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Cashout – ticket value / cashout offer

1 Definitions

1.1 Cashout

Cashout functionality allows a punter to sell an already-placed ticket back to the bookmaker before it is settled.

When a punter indicates a desire to sell, i.e. Cashout, the bookmaker offers an amount that they are willing to buy back the ticket for. If the punter accepts the offer then they receive this amount, but lose the chance of further payment if the ticket wins.

The two most common use-cases are (a) partly-won multiples where the punter wants to secure a portion of the potential winnings and no longer depend on the outcomes of unsettled events and (b) tickets which look set to lose for which the punters want to reduce their potential losses by getting some small part of their stake back.

1.2 Ticket Value

The expected value of a ticket at a given time is defined as the product of

- the ticket-stake
- the ticket-odds
- the probability at that given time that the ticket goes on to be a winner

The above approach is suitable for almost all bet types. However, bet types where *void, halfwon* or *halflost* are regular and expected possible settlements, a more complicated calculation is required (see chapter 1.3). The most popular bet types where this is applicable are soccer's *Draw no Bet, Asian Handicap* and *Asian Totals* but also sports and markets that feature push-lines.

EXAMPLE 1:

A punter places a single bet, with stake €100 at odds of 1.9, on an event with probability of 50% (at placement time). Later the event probability changes from 50% to 80%. At placement the ticket was worth € €95 (€100 * 1.9 * 50%), but now it is worth €152 (€ 100 * 1.9 * 80%).

This definition is also applicable to multiples where ticket-odds are the product of single-event-odds and the ticket winning-probability is the product of the single-event-probabilities.

EXAMPLE 2:

A punter places a 10-fold multiple, with stake €10 at combined odds of 100, with an initial win probability of 0.5%. Some ticket events occur and the win probability becomes 50%. At placement the ticket was worth €5 (€10 * 100 * 0.5%), but now it is worth €500 (€10 * 100 * 50%).

Since stake and odds are stored on the ticket, all a bookmaker needs to evaluate is the current ticket value. This is defined by the current win probability that Sportradar provides within the probability attributes in the feeds or in the probability-API (for lines that are no longer offered at the time the ticket is cashed out, but were offered at the time the ticket was placed).

1.3 Ticket value on markets with the possibility of (partly) voided outcomes

Tickets on markets with the possibility of (partly) voided outcomes (like "Draw no Bet" or "Asian Handicap") require more information than just the aggregated win-probability and also a slightly more complicated formula:

current ticket value =

- probability(ticket wins) * payoutIfTicketWins +
- probability(ticket wins half) * payoutIfTicketWinsHalf +
- probability(ticket voids) * payoutIfTicketVoids +
- probability(ticket loses half) * payoutIfTicketLosesHalf +
- probability(ticket loses) * payoutIfTicketLoses

with

- payoutIfTicketWins = ticketStake* ticketOdds
- payoutIfTicketWinsHalf = ticketStake* ((ticketOdds-1) / 2+1)
- payoutIfTicketVoids = ticketStake
- payoutIfTicketLosesHalf = ticketStake / 2
- payoutIfTicketLoses = 0

Please note that *probability(ticket wins half)* and *probability(ticket loses half)* is zero in case of "Draw no bet", and since *payoutIfTicketLoses* is always zero, the last term also becomes zero in all cases.

Sportradar has extended the UOF with the extended probability information as new optional fields for all markets with the possibility of (partly) voided outcomes.

2 Cashout offer

The cashout functionality itself must be generated by the bookmaker's platform as we will only supply the current probabilities and settlement information in order to complete the calculations.

This document outlines three suggested business strategies for cashout.

- **Simple Cashout** returns punters a purely probabilistic Cashout value.
- **Cashout With Additional Expected Profit** is an option that gives the bookmaker lower cashout values to offer, than are calculated via Simple Cashout.
- **Advanced Cashout Compensating For high Implied Margin** describes a way to offer less aggressive cashout offers for losing tickets.

2.1 Cashout variants

2.1.1 Simple Cashout

If a bookmaker always offers the ticket price without margin (according to definition 1.2) they can expect not to win/lose money long-term via the cashout feature. They will still win the same money long-term via the regular odds-offering (since the actual gain is created at ticket placement rather than on settlement, e.g., example 1) and the cashout wouldn't counter that.

This is the most straightforward approach and can already be recommended in its simple form (see details in "Simple Cashout" tab). One note of caution however: while this approach is standard for singles, it is worth mentioning that it might not be ideal for multiples. The gap between the value of the ticket at placement and the stake (multiples have a higher implied margin since the odds-keys of each single are multiplied) is usually large. Bookmakers may not want to reveal the extent of this gap to punters, so may wish to introduce rules for when to offer/not offer a cashout.

Two straightforward suggestions to this complex issue would be to only allow cashout if (a) the cashout-value exceeds the ticket-stake or (b) the ticket probabilities have changed "significantly" since ticket-time.

