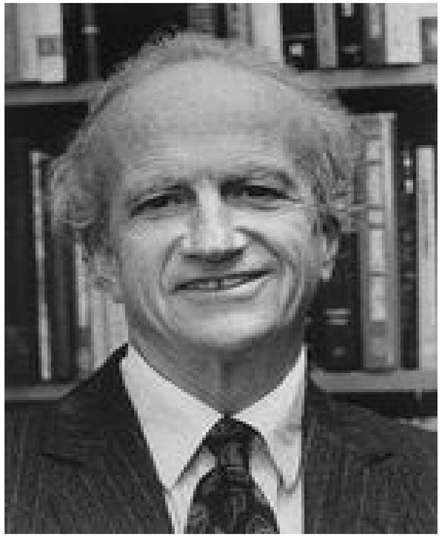
Topic: Addiction and Gambling

Addiction

- Can economists self-destructive addictions be rational?
- Gary Becker (1992 Nobel Prize in Economics) answered that question
- Rational people are aware of the long-run consequences of their actions
- They may engage in self-destructive behavior if the current pleasure outweighs the anticipated future costs

Gary Becker



Gary Becker, Michael Grossman, and Kevin Murphy, "Rational Addiction and the Effect of Price on Consumption," *American Economic Review*, *81:2 (1991), 237-241*

Theory

- Becker assumed the person maximizes utility subject to a budget
- The person's utility function is key to the theory:

$$U_t = f(C_t, S_t, G_t)$$

- Utility at time t depends on consumption of the addictive good (e.g. cigarettes) at time t, the stock of addiction at time t, and consumption of other goods at time t
  - The marginal utility of current consumption of the addictive good is positive
  - The marginal utility of the stock of addiction is negative, a property known as *tolerance*
  - An increase in the stock of addiction (e.g. how much you have smoked in the past) increases the marginal utility of smoking another cigarette today, a property known as *reinforcement*

  - Formally speaking: $\dfrac{\partial^2 U}{\partial C \partial S} > 0 \ or \ U_{12} > 0$

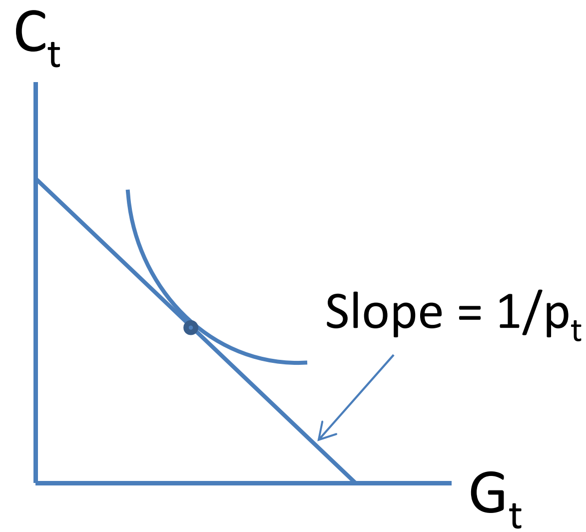
Evolution of the Stock

- The stock of the addictive good evolves over time according to the equation: $S_{t+1} = S_t(1-\delta) + C_t$
- The stock next year equals the stock this year, less depreciation at rate δ, plus current consumption
- For simplicity, let δ = 1 (the stock depreciates rapidly), so $S_{t+1} = C_t$
- This means the utility function can be written: $U_t = f(C_t, C_{t-1}, G_t)$
- The consumer maximizes utility subject to the budget: $Y_t = p_t C_t + G_t$, where p = price of addictive good and the price of G is 1€

