SLOT PERFORMANCE ANALYSIS

AN ESSENTIAL RESOURCE FOR CASINO MANAGEMENT

William T. Dunn

DUNN GAMING SOLUTIONS

PREVIEW

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Dunn Gaming Solutions
PO Box 27740
Las Vegas, NV 89126

www.DunnGamingSolutions.com

Brief Contents

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Chapter 1. Slot Machine Basics

As a precursor to conducting analysis, we will review some basics about slot machines including:

- Types of machines
- Components of a slot machine
- Floor layout
- Slot accounting
- Promotional wagers
- System configuration

Types of Machines

Modern slots are electronic gaming machines on which, when a wager is made, the win or loss is determined by the combination of symbols that result on the display. A special computer chip controls combinations of symbols. These machines come in many varieties.

Class II vs. Class III

In **Class II** machines, the outcomes are centrally determined—meaning the computer chip that determines the win/loss outcomes resides on a server to which the machines are networked. The multiple machines on the server are participating in a virtual bingo game or lottery drawing. The outcome of the drawing is then translated into a combination of symbols on a machine's display. Sometimes, these machines are referred to as **Video Lottery Terminals** (**VLT's**). Class II machines were developed to service gaming jurisdictions where "Las Vegas-style" gambling was not allowed but bingo or lottery operations were legal.

In **Class III** machines, the outcomes are locally determined—meaning the controlling computer chip resides inside the machine and directly determines a game's outcome. There is no need to participate in a bingo game or lottery drawing behind the scenes. These are Las Vegas-style slots. The focus of this book is on Class III gaming in U.S. Casinos, but many topics are applicable to Class II operations.

Reels & Video

Slot machines used to be purely mechanical devices. The typical display consisted of three physical reels. The reels were marked with numerous symbols (sometimes called "stops").

When a wager was made, the reels would spin then sequentially stop at random. After all reels stopped, the alignment of the reel symbols on the payline determined the wins and losses. These types of machines are referred to as "mechanical reels". As technology evolved, computer chips assumed control of the reels, though the reels and display were still physical. These were sometimes called **stepper reels** after the stepper motor that moved the reels as determined by the chip.

As display screen technology evolved, video slots were introduced. Known as **video reels**, these machines mimicked the spinning of mechanical reels through computer animation. While the underlying chip determination was the same, players were initially reluctant to adopt video reels. Eventually, game manufactures became more creative in the design of video reels, offering payouts for combinations on multiple paylines and even creating non-linear paylines (to induce higher levels of wagering), and much improved sound and graphics. Today, these machines are often referred to as **multi-line video** or **video slots** and are more popular than traditional reel slots in many markets.

Game Features

Manufactures continuously introduce new game features to attract players and sell more machines. Here are some of the basic ones:

- **Multiplier**: increased payout in proportion to increased wager. Where a $1.00 wager would yield a $100 payout, a $2.00 wager would yield a $200 payout, a $3.00 a $300 payout, and so forth.
- **Jackpot Multiplier**: increased payout disproportionate to increased wager. Where a $1.00 wager would yield a $1,000 jackpot, a $2.00 wager might yield a jackpot $5,000 payout. This is an inducement to maximize the wager amount on each spin.
- **Buy-A-Pay**: another inducement to increase wager where additional monies wagered activate additional reel symbols.
- **Buy-A-Line**: activate additional paylines through additional wagers. For example a game might have 30 possible paylines, but the minimum wager might only activate one of these lines. This is yet another inducement to maximize the wager amount on each spin.
- **Game-within-a-Game**: a certain symbol or combination of symbols activates a secondary game on the machine. A machine with a bonus wheel on top that spins and pays the amount listed on the wheel stop is a classic example of this feature. Many new machines offer secondary display screens where various types of bonus games-within-a-game can be hosted.
- **Bonusing**: similar to game-within-a-game, a certain symbol or combination provides a bonus to the player, such as free spins.
- **Community Game**: bonus/game-within-a-game features are shared by multiple machines. For example, four individual machines might share a large bonus screen wherein all players on the individual machines are able to participate communally in the bonus game when activated.

Many contemporary bonus features are designed to more highly engage the player by simulating player control of the outcome (such as selecting one of any number of icons to uncover a bonus payout), when in fact the outcomes are either random or predetermined.

Progressives

With a progressive game, a portion of the monies wagered are diverted to a jackpot meter (or multiple meters). The initial jackpot starts as a seed amount and then grows with each wager made. Thus, as the jackpot grows, so does the incentive for players to play the game. Progressives come in many varieties, including:

- **Stand-alone progressive**: a single machine with a progressive jackpot solely fed by play on that machine.
- **Linked progressive**: two or more machines in the same casino area linked to the same progressive jackpot. Thus, the jackpot presumably will grow faster since it is fed by multiple machines. Only one machine would win the jackpot when it hits.
- **Wide Area progressive (WAP)**: a linked progressive in multiple casinos. These are typically run by the game manufacturer. The casino will pay a portion of monies wagered to the manufacturer who is then responsible for paying the progressive jackpot to the player when it hits. The manufacturer will keep a portion of the monies paid to cover operating costs and generate additional profits.

