# Positive Hit Rates vs. Return Asymmetry. Does it matter how Alpha is Achieved?

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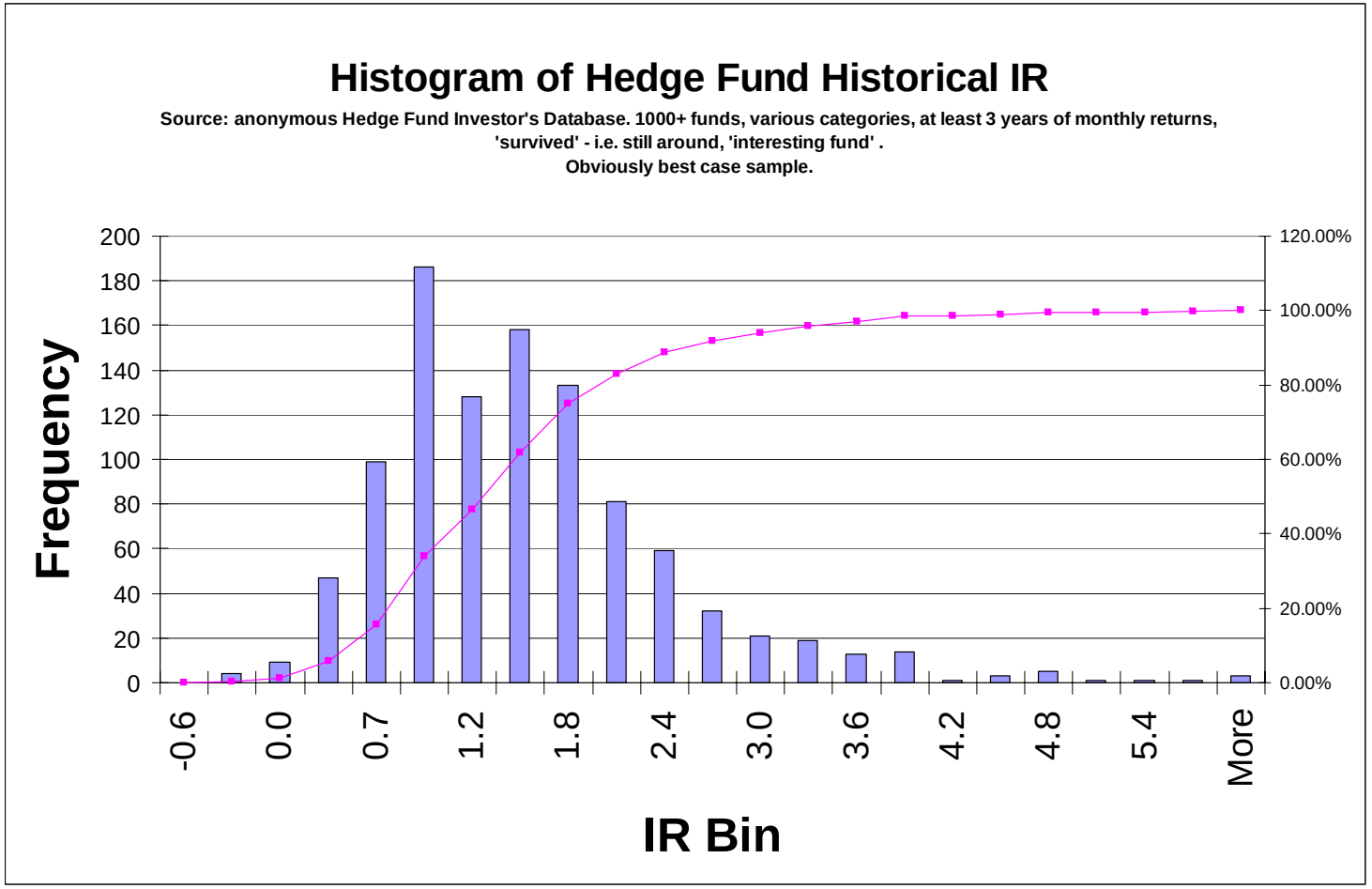
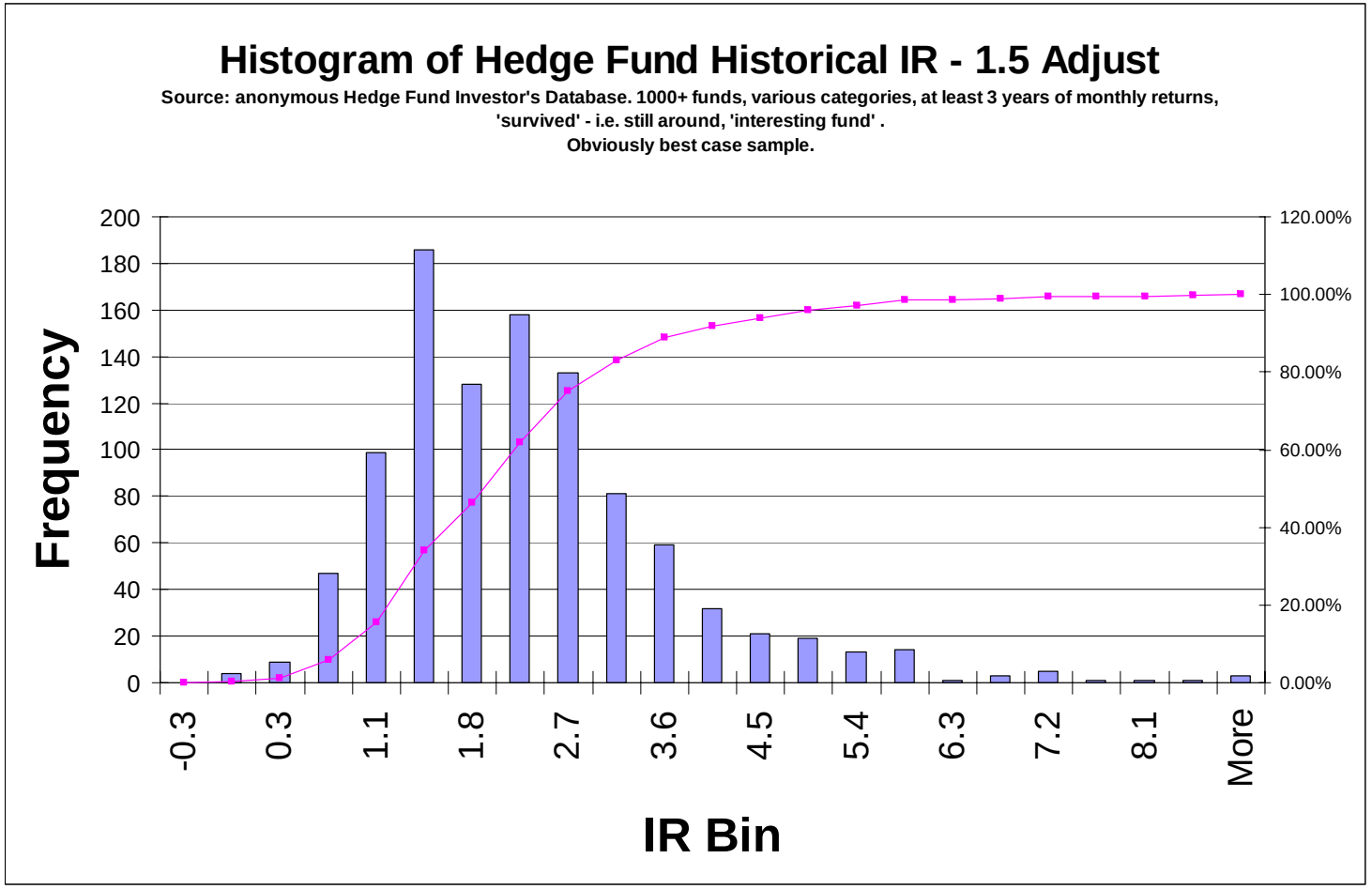
# How good could things be?