Optimal Consumption of Addictive Good

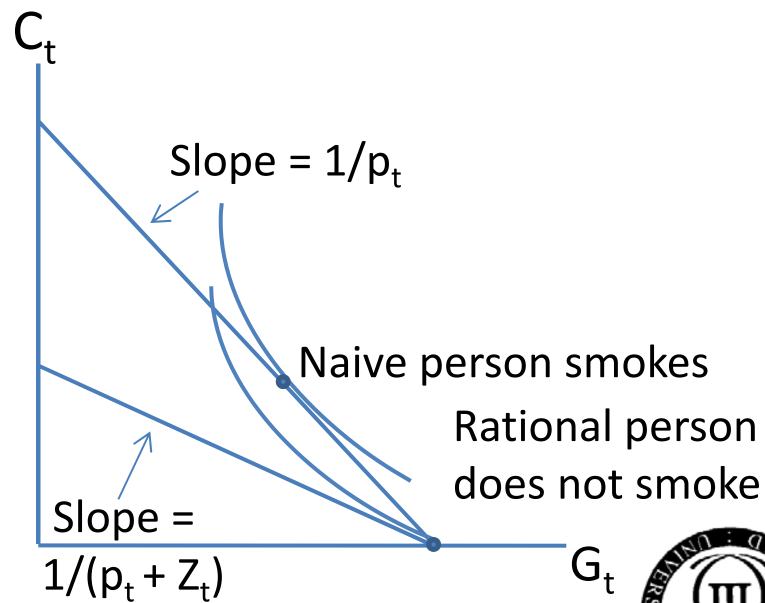
Normal Good

The slope of an indifference curve equals the slope of the budget constraint



Addictive Good

A rational person knows that smoking now will reduce their utility next year, so they act as if the price of C is higher than p



What is Z_t?

- Z_t represents the realization that current smoking causes future harm
- The *full price* of smoking is $p_t + Z_t$
- The size of Z_t depends on my discount rate
  - If I discount the future heavily, Z_t gets smaller and the full price approaches p_t
  - I'm more likely to smoke
  - This is the first prediction from the theory: smoking is associated with a high discount rate

The Reinforcement Property

- To repeat the reinforcement property: An increase in the stock of addiction increases the marginal utility of current consumption
- The stock of addiction depends on past consumption, so we can rephrase this property in terms of observables: An increase in past consumption of the addictive good increases current consumption
- This is the 2nd prediction from the theory

Future Consumption Affects Current Consumption

- If the future price of cigarettes increases I will smoke less next year
- Remember that $U_{12} > 0$
- This works in reverse as well: a decrease in future consumption of the addictive good reduces the marginal utility of the future stock of addiction
- But the future stock of addiction is simply C_t, so the marginal utility of current smoking falls, and I smoke less today
- This is the 3rd prediction from the theory: an increase in future consumption of the addictive good reduces current consumption
- Be careful in empirical work to measure consumption by current *smoking*, not packs of cigarettes *purchased* – you may purchase and hoard cigarettes today when you expect the future price to rise

The Demand for Cocaine

- Grossman and Chaloupka estimated a model of demand for cocaine by young adults:

$$C_{it} = \beta_1 C_{i,t-1} + \beta_2 C_{i,t+1} + \beta_3 P_{it} + u_{it}$$

Expect $\beta_1 > 0$ because past consumption affects current consumption

Expect $\beta_2 > 0$ because future consumption affects current consumption

Higher current price should reduce current use

Michael Grossman and Frank Chaloupka, "The Demand for Cocaine By Young Adults: A Rational Addiction Approach," *<u>Journal of Health Economics</u>, 17 (1998), 427-474*

Results

- Annual participation and frequency of cocaine use given participation are negatively related to the price of cocaine
- Participation and frequency of cocaine use are positively related to past and future consumption
- The long-run price elasticity of total consumption (probability of use x conditional use given participation) is -1.35
- They were not able to ‘pin down’ an estimate of the discount factor, but other research supports the prediction that high discount factors contribute to addictive behavior

Gambling

- Gambling is an age-old and widespread phenomenon
- 2014 World Cup odds:

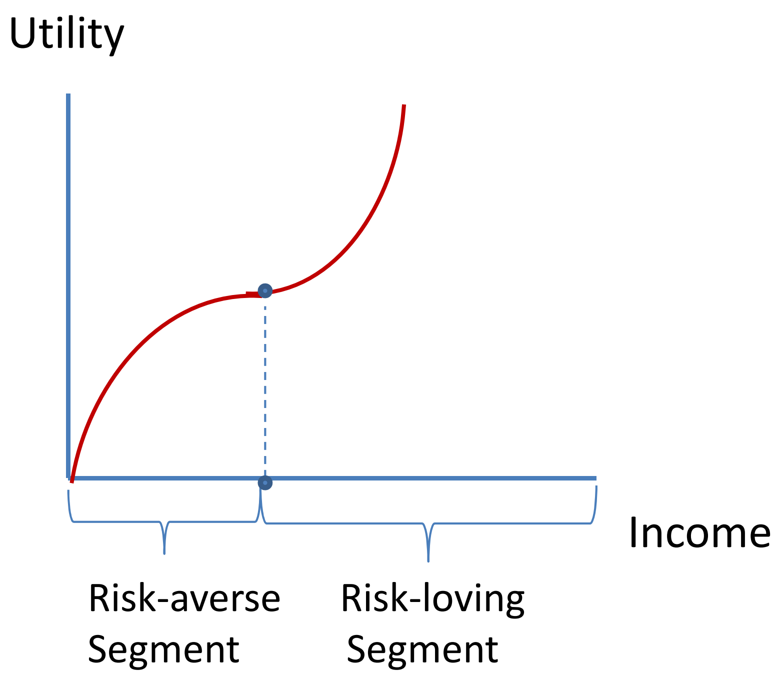
Germany **5/1***	Spain **8/1**	Argentina **8/1**
Brazil **9/1**	Netherlands **11/1**	France **12/1**
Italy **12/1**	Belgium **16/1**	England **20/1**
Russia **20/1**	Colombia **22/1**	Portugal **28/1**
Chile **33/1**	Ukraine **50/1**	Uruguay **50/1**

*5/1 odds means you bet 1€ and get 6€ if Germany wins, giving you a profit of 5€

- Pathological gambling can be a significant problem: personal and family debt, bankruptcy, crime

The Gambling Puzzle

- Despite the importance of gambling, economists do not have a good theory to explain it
  - One possibility is that gamblers are 'risk lovers'
  - But how do you reconcile gambling with the purchase of insurance – which indicates that people do not like risk?
  - One possibility is that the utility function displays both risk-averse and risk-loving segments
  - But this doesn't explain anything beyond the assumptions we make