Video Poker & Blackjack

Video poker and blackjack machines are different from regular slots in two distinct ways. First, these are games of skill—decisions made by the player affect the outcome. Second, the probabilities of card games are publicly known (whereas the probabilities of payouts on regular slots are kept secret). Thus, an informed player can determine the casino's house advantage (*see Chapter 5*). While operated by the slot department, these games tend to perform differently and attract a different type of player than a regular slot game.

Video Keno, Craps, Roulette

Various live games with random outcomes, such as keno, craps, and roulette, have been converted to slot-style machines and operated by slot departments. Again, theses will typically attract a different type of player than a regular slot game.

Fee Games

Some slot machines are purchased outright and are owned and operated by the casino. Other machines involve fees paid to the manufacturer. The previously discussed WAP machines are owned by the manufactures rather than the casino, so the percentage of monies wagered paid by the casino is considered a fee. Other types of machines are owned by the manufacturer, and the operating casino pays a percentage of the machine's revenue as an operating fee (often 20%). Typically, these are branded and themed games, and the fee is called a **participation fee**. While the fees can be substantial, they offer the casino the benefit of not having to purchase a game and be stuck with it if it is not successful. Some games also require a royalty or flat daily fee to be paid by the operating casino.

Multi-Denomination / Multi-Game (MDMG)

Games that can be played at different base denominations are known as multi-denom. For example, the player might be able to choose between playing a 25 cent, 50 cent or 1 dollar version of the same game title on a single machine.

Some machines offer multiple game titles (multi-game), allowing the player to select which title he or she prefers to play.

Often, we find both multi-denom and multi-game options in the same machine, referred to as "MDMG". This feature can create accounting and performance analysis challenges as we will see in later chapters.

Server-Based

Server-based (SB) gaming proposes to offer the casino operator more flexibility and ease of content management. On a traditional stand-alone machine, all the operating software, content, and graphics are installed at the machine. In server-based, machines are connected to a central server from which operating software, content, and graphics can be downloaded rather than manually installed. SB allows the opportunity to offer MDMG content from the casino's library of server-based game titles. (This is not to be confused with Class II machines, where the actual game outcomes are determined on a central server).

Server-based machines should also alleviate the aforementioned MDMG accounting and analysis challenges, though to date, many difficulties still remain.

Components of a Slot Machine

A slot machine is a system of systems. It may house mechanical reels or utilize a video display screen or a combination of the two. Machines may also have sound, lighting, and player tracking hardware (card readers).

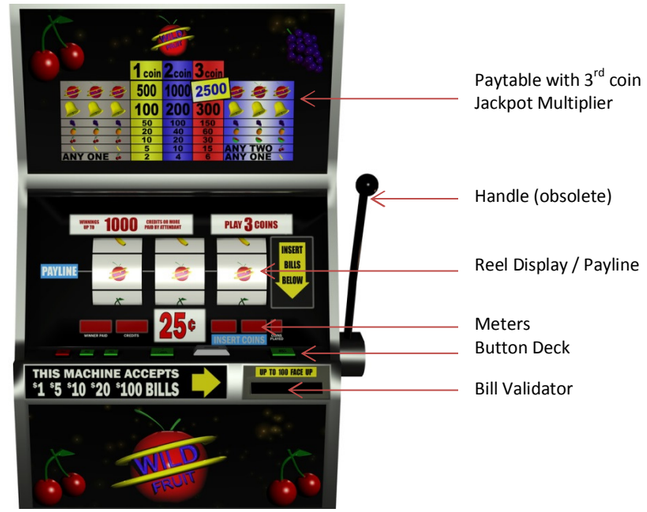
It will display a **paytable**, which shows how much a player will win for the different combinations of symbols that might appear.

We'll find **button decks**, which are essentially the player controls. Some button decks are physical and some utilize touch screen technology.

The **bill validator** is used to verify currency placed in the machine by players in order to purchase the machine credits used to make wagers. After acceptance, the currency falls into the machine's **drop box**. The drop boxes are periodically emptied and contents counted to collect revenue for the casino.

We used to have **coin slots** (hence the name "slot"), coin-hoppers, and coin-drop buckets to collect coins deposited. These have largely been eliminated and replaced by **ticket-in/ticket-out (TITO)** systems. TITO allows for greater operational efficiency by increasing machine uptime (no need to wait for coin hopper fills when a game has been paying out), reducing manual jackpot processing and various coin handling labor requirements, allowing players to easily cash out gaming credits and move to different machines…not to mention eliminating those plastic coin buckets that used to litter the slot floor.

Exhibit 1-1: Example Three-Reel Upright Cabinet Slot Machine



The control chip is known as the **EPROM** (erasable, programmable, read-only memory) which contains a pseudo **random number generator** that continuously generates random number sequences. When a player makes a wager, the game uses the random sequence at that time to determine the outcome. Various random number sequences are tied to paytable outcomes.

