

Fair Market Value in Craps

Mike in Hawaii

When you place a cheque (OK, a chip) on a craps layout, you can ask an interesting question. How the answer to this question changes based on what point is set, whether or not the next roll is a comeout roll, and exactly where on the felt you place it, is quite interesting and instructive.

The basic question is this: Once a \$5 red chip is on the felt, what is it really worth? How much should you pay, or be paid, to pick that chip up and call off the bet right now?

Let's have an example. Your friend bets \$5 don't pass. The shooter throws a four. Your friend says "Phooey I never win on fours" and reaches to pick up his chip. What should you do?

The answer might surprise you. The second that \$5 chip hit the don't pass line, it was no longer worth \$5. When the shooter missed hitting a 7 or 11 on the comeout roll and set a point of four, the value of that chip changed again, dramatically.

From moment to moment each chip has a future. There is a finite list of things that can happen to it, both positive and negative. When you take all these things together, with their proper weights and values, both plus and minus, you end up with what that chip is really worth now that it has been bet.

This is its **Fair Market Value**. The table below illustrates all the future paths a chip on the passline faces and the long term, average probability of each outcome.

Passline			
	Bet	FMV	VIG
Before CO	\$5.00	\$4.93	-1.41%
Immediate	33.3%	\$0.56	
7	16.7%	\$0.83	
11	5.6%	\$0.28	
3	5.6%	(\$0.28)	
2	2.8%	(\$0.14)	
12	2.8%	(\$0.14)	
Point Set			
Hit 4	2.8%	\$0.14	
Miss 4	5.6%	(\$0.28)	
Hit 5	4.4%	\$0.22	
Miss 5	6.7%	(\$0.33)	
Hit 6	6.3%	\$0.32	
Miss 6	7.6%	(\$0.38)	
Hit 8	6.3%	\$0.32	
Miss 8	7.6%	(\$0.38)	
Hit 9	4.4%	\$0.22	
Miss 9	6.7%	(\$0.33)	
Hit 10	2.8%	\$0.14	
Miss 10	5.6%	(\$0.28)	
	66.7%	(\$0.63)	
After CO	\$5.00	\$4.37	-12.5%
	Bet	FMV	VIG

When you toss a nickel on the passline, it instantly changes value. (It is a bit like driving a new car off the lot for the first time.) It is now a \$4.93 chip, not a \$5 chip. Why? The chart above shows all the things that lie in its future. When they are all added up, they come out about seven cents short of \$5.00. Or about 1.4%

less than they should total. Where have we seen that percentage before? It is the well known "House Advantage" on a passline bet.

Now this is the value of the chip awaiting the comeout roll, all filled with hope for a natural win. Once the comeout roll is over, If the chip still survives to face the "Chasing a Point" phase of the game, its average value (considering all possible points that might be set and the probability of each one) drops to just \$4.37. That is a grizzly 12.5% house advantage. Think about that for a minute...

Time's up. The house advantage on a Hard 4 or a Hard 10 bet is just a bit over 11%. The house advantage on a Hard 6 or a Hard 8 is closer to 9%. In short, the future for a poor red passline chip, which was a once proud \$5 American Cash Money Bill, has turned rather sour after missing the natural win on the comeout roll.

It gets worse. This \$4.37 is the average value after the comeout roll. Since we will know by then what point was set, we can recompute the Fair Market Value of that chip again based on which pair of points, 6 & 8, 5 & 9, or 4 & 10, is actually being chased. Remember the points arrange themselves in pairs with similar math properties.

	Pass Line	After CO	
Point 6 & 8			
Make Pt.	45.5%	\$2.27	
7 Out	54.5%	(\$2.73)	VIG
FMV	\$4.55	(\$0.45)	-9.1%
Point 5 & 9			
Make Pt.	40.0%	\$2.00	
7 Out	60.0%	(\$3.00)	VIG
FMV	\$4.00	(\$1.00)	-20.0%
Point 4 & 10			
Make Pt.	33.3%	\$1.67	
7Out	66.7%	(\$3.33)	VIG
FMV	\$3.33	(\$1.67)	-33.3%

Check out the bad news. If the point is 6 or 8, then your passline bet is still worth \$4.55. If the point is 5 or 9, its value drops to just \$4.00. But if the point is 4 or 10, the damage is massive. The Fair Market Value of that chip would be just \$3.33! The house advantage on that poor thing is 33 percent!