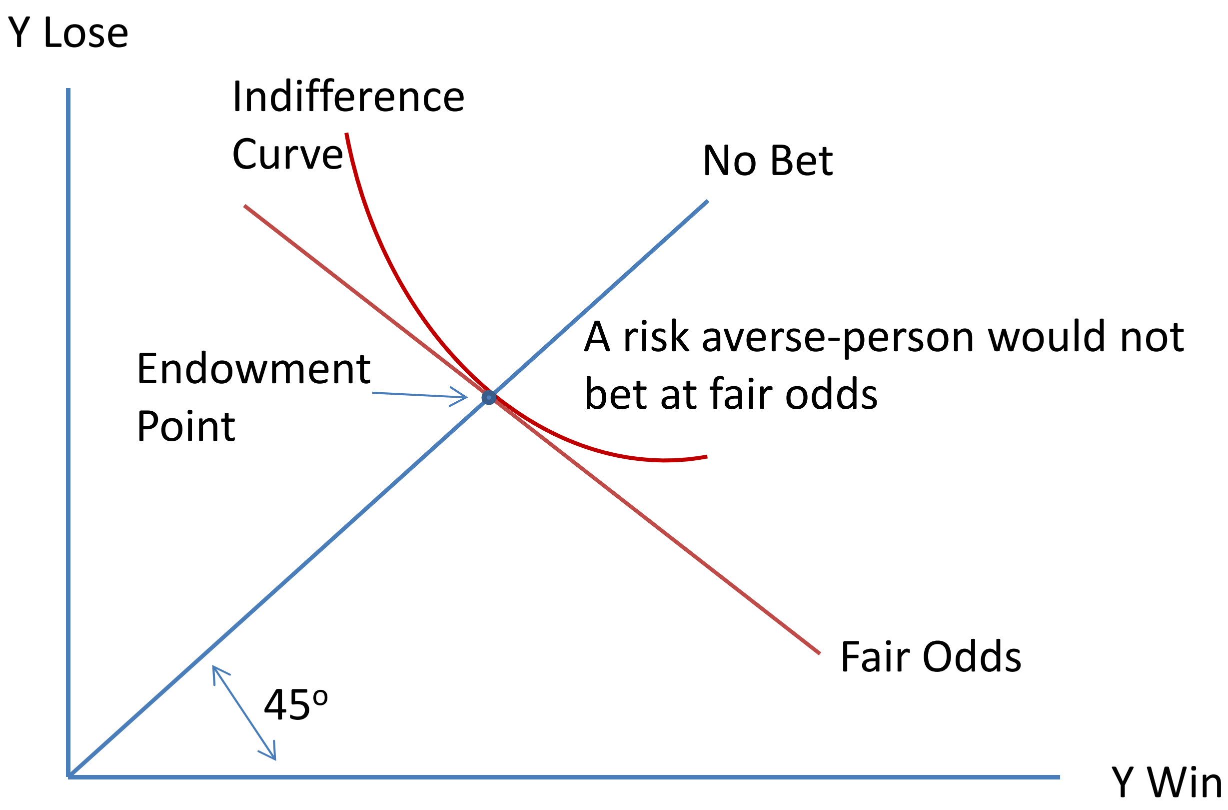


The Standard Theory of Gambling

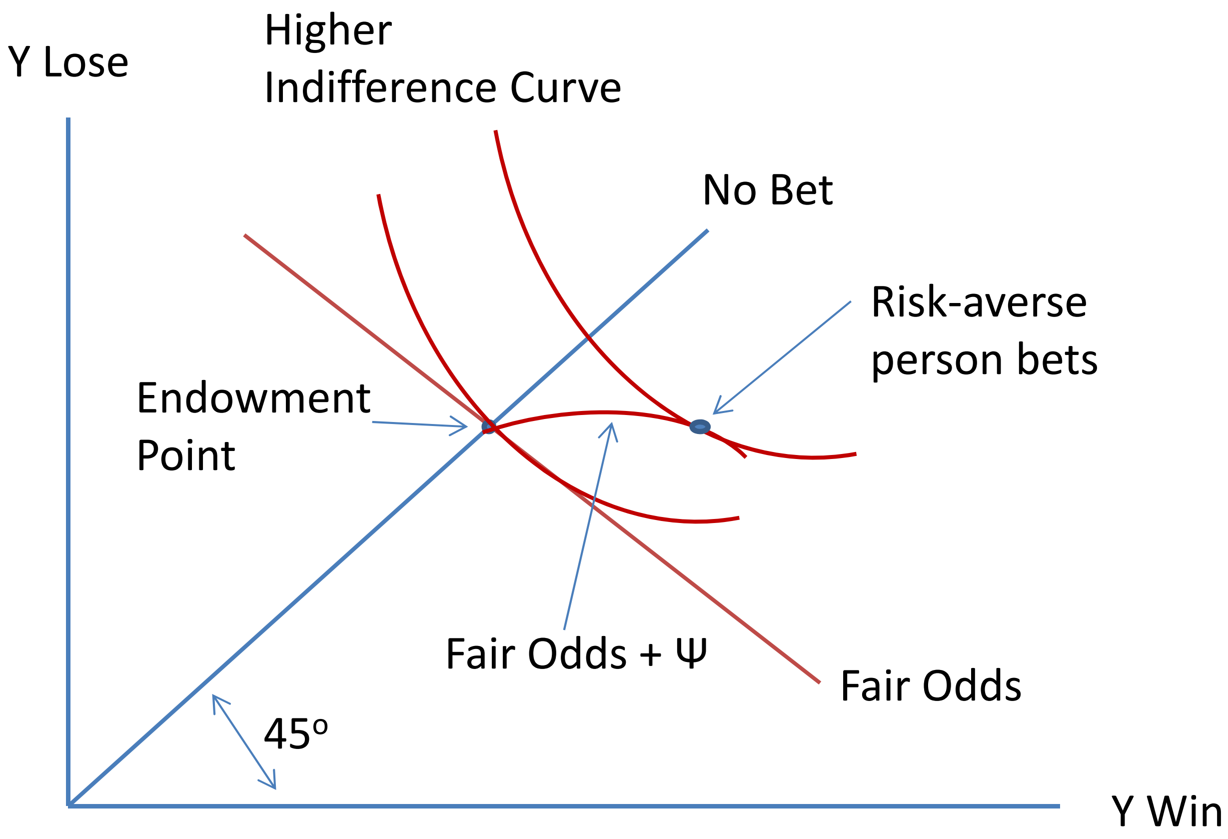
- John Conlisk developed the standard theory of gambling
- He noted that most gambles are small – for example, you bet 10€ on a horse at 3/1 odds
- That's hard to explain with *any* theory that involves the curvature of the utility function (because the gains and losses are small)
- Conlisk proposed that people derive a small amount of utility from gambling itself
- This 'gambler's bonus' (Ψ) decreases as the size of the bet increases

John Conlisk, "The Utility of Gambling," Journal of Risk and Uncertainty, 6 (1993), 255-275