Inside the machine, there are numerous **meters** used to track activity. For example, there is a "games played" meter that increments each time a player pulls the handle or presses the spin button to play a game. There are "bill-in" meters used to track the number of bills inserted into the machine by currency denomination accepted through the bill validator. Much of our slot accounting and performance analysis is dependent upon the readings of the game meters.

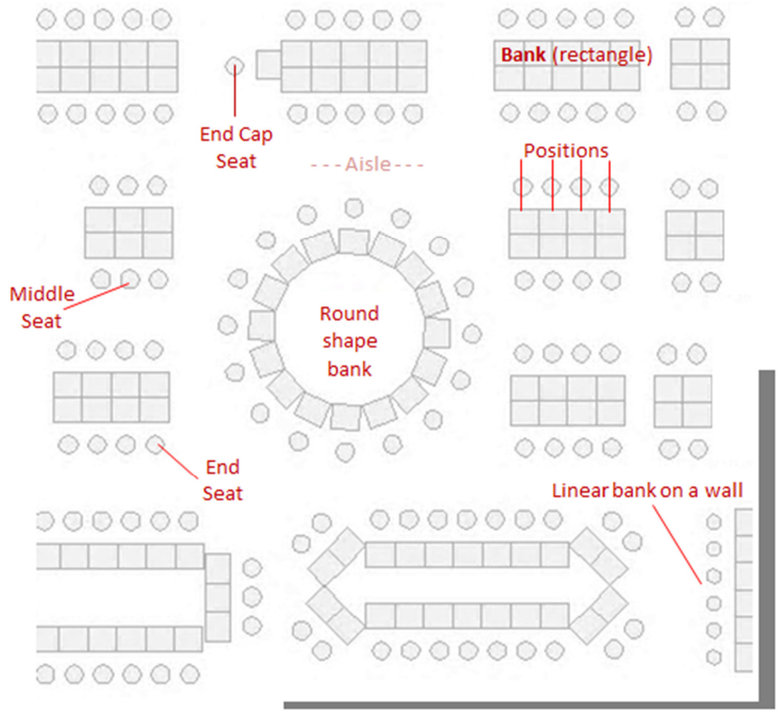
Finally, slot machines come in many different **cabinet models** (aka **platforms**) designed by manufacturers. Cabinets may offer different types of features and may only support operation of certain game titles on a given platform. The casino often has the ability to change game content without purchasing an entirely new machine buy purchasing a **conversion kit**. On a physical reel game, this kit would include a replacement control chip, reels, and graphics printed on insert glass. Many newer platforms use video display for all graphics, so a conversion kit would just be new software.

Generically, we classify cabinet styles as **upright** (taller, thinner), **slant top** (shorter, wider) and **Bertha** (novelty oversized).

Floor Layout

A casino slot floor is typically arranged in **aisles** and **banks** and subdivided in to **areas** or **zones** which are usually named using a letter or number (such as area "B" or zone "2"). Often the area is defined by network connection routers rather than architectural or environmental attributes. Sometimes called **stands**, banks are clusters of machines, usually of similar content. Banks come in many different shapes, such as rectangles, arcs, tri-pods, rounds/carousels (traditionally, carousel refers to a configuration that could be staffed inside), or linear arrangement against a wall. Banks will typically be numbered within an area. Bank shape arrangements can affect game performance, so they are worth noting for analytical purposes.

Exhibit 1-2: Floor Layout Drawing (aerial view)



On a bank, each gaming **position** is also usually numbered. So we might have machine ID 10001 located in area A, bank 01, position 01 which we would refer to as location "A-01-01".

Machine ID 10001 might someday be replaced by new machine 20001, but the location identification would remain unchanged.

Within a bank, we'll usually have different seat position types—such as **middle seats**, **end seats**, and **end caps**. Seat position types often have different performance characteristics, so they also are worth noting for analytical purposes. Exhibit 1-2 provides a floor layout illustration to visualize these terms.

Slot Accounting

This is not meant to be a manual for slot audit and operations accounting. However, it is necessary to understand some basic slot accounting concepts when undertaking performance analysis.

Basic Terminology

Familiarity with following terms will aid in understanding slot accounting:

- **Credits**: cash deposited into a machine is converted to wagering credits based on the game's denomination. For example, $20.00 deposited into a $5 denomination game will convert to four wagering credits.
- **Handle Pull**: one spin or game played or bet/wager made.
- **Coin-In**: money wagered, accumulates with each handle pull (sometimes called "Handle").
- **Coin-Out**: money paid to the player in credits by the machine.
- **Jackpot**: money paid to a player in cash by an attendant.
- **Drop**: cash and cash equivalents removed from the machine, traditionally segmented as "soft" (currency) and "hard" (coin/token).
- **Voucher**: a casino-issued cash equivalent, such as a TITO ticket.
- **Accrual**: a reserve of money to pay progressive jackpots.
- **Hopper Fill**: coins or tokens added to the game by an attendant (legacy, pre-TITO term).
- **Machine Days**: number of days a machine is active on the casino floor (aka. days on floor, days online, game days).

Meter and Actual Win

We calculate slot win two different ways. **Meter win** is calculated from the game meters—it is what the machine is reporting as its win. **Actual win** is calculated when we empty the drop boxes and physically count the money. We often look at meter data, since it is continuously updated, while actual win is dependent on the drop schedule.