# Add back fees and slippage... Cutting as much slack as possible



# How does a manager earn IR

- Looking at best case Historical IR histogram  the range is  roughly 0 – 7 when you throw out funds that did not survive.

- Let’s do a thought experiment to see how ‘good’ a manager has to be to fall in different parts of that range.

- Only two ways a manager can make money:

  – Being Right more often than Wrong – Positive Hit Rate

  – Making more when Right than Loosing when Wrong – Payoff Asymmetry  (Skew)

# One way to relate IR, Manager Skill and Breadth

- Grinold and Kahn expressed the relationship between manager skill, IR and number of bets by the approximation

$$IR = IC * SQRT(Breadth)$$

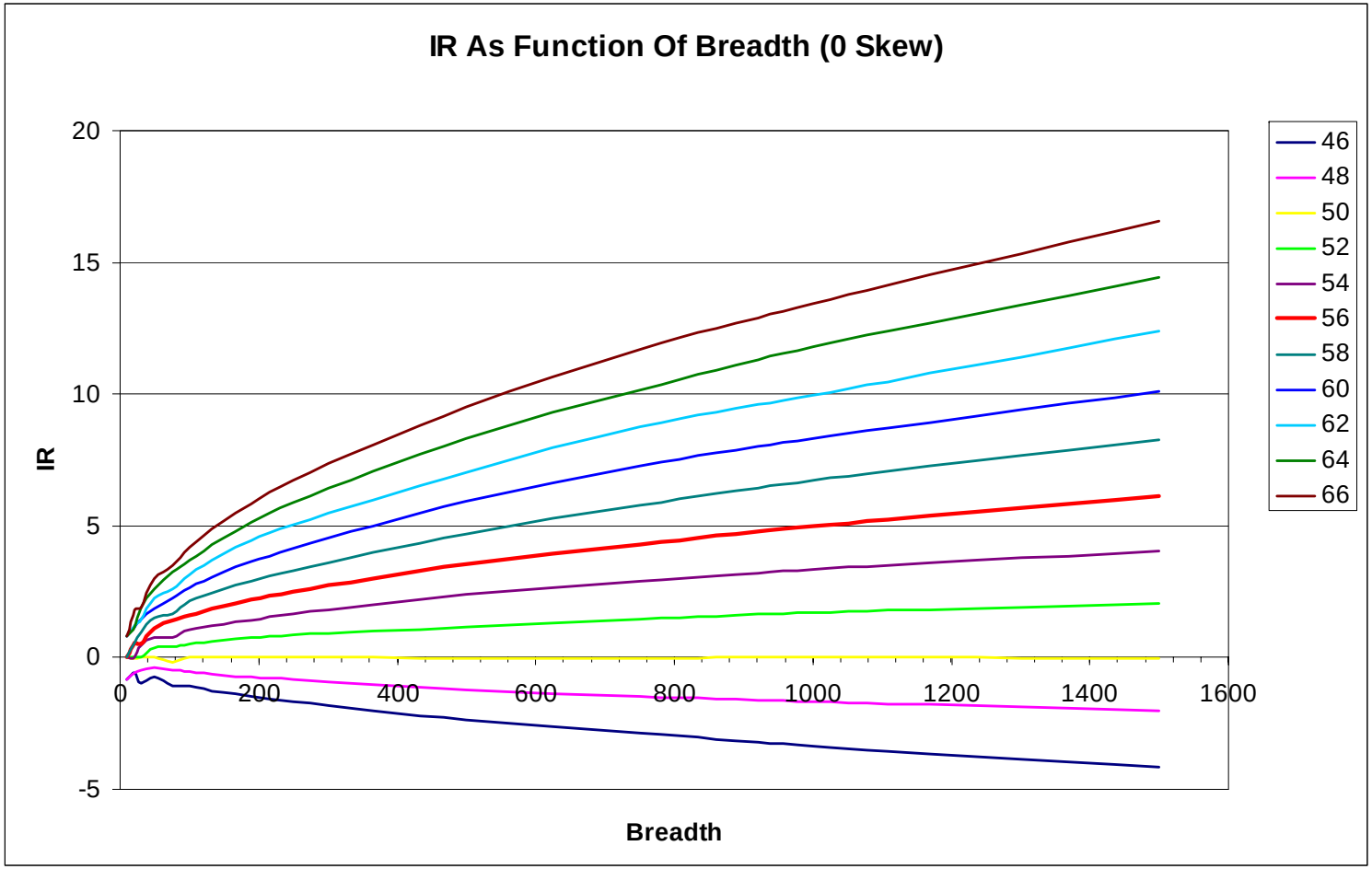
  - IC : Information Coefficient. Correlation between forecasts and results. A measure of manager skill.
  - Breadth : The number of Independent Bets the manager gets to make per period.
  - Certain assumptions : Portfolio constructed with mean variance efficiency, Skill stays the same across Bets even as number of Bets increases.