No wonder the Casino considers this a "**Contract Bet**". You would be at a HUGE advantage if you could drop a nickel on the passline, wait to see if you get craps or a natural win and then if you set a point, just pick up your red chip and put it back in your rail to await the next comeout roll. On average if a point is 4 or 10, the Casino has already won about 33% of all money trapped on the passline.



Comeout



Point 6 or 8



Point 5 or 9



Point 4 or 10

So What Just Happened?

When Craps entered the second phase, Chasing Points, **the rules changed, but the odds did not**. The odds stayed at even money. Even money was not that bad a deal before the comeout roll because of all the wonderful things that could happen on that first roll. So when everything was considered, including all the great stuff that happens 22% of the time on the comeout roll, the deal was only sour by 1.41%.

But after the comeout roll the only thing that matters is the odds of making your point vs. sevening out. Even in the best case, a point of 6 or 8, the 1 to 1 odds is a bad deal. In the case of a point of 4 or 10, it really stinks! Stuck with one to one odds as the hand goes south with the setting of a point, the passline chips are no longer being properly compensated for the new increased risk that lies in their future. Thus their Fair Market Value is degraded.

Let's say that again. **Stuck with one to one odds as the hand goes south with the setting of a point, the passline chips are not being compensated for the new increased risk that lies in their future.**

We can take a side trip to faerie land to show another aspect of this. What if we lived in a wonderful world where the passline was not a contract bet? What if you could plunk down your nickel and then if the game advanced to Chasing a Point, just pick it up and opt out of the bet at that point?

	Bet	FMV	VIG
Just CO	\$5.00	\$6.67	33.3%
			Ways
Immediate	100.0%	\$1.67	12
7	50.0%	\$2.50	6
11	16.7%	\$0.83	2
3	16.7%	(\$0.83)	2
2	8.3%	(\$0.42)	1
12	8.3%	(\$0.42)	1

The Casino would be crazy to allow that! If you essentially convert all the points to a "Push", like the 12 on a don't pass line wager, and make the passline a one roll, comeout roll only bet. The house takes a terrible beating. This phase of the game favors the shooter a whopping 33% when isolated by itself. The Casino is counting on the two thirds of the time that the game will advance to Chasing a Point to get its turn at the lopsided vig.

What about the DARK SIDE? (insert funky breathing)

Everything changes when your world goes dark. Interestingly enough, even though there is a slight change in the house advantage on a don't pass bet, the value of a \$5 chip dropped on the don't pass line is still basically \$4.93. One can

simplify by saying the house advantage on both the passline and the don't pass bets are essentially the same 1.4% without committing too big a crime against Math.

Over on the Dark Side, we are quietly crossing our fingers and hoping for anything BUT a 7 or 11.

Don't Pass

	Bet	FMV	VIG
Before CO	\$5.00	\$4.93	-1.36%

Immediate	33.3%	(\$0.69)
7	16.7%	(\$0.83)
11	5.6%	(\$0.28)
3	5.6%	\$0.28
2	2.8%	\$0.14
12	2.8%	\$0.00

Point Set

Hit 4	2.8%	(\$0.14)
Miss 4	5.6%	\$0.28
Hit 5	4.4%	(\$0.22)
Miss 5	6.7%	\$0.33
Hit 6	6.3%	(\$0.32)
Miss 6	7.6%	\$0.38
Hit 8	6.3%	(\$0.32)
Miss 8	7.6%	\$0.38
Hit 9	4.4%	(\$0.22)
Miss 9	6.7%	\$0.33
Hit 10	2.8%	(\$0.14)
Miss 10	5.6%	\$0.28
	66.7%	\$0.63

After CO	\$5.00	\$5.63	12.5%
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Bet FMV VIG

What happens to the value of our chip if the shooter misses a natural win? It shoots up in value! If it survives a comeout roll, the average value of the \$5 chip is now \$5.63. It has a positive house advantage, which is a bit awkward to think about. Let's say it has a **Better's Advantage** of 12.5% on average. But again, which point is set makes a big difference. Things are basically reversed. Now the worst paying points for the Dark Side are 6 and 8. But even there, the value of the chip goes up dramatically. If the point being chased is 6 or 8, the chip is worth \$5.45 or has a Better's Advantage of about 9%.