In theory, meter and actual win should be the same. In reality, they may diverge either due to meter malfunctions, cash handling /counting errors, or even theft or fraud. From an audit perspective, it is important to investigate machines with material variances in actual and meter win.

Calculating Win

Meter win is basically calculated as: ➲Coin-in – (Coin-Out + Jackpots)
Actual win is basically calculated as ➲Drop – (Jackpots + Hopper Fills)

From the following data, we can compute both meter and actual win:

- Coin-in = 10,000
- Coin-out = 6,600
- Jackpots = 2,400
- Fills = 0
- Drop = 3,390

Meter win = 10,000 – (6,600 + 2,400) = 1,000
Actual win = 3,390 – (2,400 + 0) = 990

We have a $10 variance between meter and actual win. From these calculations, we would also compute three percentages:

- Meter win % ➲Meter win / Coin-In
- Actual win % ➲Actual win / Coin-In
- Hold % ➲Actual win / Drop

In our example, the percentages are 10.00%, 9.90%, and 29.20% respectively.

Theoretical Win

We would also consider how much money the machine should have won based on the game's long-run mathematical probabilities. This is most commonly referred to as theoretical win, but may also be referred to as **expected win**, **composite win**, and **par win**. The calculation for theoretical win is ➲Coin-in x Par %.

Par percent is the essentially 1 minus the mean of the paytable (*see Chapter 5*). In our example, if par was 9.00%, then theoretical win would be $900 (computed as coin-in of 10,000 x 9.00%).

For analytics, it is usually best to look at theoretical game performance because meter win and actual win are short run samples of performance that may diverge significantly from theoretical. This is the business of gambling. With a coin toss, there is a 50/50 chance of heads or tails; however, if we see heads on the first flip there is no guarantee we will see tails on the second flip. We might experience a long series where either heads or tails lands predominantly. Nevertheless, if we keep flipping that coin—in the long run—we will see heads about half time and tails about half the time.

While theoretical win is generally the most useful performance metric, actual win is important in analysis of skill games and/or when there are flaws in our computation of the true theoretical (*see Chapters 5 and 6*).

Win per Machine per Day

We focus on win per machine day in analytics. This allows us to make fair comparisons as changes are made to the slot floor. For example in the month of November, we might have Machine A with theoretical win of $5,550 and Machine B with a theoretical win of $2,100. In this context, Machine A would seem the higher performer.

However, if Machine A was on the floor all 30 days and Machine B was new to the floor on November 21st, then it would have only 10 machine days in the month. We would compute theoretical win per machine day as:

Machine	Days Online	Total Theoretical	Theo per Machine per Day	Theo per Machine per Day
A	30	5,550	=5,550/30	185.00
B	10	2,100	=2,100/10	210.00
Total	40	7,650	=7,650/40	191.25

In this context, Machine B is the higher performer. Note we also compute a weighted average total. (Chapter 4 expounds upon simple and weighted averages).

Of course this is surface-level analysis. We would also want to control for location and other game features in a deeper analysis. We might also look at how Machine A performed over the same 10-day period Machine B was on the floor…perhaps that last 10 days had unusual levels of overall play due to the Thanksgiving holiday.

Progressive Accruals

We should accrue for games with large progressive jackpots since this is money we are holding in escrow. Otherwise, we would take a hit to revenue on a day when a large progressive is paid. If a game has a 10% theoretical win but has 2% of coin-in going to a progressive, then our true theoretical nets to 8%. Ideally, the slot accounting system would deduct the progressive accruals.

- Meter Win: ➲Coin-in – (Coin-Out + Non-progressive Jackpots + Accrual)
- Actual Win: ➲Drop – (Non-progressive Jackpots + Hopper Fills + Accrual)

This way, the win metrics would be compared against the true net theoretical on an ongoing basis. Different slot systems handle progressives differently, so it is important to review your internal progressive accounting procedures. In reality, most progressive accounting happens offline, so it is likely you are comparing day-to-day meter and actual win numbers on a gross basis to a net theoretical expectation. Thus, you would appear to be over-holding until the progressive hits.

If you have internally linked progressives, it is important to distribute the progressive jackpot amongst the contributing machines. Accruing as outlined above would accomplish this. If you are not accruing, then a manual adjustment would be necessary.

Wide Area Progressives are paid by the game manufacturer who would also generate their own taxable jackpot form for the winning player, so these would be an exception to the above.

Some contemporary games are pseudo-progressives, meaning the expected progressive payout is averaged and built-in to the paytable. With such games, there would be no need to accrue or adjust the theoretical house advantage percentage. These are typically smaller jackpots that hit frequently.

Promotional Wagers

Many casinos offer marketing incentives directly to players in order to induce visitation or reward loyalty. The simplest would be an offer of cash—some money with which to gamble on the house. With the evolution of TITO, it became possible to send a cash equivalent voucher as an incentive. The player could bring the voucher to the casino and insert directly into the machine rather than having to jump through some of the hoops needed to redeem a cash offer.

