertainment time available for a relatively modest stake. In our submission, reducing bet limits is clearly an effective strategy to reduce harm and increase entertainment value.

Figures

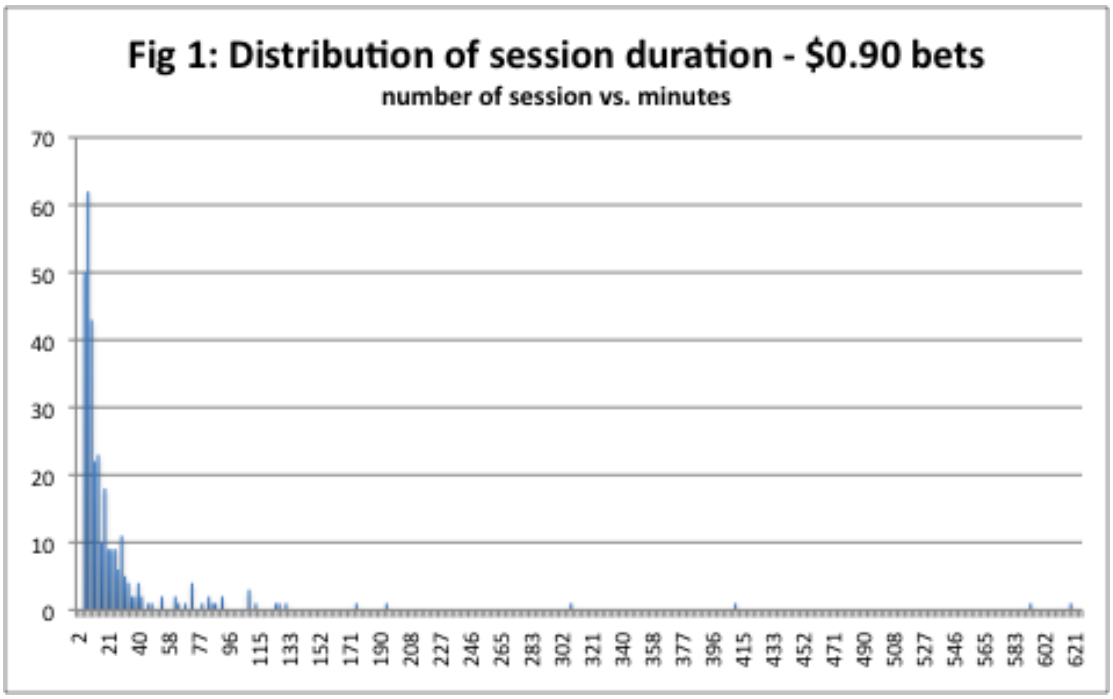
Fig 1: Distribution of session duration - $0.90 bets
number of session vs. minutes
70
60
50
40
30
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10
0
2
21
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58
77
96
115
133
152
171
190
208
227
246
265
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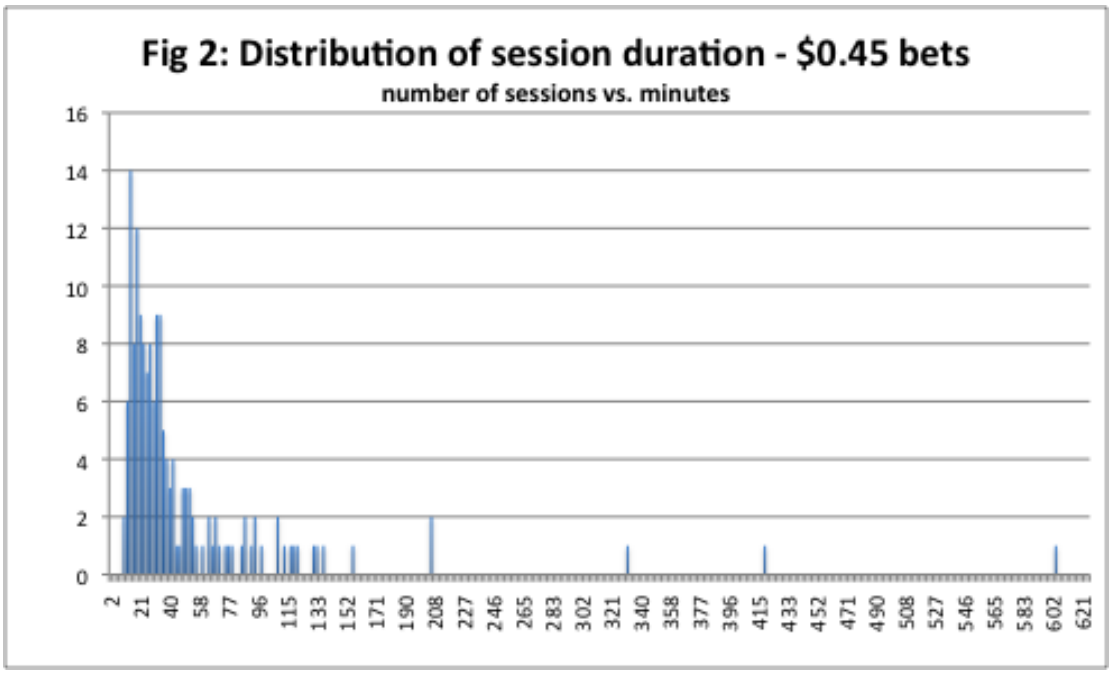
Fig 2: Distribution of session duration - $0.45 bets
number of sessions vs. minutes
16
14
12
10
8
6
4
2
0
2
21
40
58
77
96
115
133
152
171
190
208
227
246
265
283
302
321
340
358
377
396
415
433
452
471
490
508
527
546
565
583
602
621