Both solutions have the obvious drawbacks of a limited offer but would cover the likely use-case of cashing out partly-won multiples.

2.1.2 Cashout with additional expected profit

Situations exist where punters may want to cashout even if they are not offered a cashout-offer without margin:

EXAMPLE 3:

Imagine a 10-fold multiple with €1 stake for a potential win of €10k. In case 9 out of the 10 selections have already won. The last event has not started and has a current probability of 50%. The ticket is currently worth €5k but a punter might decide to accept a certain but lower offer of e.g. €4k generating an extra €1k (expected) profit for the bookmaker.

EXAMPLE 4:

Conversely, the punter may not be willing to cashout €4k if he had just staked €5k in a single ticket.

Hence the deduction of the cashout-offer could be a function of the **change** in ticket-value compared to ticket-time[1] rather than a function of absolute current ticket value. How much a bookie wants to reduce the cashout-offer is based on their business strategy, but one easy option to allow for this feature is to simply create one or more deduction ladders, defining how they want to reduce offers as a function of the change in ticket-values (e.g., Image 1).

ticket value factor	desired deduction factor
…	…
0.05	105.0%
0.1	105.0%
0.2	105.0%
0.5	102.5%
1	100.5%
2	105.0%
5	107.5%
10	112.5%
20	117.5%
…	…

Image 1: example of a cashout deduction table

Hence (e.g.), if the current ticket value is 10 times higher than the original value (or the stake) then the offered cashout is deflated by a factor of 1.125. This idea is included in the excel scribble (cell B24 based on the ladder in columns F:G), which interpolates between ticket value factors to guarantee a smooth trend. Note that additional sample-ladders (column O and onwards) can be pasted into F:G.

This extension doesn't solve the mentioned problem in 2.1.1 so additionally one could implement:

2.1.3 Advanced Cashout compensating for high implied margin (multiples)

If a punter has just placed a ticket with a certain stake then one can argue that it is only reasonable that he is allowed to cashout with the same amount, unless the ticket probabilities have changed "significantly". Above we explained that such an offer would have a negative expectation for the bookmaker since it counters the positive expectation at ticket placement. Hence Sportradar doesn't recommend this logic unless the mechanics involved are fully understood.

The idea is to calculate the difference between stake and ticket value at ticket-time[2] (based on offered odds, probability at ticket-time and ticket stake) and compensate by this amount - or a fraction of the amount - at cashout. In example 1 the gap at ticket time was € 5[3] so the bookmaker could compensate parts of that in his cashout-offer. Looking at the potential compensation in absolute terms[4] has many advantages (see 2.2.1) and ensures that the bookmaker never offers a more generous cashout-offer than he already collected at placement.

Naturally the compensation must decline as the ticket win-probability changes and completely vanish as the probability approaches 100%[5] or 0%[6]. The excel suggests (a) a linear interpolation of the compensation value when current probabilities moves towards 100% or 0% (cell B28) and (b) the (alternative but unused) formula for a geometrical interpolation (cell D28) which is more aggressive (faster decline as probabilities change). The final cashout offer (cell B30) is also impacted by a parameter how much of the expected profit at ticket-time should be compensated by an immediate cashout.

[1] or the relation of current ticket value compared to ticket stake (i.e., we don't need ticket-time probability)
[2] i.e. the expected profit of the bookmaker from a single ticket
[3] Since the punter "paid" 100€for something that is just worth 95€
[4] In contrast to a correction factor
[5] since one never wants to offer more than the actual return in case the ticket wins 6 since the ticket value should be zero if it could no longer win.

2.2 Poor example approaches

Sportradar already encountered two other cashout solutions which we believe should not be used:

2.2.1 Cashout-offer by extrapolating the ticket-stake based on the factor of ticket probability and current probability

$$\text{Cashout offer} = \text{ticket stake}^* \frac{\text{probability}_{\text{current}}}{\text{probability}_{\text{ticket time}}}$$

Even if an additional correction is introduced afterwards, this can lead to cases where ticket cashout offer exceeds the payout if the ticket wins.

EXAMPLE 5:

10-fold-multiple with stake of €1, ticket odds of 100, win-probability at ticket-time of 0.5%; current won-probability of 80%. The "cashout offer" according to above formula would be €1 * (80%/0.5%) = €160 where the payout in case the ticket wins is just €100!

2.2.2 Cashout-offer by extrapolating ticket-stake based on the factor of ticket odds and current odds

$$\text{Cashout offer} = \text{ticket stake}^* \frac{\text{keyodds}_{\text{ticket time}}}{\text{keyodds}_{\text{current}}}$$

Even if an additional correction is introduced afterwards, this can lead to cases where ticket cashout offer exceeds the payout if the ticket wins.

This is even worse than the previous approach since in addition to above it also uses rounded, capped and key-converted odds. Hence (e.g.), it is likely possible that a losing soccer-team, after conceding two more goals, has unchanged key-odds (e.g. because odds were capped already), implying a free bet that the punter could cashout with the same amount that they staked.