A downside to both cash and voucher offers is the player's ability to "**walk**", meaning take the cash and leave without ever playing in the casino. To counter this, systems manufacturers introduced promotional wagering capabilities. Essentially, the casino can load the marketing incentive directly to a player's account. When the player comes to the casino to redeem, she simply places her card in a machine's player tracking card reader, enters her PIN, and the incentive is downloaded directly to the game's credit meter.

The casino typically has the option to offer promotional credits as cashable or non-cashable. Cashable credits can be cashed out of the machine, while non-cashable credits must be wagered—thus eliminating the player's ability to walk. Any credits earned from wins on the promotional wagers would be awarded as live, cashable credits.

Suppose in our above meter and actual win example, $400 in marketing incentives had been provided as cash or vouchers. We would have accounted for this as a marketing expense, so our profit would be:

Actual win = 3,390 – (2,400 + 0) = 990 **– 400 = $590 profit**

The slot operations win and hold percentages would not be affected. With promotional credits, however, nothing is inserted into the bill validator or lands in the drop box, so our drop amount would be $400 less:

- Coin-in = 10,000
- Coin-out = 6,600
- Jackpots = 2,400
- Fills = 0
- Drop = **2,990**

Since the meter data is not affected, both meter win and theoretical win computations would be unchanged. However, actual win would now be **2,990** – (2,400 + 0) = **590**. Actual win percent would be 590 / 1,000 = 5.90% and hold on drop percent would be 590 / 2,990 = 19.73%. Exhibit 1-3 illustrates the differences between promotional credits and cash offers in the accounting process.

Exhibit 1-3: Impact of Promotional Creidts on Slot Accounting

Item	Cash/Vouchers	Promo Credits	Difference
Coin-in	10,000	10,000	0
Coin-out	6,600	6,600	0
Jackpots	2,400	2,400	0
Fills	0	0	0
Drop	**3,390**	**2,990**	**-400**
Theoretical win	900	900	0
Meter Win	1,000	1,000	0
Actual Win	**990**	**590**	**-400**
Theoretical Win %	9.00%	9.00%	0
Meter Win %	10.00%	10.00%	0
Actual Win %	**9.90%**	**5.90%**	**-4.00%**
Hold on Drop %	**29.20%**	**19.73%**	**-9.47%**
Marketing Expense	400	0	-400
Actual Profit	590	590	0

Here, there are notable variances between actual win and actual win % to theoretical and meter wins. Also, our hold on drop % is significantly reduced. If we were comparing a period with heavy promotional credit activity to a period with little or no promotional credit activity, we might be left scratching our heads. At the end of the day, our profit is unchanged, and the variances are really just an illusion because we are comparing apples to oranges.

We need to make an adjustment to add the $400 to the drop, re-compute, and then compare everything on an apples-to-apples basis. If you pay gaming taxes on actual win, you would rather state it at $590 as opposed to $990 in this example.

Different systems handle promotional accounting differently, so it is important for you to understand how your system and your Accounting department are treating promotional wagering activity.

System Configuration

Most casinos utilize a central system for slot accounting. All the games on the floor are networked to the system. When a game is initially placed on the floor, information about the game must be entered into the system. This would normally include a machine ID number, floor location, the game title, type, denomination, manufacturer name, cabinet style or model, number of paylines, maximum bet amount, and theoretical %. We might also find information about fees, progressives, multi-denom/multi-game, other game features, if promotional wagers are accepted, and how player reward points are earned, if applicable.

This information is often called the **slot configuration** or **slot master file**. Responsibility for entering this information typically resides with the slot technicians or operations department. These systems are designed to facilitate operations and maintain regulatory compliance rather than back-end analytics. Different systems will handle information differently; different game manufacturers will provide different information about the individual games, and different operators might input information differently. In this respect, our industry could benefit from a set of uniform standards for all to follow.

For analysis, it is essential that information in the system be accurate, comprehensive, and up-to-date. If we do not have correct information about the games, we cannot produce meaningful performance analytics

Review Questions

1) What is the fundamental difference between a video reel game and a video poker game?

2) Explain the difference between an “end seat” position and an “end cap” seat position?

3) What is the difference between slot drop and coin-in?

4) Explain why meter win, actual win, and theoretical win may vary from each other?

5) If a game has a par of 12% and is a progressive diverting 1.5% of coin-in to a jackpot meter, what would be the theoretical win if it received $50,000 in coin-in? If this game was active on the floor for 30 days, what would be the theoretical win per machine day?

6) What happens to our analytics if we have bad information in our slot system configuration?

2

Chapter 2. Useful Financial Analysis Concepts

As a primer to analyzing slot machine performance, this section will review some basic financial analysis concepts relevant to casino operations:

1. Profit & Loss
2. Variance
3. Rank
4. Index
5. Market Share
6. Normalization
7. Allocation
8. Breakeven

Profit & Loss

In its most elementary form, a profit and loss (P/L) statement consists of three line items:

- Revenue
- Expense
- Profit (or Loss) ➲Revenue - Expense

The P/L statement (also known as the Income Statement) is often expounded upon to include details and subtotals on revenues and expenses. For the Slot department, the P/L statement might segment revenues by denomination or by game type. Expenses might be segmented into labor, leases, parts, and professional services.