Attachment 2

JOINT SELECT COMMITTEE ON GAMBLING – PRE-COMMITMENT

ADDITIONAL FURTHER SUBMISSION

Charles Livingstone[3] PhD & Kevin Harrigan[4] PhD

Impacts of lowered prize limits on poker machines

Introduction

This submission addresses some further aspects of the characteristics of poker machines as they might be adjusted to present low-risk poker machine games in a two-stream (high-risk – low-risk) model of pre-commitment. In an earlier submission the present authors discussed the results of lowering maximum bets on poker machines, particularly in relation to the volatility of game outcomes.

This further submission addresses issues related to the lowering of maximum bet limits and the extent to which this would affect game volatility and assist in reducing the risks associated with poker machine use.

Description of modelling

As discussed in our earlier submission, we accessed game data for a popular Australian poker machine game. As before, we were able to simulate game outcomes. For the present exercise, we selected the same set of 100,000 spins utilised in our previous submission.

To remind, the purpose of estimating session duration is to determine the relative entertainment time afforded to users under various parameter settings, and thus to determine bet and/or prize limits which are focused on providing entertainment at reasonable cost focussed on the needs of 'recreational', intermittent, or, as we prefer to call them, 'entertainment' players. As the Productivity Commission reported, a significant number of users experience a shorter than anticipated duration of play, which results in high average hourly expenditure.

In this simulation, which we undertook to demonstrate the effect of reducing maximum prizes, we modified the game output data in two ways: firstly, to provide a low volatility game with a maximum prize of no more than 500 credits, and, secondly to produce a more volatile game with a maximum prize of 27,000 credits.

In the case of the first (low volatility) game, credits won in excess of 500 were redistributed across all game outcomes, save that no outcome resulted in a prize of greater than 500 credits. The purpose of this was to simulate a prize structure capped at a modest level.

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In the case of the second modification, we tripled maximum prizes above 500 credits and reduced the game outcomes below 500 proportionately, provided that no game outcome was reduced to less than zero.

As this is a 9-line game, a max bet of $0.90 is realistic and within the bounds of the $1.00 maximum bet proposed by the Productivity Commission. For comparative purposes we also simulated a maximum bet of $0.45.

It must also be noted that the game we used as the basis of these simulations is already a relatively low volatility game, by Australian standards. Thus, the effects we are attempting to elucidate would be greater if applied to a higher volatility base game.

Results

Table 1 sets out the mean and median session duration for each of the two bet limits we modelled. The mean session duration is the average of all sessions and is skewed (i.e., biased towards an unrealistically high average figure) by a small number of relatively large sessions times associated with quite irregular large rewards. The median session duration is the mid-point of all outcomes, such that 50% of users would experience a shorter duration, and 50% a longer session duration. The closer the median and mean are, the less skew is demonstrated. However, poker machine game outcomes will always be skewed to some extent by the existence of a small number of larger rewards, even if those rewards are limited to a relatively low level. Skew would increase with larger maximum prizes.

Table 1: Mean and median session duration at various prize and bet levels – average 12 spins/minute - $40 stake

Max Bet	Max prize (credits)	Mean session duration	Median session duration	Median as % of mean	Mean cost per hour	Median cost per hour
$0.90	27,000	21.6 mins	6.8 mins	31.5%	$111.11	$352.94
$0.90	9,000	27.5 min	10.9 min	39.6%	$87.27	$220.18
$0.90	500	25.9 min	13.5 min	52.1%	$92.66	$177.78
$0.45	27,000	43.4 mins	16.3 min	37.6%	$55.30	$147.24
$0.45	9,000	55.3 min	27.0 min	48.8%	$43.40	$88.89
$0.45	500	51.9 min	33.5 min	64.5%	$46.24	$71.64

Source: Game simulation by the authors

It will be noted that although both mean and median game duration change significantly across the three prize limits, median session duration changes are much greater as a proportion than are changes to the mean session duration. Although both reduced bet levels and reduced maximum prizes reduce the median and mean hourly cost of play, greater reductions are associated with reductions in maximum bet.

We do caution that these simulations have been undertaken on a game which is already of relatively low intensity. Similar simulations utilising a more volatile

base game may produce different results, which we believe would be of greater magnitude

Discussion

We believe these and earlier simulations demonstrate that increased entertainment value is afforded poker machine users via a reduction in maximum bet – both in terms of reduced hourly cost and the concomitant increase in median and mean time on the game for a fixed stake. Similar benefits are also demonstrated via a reduction in maximum prize, although these appear to be less significant.

In these circumstances we believe that low impact games would provide considerable value to users who did not wish to enrol in a pre-commitment system. We would urge maximum bets and prizes to be set at quite moderate levels, and would encourage broader community discussion on what level that should be.

Further, they appear very likely to reduce the harm associated with poker machine use, via significant reduction of costs of use. The public benefits of adopting a low-risk high-risk pre-commitment system would therefore be considerable.