	Don't	Come	After CO
Point 6 & 8			
Make Pt.	45.5%	(\$2.27)	
7 Out	54.5%	\$2.73	VIG
FMV	\$5.45	\$0.45	9.1%
Point 5 & 9			
Make Pt.	40.0%	(\$2.00)	
7 Out	60.0%	\$3.00	VIG
FMV	\$6.00	\$1.00	20.0%
Point 4 & 10			
Make Pt.	33.3%	(\$1.67)	
7 Out	66.7%	\$3.33	VIG
FMV	\$6.67	\$1.67	33.3%

If the point is 5 or 9, that value goes up to \$6.00. And if we get the super dark power points of 4 and 10, the value skyrockets to \$6.67! The worst of the two phases for the Dark Side is the comeout roll. If that is survived, then chances are good there is gravy in the future.



Comeout



Point is 6 or 8



Point is 5 or 9



Point is 4 or 10

No wonder the Casino does not consider this a "Contract Bet".

They would be tickled all pink bunny fuzzy if you picked up your \$5 chip on the don't pass line after the comeout roll! You would be letting them off the hook. With a point of 4 or 10, a chip that has survived a comeout roll on the don't pass line has a whopping better's advantage of 33%. If you are crazy enough to opt out of that bet, the Casino ain't gonna stop you. You have already gotten lucky. You have not yet been paid for that luck of course. You can still lose that money, but odds are now significantly in your favor.

Over at faerie land, we can look at the don't pass bet converted to a single roll, comeout roll only bet. (Those of you with a weak constitution may want to look away at this point.)

	Bet	FMV	VIG
Just CO	\$5.00	\$2.73	-45.5%
			Ways
Immediate	100.0%	(\$2.27)	11
7	54.5%	(\$2.73)	6
11	18.2%	(\$0.91)	2
3	18.2%	\$0.91	2
2	9.1%	\$0.45	1
12	0.0%	\$0.00	0

Nightmare on Don't Street! 45% House Advantage? That is truly the stuff of slasher movies. As you can see, any chip that survives a comeout roll on the don't pass should be considered a "contract bet" by the player. Picking up a chip off the don't pass after a comeout roll is a really bad play. It has most definitely taken its chances and now Chasing a Point is the phase of the craps game don't pass chips live for.

"Free" Odds Bets

So what about odds? First of all there are no odds on either the passline or the don't pass for the comeout roll. So you are only going to be adding this bet in the second phase, Chasing a Point. Second, this odds bet is a **zero sum bet**. That zero is very powerful. Anything multiplied by zero is still zero. Mathematicians make things go "poof" all the time by finding a zero to multiply by. The odds bet, unlike

the carried over passline chip, is paid at true odds, not the 1 to 1 odds of the poor trapped passline chips. The house advantage and the better's advantages are both zero as a result.

So what happens if you make an odds bet on the Right Side? You dilute some of the large house advantage that your passline chips are now facing.

What happens if you make an odds bet on the Dark Side? Oops, you dilute again, but this time you are diluting YOUR better's advantage!

Moral to this story is you need a very good reason, something else going on with your composite betting strategy, to justify making an odds bet on a don't pass wager. Typically that would be a temporary odds bet to hedge some other bet for the next roll only.

Here is an interesting question:

Is it better to put \$15, three reds, directly on the passline before the comeout roll, or should you just put one red chip and if a point is set, put down the other two as an odds bet?

	Bet	FMV	VIG
Before CO	\$15.00	\$14.79	-1.41%
After CO	\$15.00	\$13.12	-12.5%
	Bet	FMV	VIG

With the first scenario we just plunk down three reds, \$15. Our composite house advantage is still 1.41%. The Fair Market Value of those three chips is \$14.79. If we end up (two thirds of the time) with a point, then on average those three chips are only worth \$13.12, more or less depending upon which exact point it is set of course.