The P/L statement will usually include the Profit Margin ➲Profit / Revenue. Note this formula is technically only valid if profit is reported, and is invalid if a loss is reported.

The P/L statement might also express revenue and expense line items as a percentage of total revenue. Often, then statement will include budget numbers, prior period numbers, and variances to budget and/or prior period.

Variance

Amount

Variance amount is the difference between two numbers that we expected to be similar. For example, if revenues were budgeted to be $10,000 and were actually $12,000 then the variance to budget is positive $2,000. ➲Actual - Budget

Percent

Variances are often more meaningfully expressed as a percentage to provide context to the original budget number. In our preceding example, the $2,000 variance is positive 20%.
➲Variance Amount / Budget.

Exhibits 2-1 and 2-2 illustrate how variance % can provide better context:

Exhibit 2-1: Year-Over-Year Revenue Growth

Year	Revenues	Var. to Prior Year	Var. % to Prior Year
2010	25,000,000	n/a	n/a
2011	35,000,000	10,000,000	40%
2012	45,000,000	10,000,000	29%

The absolute growth amount is $10,000,000 each year; however, we see the relative growth % has declined from 40% to 29%.

Exhibit 2-2: Variance Percentage to Budget

Expense Item	Actual	Budget	Variance	Variance %
Labor	2,000,000	1,900,000	100,000	5.3%
Parts	200,000	100,000	100,000	100.0%

Here, we went over budget by $100,000 on both labor and parts; however the Labor variance is relatively small compared to the budget, while the Parts variance would probably require an explanation since we spent twice as much as budgeted.

Slot Variance Analysis

In slot performance analytics, we often focus on variances to help answer critical questions:

- *Is a game performing to spec? Is there potential fraud or malfunction?*
  Examine variance in actual revenue to theoretical revenue.

- *Do we have cash handling problems or game meter reporting problems*?
  Examine variance in metered revenue to audited actual revenue.

- *Is the game performing to our overall revenue expectation?*
  Examine variance in theoretical and actual wins to a similar game, a benchmark, a budget, or a predicted win.

Mix Percent

Mix percent is essentially the size of the pie-chart slices. Mix percentage analysis, at a macro level, can help us understand how certain segments are contributing to revenues and expenses.
➲Individual part / Sum of all parts

Exhibit 2-3 shows the mix of the slot floor (represented by days online) and the mix of revenues segmented by fee types:

Exhibit 2-3: Mix Percentages

	A	B	C	D	E		
1	**Fee Type**	**Machine Days**	**Net Win**	**% of Machine Days**	**% of Net Win**	**% of Machine Days**	**% of Net Win**
2	WAP	849	204,473	1.7%	1.8%	=B2/B$5	=C2/C$5
3	Royalty	5,097	996,892	10.3%	8.7%	=B3/B$5	=C3/C$5
4	None	43,695	10,271,272	88.0%	89.5%	=B4/B$5	=C4/C$5
5	Total	49,641	11,472,637	100.0%	100.0%	=B5/B$5	=C5/C$5

Useful Application of Mix Analysis

When looking at our slot floor from a bird's eye view, mix analysis can point us to things that seem out of balance and merit further investigation. In the above example, we see the Wide Area Progressive (WAP) games are 1.7% of the floor and generate 1.8% of the win net of fees. They appear to be in near equilibrium. Games with no fees are 88% of the floor and generate 89.5% of the net win, so they seem productive. Royalty fee games, by contrast, are 10.3% of the floor but generate only 8.7% of the net revenue. It appears these games are less productive than non-fee games and perhaps supply should be reduced especially since we incur daily fees for having these games on the floor.

Try looking at your slot floor mix by dimensions such as denomination, game type, manufacturer, and cabinet model to see if you have any imbalances that might suggest a change in supply to better service demand. The "Optimization" section in Chapter 6 expounds upon this concept.

Rank Function

Ranking is analogous to sorting a list of data from top to bottom (or bottom to top), showing which item is first ranked, second ranked, third ranked, and so forth. Some slot managers will rank their individual machines based on a key performance indicator such as coin-in per machine per day or win per machine per day.

The spreadsheet function called RANK illustrated in Exhibit 2-4.

Index

Indexing is similar to ranking, but it compares a specific item to an average of all items. In the exhibit below, the specific item is an individual machine's coin-in per day divided into the coin-in per day average of the ten machines. ➲Specific Item / Average

While similar, Exhibit 2-4 illustrates how the index is generally more robust than the rank because indexing gives us a sense of relative distance. In this case, the top ranked machine (ID 1008) vastly outperforms the second ranked machines (ID 1001). The index tells us machine 1008 is performing at 166% of the group average, far ahead of 1001 at 109% of average. Note Machines 1003 and 1007 are tied for 3rd, so there is no rank 4 listed.