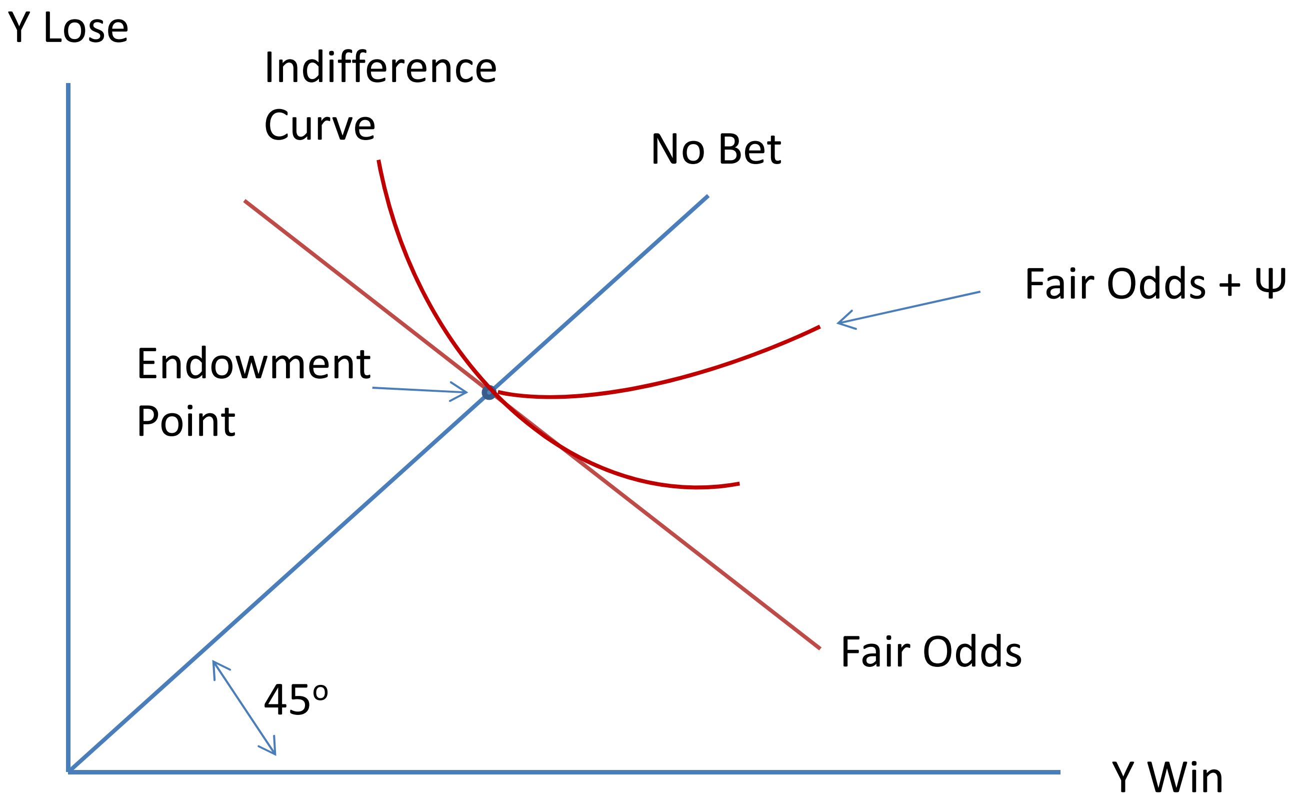
Graph of Standard Theory - 1



Graph of Standard Theory - 2



Pathological Gambling



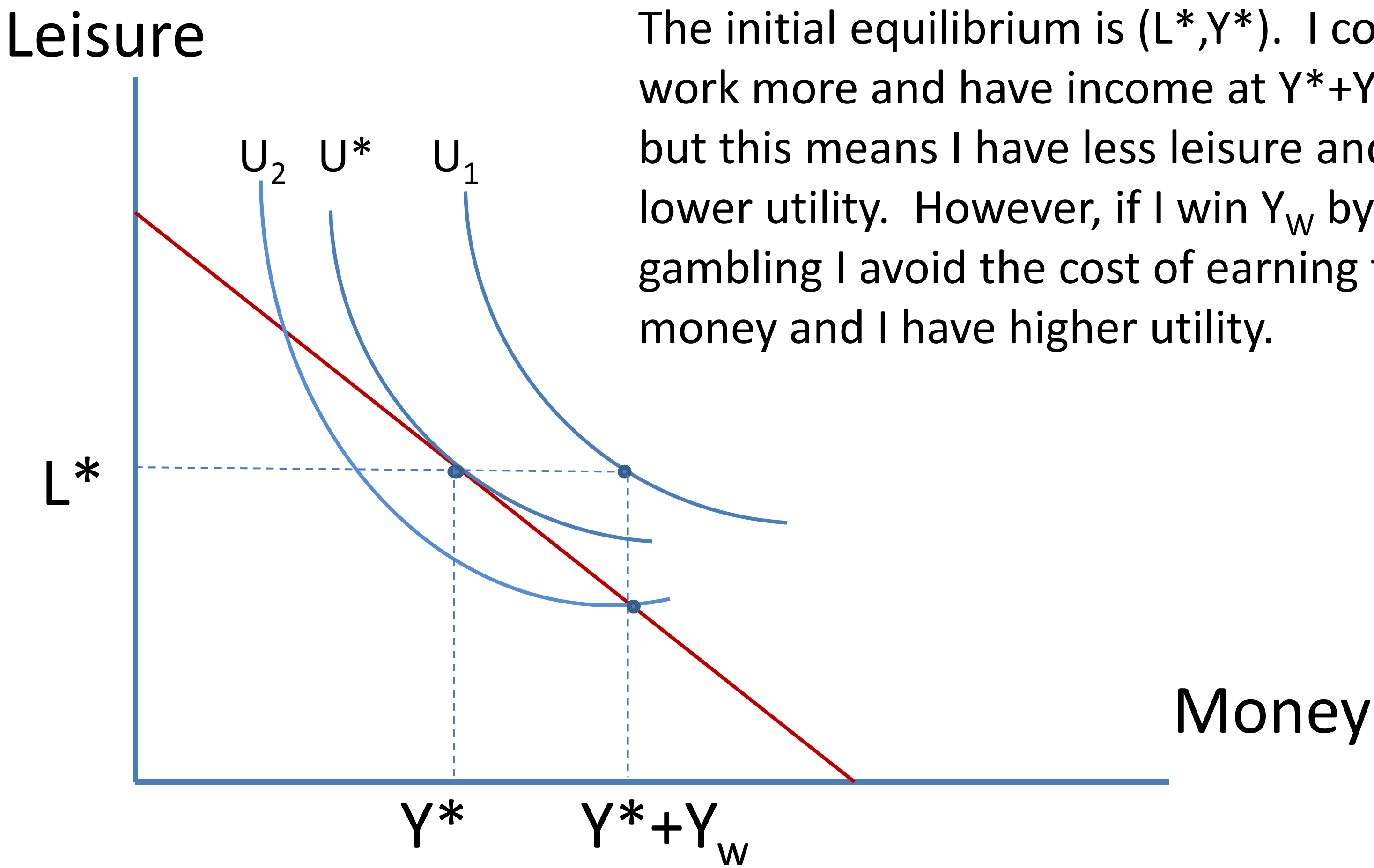
- Brain science suggests that Ψ increases with the size of the bet for some people
- Such people would ‘bet the limit’ even at unfair odds

Nyman’s Theory of Gambling

- John Nyman offers a <u>behavioral</u> explanation for gambling
- Not standard economics, but it may be plausible

In the 2004 movie, Dodgeball, Vince Vaughn’s character says, “Money won is twice as sweet as money earned.”

Nyman's Theory - 2



The initial equilibrium is (L*,Y*). I could work more and have income at Y^*+Y_W but this means I have less leisure and lower utility. However, if I win Y_W by gambling I avoid the cost of earning the money and I have higher utility.

Empirical Results & Comments

- Decision to gamble
  - People with labor market experience are more likely to understand that obtaining additional income requires more work → more likely to gamble
  - Those working fulltime are more likely to regard extra work as reducing utility → more likely to gamble
- Frequency of gambling
  - People with low wage rates and unpleasant jobs place more value on the extra money from winning → gamble more often
- The behavioral theory has a risk-loving perspective: money won from gambling has more utility than money lost
- This person would not buy insurance, so we would need a different behavioral theory to explain insurance purchase

John Nyman, John Welte, and Bryan Dowd, "Something for Nothing: A Model of Gambling Behavior," Journal of Socio-Economics, 37 (2008), 2492-2504