	Bet	FMV	VIG
Before CO	\$5.00	\$4.93	-1.41%
After CO	\$15.00	\$14.37	-4.2%
	Bet	FMV	VIG

With the second scenario we have the now familiar chip worth \$4.93 awaiting the comeout roll. Two thirds of the time it advances to chasing a point and gets downgraded to just \$4.37 on average. But now we are going to add \$10 to it that is bet at true odds. Since it is a zero sum bet, for the odds bet portion the Fair Market Value is \$10, exactly the face value of the chips. A zero sum bet always sees a fair and even handed future. Thus its value is not affected by the possible vagaries of chance. The odds on the zero sum bet have been adjusted to exactly compensate you for that risk correctly.

Remember the odds payoffs change based on which point was set, at least for the odds bet portion. The average value of what is now on the passline is \$14.37 instead of \$13.12. We have diluted the bad news and gotten back to a more sensible scenario. You have chopped the nasty post-comeout roll 12.5% house advantage to just one third of that amount.

One could even adjust your odds based on how bad the point was for you. This would be a rather sophisticated strategy. You would want to get your average bet to be equal to the \$15 (example) you could afford to risk on the passline. You might put down \$5 on the passline and then take single odds for the 6 and 8 which need the least dilution, double odds on the 5 and 9, and triple odds on the 4 and 10. All in an effort to get the average post-comeout roll disadvantage to minimize. To do that you would want to bet more odds on the 4 and 10 than on the 6 and 8, a bit backwards of what is intuitive.

What happens if you Place the 4 or the 10 for \$5? Normally that would be considered a bad bet since it has over a 6 percent house advantage. But wait, at

this point your poor passline nickel is facing at LEAST a 9% house advantage. The nearly 7% on a Place 4 or 10 doesn't seem so bad by comparison. For ages people have said the worst bet on the craps table is Big Red. But if Chasing a Point of 4 or 10, your poor Passline bet is facing a whopping 33% house advantage. More than double the nightmare house advantage on Any Seven.

Everyone talks about how odds can reduce the effect of house advantage. But they are usually looking at the concept from the start of the hand. But the odds don't go down at the start of the hand, they go down only if the shooter starts Chasing a Point. For the right better, splitting up you passline money so that some of it is held in reserve for odds during those 2 out of 3 times a point is set is a good idea.

Conversely it is an equally bad idea for the wrong better. Unless those odds are being used as a hedge on some other bet. Bottom line for the wrong better? If he or she is well heeled enough to bet three units, they should bet those three units on the don't pass line right up front and cross their fingers.

	Bet	FMV	VIG
Before CO	\$15.00	\$14.80	-1.36%
After CO	\$15.00	\$16.88	12.5%
	Bet	FMV	VIG

Overall the \$15 is not that devalued sitting there waiting for the comeout roll. In fact they are still worth \$14.80. True, when viewed from a one roll perspective that poor stack of nickels should be quaking in their boots, if they had boots. But, if there is life after the comeout roll, all three chips will be looking great. It makes no sense for the wrong better to dilute his hard won better's advantage with odds, at least not from a simple don't pass analysis.

Viewing Chips through the Crystal Ball

When we look into the crystal ball and use it to view chips on the craps table, we can see some interesting things. Viewed through the crystal ball, the chips may magically change value, well not magically. Their Fair Market Value represents what we should have to pay or be paid, in order to pick those chips up and call off the bet at any given point in the game. Any bet on the table at any time can be subjected to Fair Market Analysis. But many bets are decided in a single roll, so the rules cannot change. Rules for many multi-roll bets do not change in ways which dramatically alter the chips value like they do for the passline and don't pass bets. (Can you spot the other class of bets which do undergo similar changes of value?)

For the free odds bets on the passline and don't pass we are looking at chips which are fully compensated for the risk in their future, so their value does not change. But for chips on the passline and don't pass the value changes dramatically as craps moves from the Comeout Roll phase to the Chasing a Point phase.

In fact, for the chips trapped on the passline, the Fair Market Value gets quite hideous once the comeout roll is passed. The chip values change because the risk in their future changes, but the odds do not change to reflect, to compensate for, those changes.

Diluting the house advantage with some odds (assuming you can afford the increased average bet) is a good idea at this point. One can consider access to an odds bet on the passline as kind of a compensation for having a chip stuck on the passline after the comeout roll.

On the other side, diluting your better's advantage with odds on a don't pass bet just does not make much sense. There are strategies which use a temporary odds bet on the don't pass to hedge action somewhere else on the felt. A good case can be made for such strategies. But by themselves odds are a bad idea for the don't pass bet.