Exhibit 2-4: Rank and Index

	A	B	C	D		
1	**Machine ID**	**Coin-In Per Day**	**Rank**	**Index**	**Rank**	**Index**
2	1001	4,589	2	1.09	=RANK(B2,B$2:B$11)	=B2/B$12
3	1002	4,373	5	1.04	=RANK(B3,B$2:B$11)	=B3/B$12
4	1003	4,392	3	1.04	=RANK(B4,B$2:B$11)	=B4/B$12
5	1004	3,339	9	0.79	=RANK(B5,B$2:B$11)	=B5/B$12
6	1005	2,027	10	0.48	=RANK(B6,B$2:B$11)	=B6/B$12
7	1006	4,314	6	1.03	=RANK(B7,B$2:B$11)	=B7/B$12
8	1007	4,392	3	1.04	=RANK(B8,B$2:B$11)	=B8/B$12
9	1008	6,989	1	1.66	=RANK(B9,B$2:B$11)	=B9/B$12
10	1009	3,896	7	0.93	=RANK(B10,B$2:B$11)	=B10/B$12
11	1010	3,732	8	0.89	=RANK(B11,B$2:B$11)	=B11/B$12
12	Average	4,204		1.00		=B12/B$12

Market Share

Market share shows what percentage of the available "market" you have captured.
➲Your Share / Market

The market can be defined any number of ways. For example, suppose you operate a casino in a region with a population of 3,000,000 people and you have 150,000 active customers who visit your casino. Your market share of the population would be 150,000 / 3,000,000 = 5%.

However, say of the 3,000,000 people in the region, only 2,000,000 are of legal age to gamble. In that case, your share is 150,000 / 2,000,000 = 7.5%.

Market share analysis can be useful to benchmark your performance against competitors in gaming jurisdictions where there is publically available information about casino revenues or taxes. In Nevada, for example, the Gaming Control Board publishes monthly revenue information for the state and includes breakdowns by geographic regions.

Normalization

Accountants are generally concerned with totals—how much money did we deposit in the bank last month? Analysts, by contrast, tend to normalize data in order to benchmark and make useful comparisons.

For example, say in March, our casino generated revenues of $1,050,000 compared to February where revenues were only $998,000. The accountant might say March was a better month because we put more money in the bank. What would the analyst say about the health of revenues moving from February to March?

The analyst would consider that February had only 28 days while March had 31 days, so naturally we would expect higher total revenues. Average daily revenues for February were $35,643 compared to only $33,871 for March. The analyst might further drill in to averages by day of week for each month to see if the average Saturday in March was better or worse than the average Saturday in February and so forth.

The idea with normalization is to make apples-to-apples comparisons. This is why we focus slot performance analytics on "per machine day" level metrics, rather than monthly or quarterly totals. We want to compare the performance of two machines in the normalized context of how many days each was actually live on the casino floor. It is also often easier for us humans to mentally process average daily numbers and place them into perspective.

Allocation

Allocation is a technique for spreading revenues or expenses when we don't have exact information.

For example, suppose we had a drawing to giveaway a new car and wanted to include the expenses associated with that promotion in a player-level profitability analysis. Say we seeded the active database with one entry and then told players they could earn additional entries from their slot play through a "points for coin-in" system. On the drawing day, we had 5,000 players come to the casino with their seeded entry and play to earn additional entries, and we gave away the car to one lucky winner. Total direct cost of this promotion we find was $40,000. So, how much do we charge each of the 5,000 participants in evaluating their overall profitability to the casino?

Straight Line Allocation

The simplest method is to evenly divide the $40,000 in expenses by the 5,000 players which is 40,000 / 5,000 = $8 promotion expense per attendee. However, is this fair? Suppose a player to whom you sent a seed entry happened to be at your casino that day for her weekly trip, so she placed her entry in the drawing bin. Should we really charge her $8 in the profitability analysis? Was her trip motivated by the car giveaway?

Weighted Allocation

A more sensible approach might be to weight the allocation based on activity. In this case, we could allocate the giveaway expense based on the number of entries each player placed into the drawing bin. To do this, we need to use the mix percentage calculation and multiply the $40,000 by each player's mix of entries.

Exhibit 2-5 demonstrates the weighted allocation method for the first eight of the 5,000 players who participated. We see our player from the discussion above, with her one entry, being charged only 71 cents as opposed to $8 as a promotional expense against her revenues. Meanwhile, player ID 1004 with 48 entries placed in the bin is charged a commensurate $34.15 in promotional expense.

Generally, weighted allocations will provide results more useful for analysis.

Exhibit 2-5: Allocation of an Expense

	A	B	C	D		
1	**Player ID**	**Entries**	**Mix of Entries**	**Allocated Expense**	**Mix of Entries**	**Allocated Expense**
2	10001	25	0.04%	$17.79	=B2/B$5001	=C2*D$5001
3	10002	1	0.00%	$0.71	=B3/B$5001	=C3*D$5001
4	10003	11	0.02%	$7.83	=B4/B$5001	=C4*D$5001
5	10004	48	0.09%	$34.15	=B5/B$5001	=C5*D$5001
6	10005	3	0.01%	$2.13	=B6/B$5001	=C6*D$5001
7	10006	7	0.01%	$4.98	=B7/B$5001	=C7*D$5001
8	10007	32	0.06%	$22.77	=B8/B$5001	=C8*D$5001
5001	Total of 5,000	56,220	100.00%	$40,000.00	=B12/B$5001	=40000

Breakeven

Breakeven is the simplest way to think about return on investment (ROI). The breakeven analysis shows what you need to do in order recover a cost on an expense. There are four steps to computing a breakeven figure:

1. Identify fixed cost components of the expense
2. Identify variable cost components of the expense
3. Calculate variable profit per unit
4. Divide total fixed costs by the variable profit per unit to compute breakeven

For example, suppose the Marketing department proposes a VIP slot tournament event to entice a group of high-value players to visit your casino. You can accommodate 200 players in the event and Marketing plans to fill this event with players who average $1,000 in revenue per visit to your casino. They give you their numbers:

- Revenue projection = $200,000
- Expense projection = $100,000
- Projected # of attendees = 200

From this information, can you tell how many attendees need to come to this event in order to recover the $100,000 expenditure? The surface answer of 100,000 / 1,000 = 100 is probably not correct. This is because we need to understand more about the $100,000 expense projection, which comes in the first two steps.

Fixed Costs (Step 1)

Fixed costs are those expenditures to which we are committed to making no matter how many players attend our event. If we are going to guarantee a prize of $35,000 for the tournament and pay that amount whether only 20 players actually attend or all 200 attend, then it is a fixed cost. If we are going to print and mail a set number of invitations—say 4,000 invitations at $1.00 each, then this is a fixed cost. Suppose we are going to hire an outside photographer for the day to take pictures of the tournament, then this is a fixed cost. As we go through the event budget in our example, we find fixed cost totaling $49,100.

Variable Costs (Step 2)

Variable costs are those expenditures that will vary depending on how many players attend our event. In a casino, player reinvestments are usually large variable costs. If we give cashback for slot play based on a "points for coin-in" system, then our cashback for our liability for the event will be larger if 200 players attend than if only 20 players attend. The same would be true for food & beverage comps, VIP souvenir gifts, and so forth. As we go through the event budget in our example, we find variable costs totaling $50,900.

Variable Profit per Unit (Step 3)

Variable profit per unit in our example is revenue per attendee minus variable costs per attendee. We have already noted revenue per attendee is $1,000. Variable costs per attendee is the $50,900 / 200 = $255. Therefore our variable profit per attendee is $1,000 - $255 = $745.

Breakeven Computation (Step 4)

Now, we divide our fixed costs of $49,100 by our variable profit per attendee of $745 which is 49,100 / 745 = 66. This means we need only 66 players to attend our event to breakeven. When the 67th player arrives, we start making a profit. If only 65 attend, then we project a loss.

Breakeven Example Summary

$100,000 proposed expense to bring in 200 players worth $1,000 each:

Step 1. Fixed Costs = $49,100
Step 2. Variable Costs = $50,900
Step 3. Variable Profit per Unit = $1,000 – ($50,900/200) = $745
Step 4. Breakeven = $49,100 / $745 = 66 players

Useful Application of Breakeven Analysis

When planning marketing activities like the slot tournament described above, it is always a good idea to compute a breakeven figure to aid in the approval process. In our example, if we are fairly confident based on our historical results that we could bring well over 66 players to the event, we would likely proceed with confidence. If we found the breakeven figure was something like 180 and our maximum capacity was 200, then we would be more reluctant to proceed. Sometimes, the distinction between a fixed cost and a variable is not evident. If so, you will need to make a judgment. Economists sometimes say that in the short-run all costs are fixed, while in the long-run all costs are variable.

On the slot operations side, you can use breakeven analysis to compute payback time for purchases of new machines or conversion kits. You would look at projected incremental revenue per day minus incremental variable costs (such as cashback to players, any associated operating fees paid to the game manufacturer, etc.) to compute a variable profit per day. Then, divide the cost of the purchase by the variable profit per day to see how many days it will take to breakeven on your purchase expense.

Review Questions

1) Explain the benefit of looking at a variance percentage rather than an absolute amount. Provide an example of a variance percentage we would want to compute when analyzing slot performance data.

2) How can mix percentages be used in slot performance analysis?

3) Given a choice between looking at either a rank or an index as a performance measure for a large set of slot data, which would you choose and why?

4) Machine ID 10001 was on the floor for 90 days during a quarter and generated revenue of $14,850. Machine ID 10002 was on the floor for 55 days during the same quarter and generated revenue of $9,460. All other factors being equal, which machine was the stronger performer?

5) The Marketing department wants to hold a daily retail slot tournament wherein they sell entries to people in the casino for a chance to win a daily prize of $5,000. They plan to advertise on billboards and in newspapers at a cost of $2,000 per day. Entries will be sold for $20 each. Included with the entry is a $10 gift card. Incremental labor costs are estimated at $30 for every 10 entries.

   a) How many entries must be sold each day in order to break even?

   b) How might the Marketing department challenge your computation?

   c) How might you counter the above challenges from Marketing?

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