# Relating IR, Hit Rate, Payoff Asymmetry and Breadth

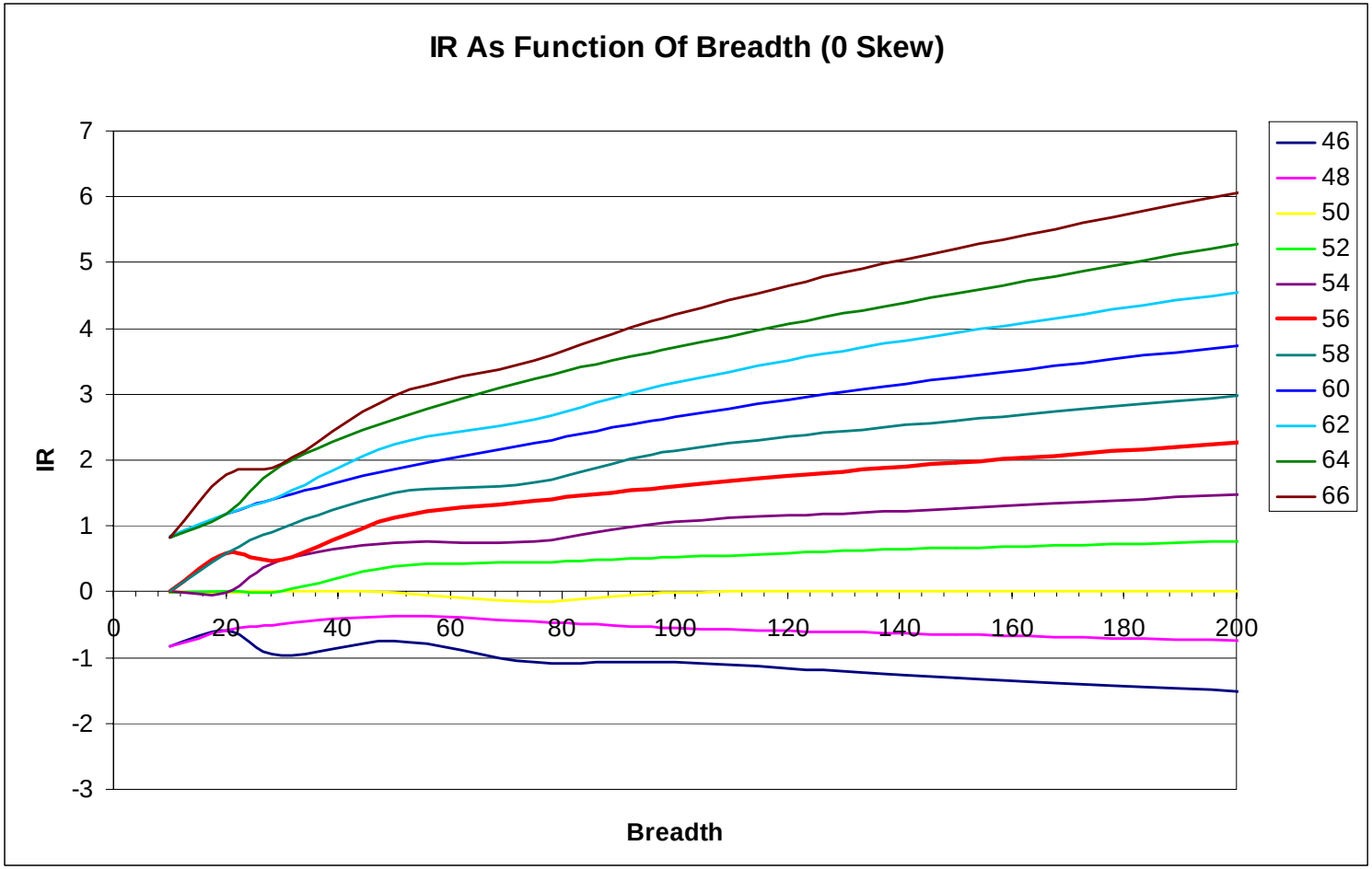
- Breadth = Number of Independent Bets a Year
- Success = Number of 'Positive Payoff' Bets
- Hit Rate = Success / Breadth
- Payoff Asymmetry (Skew) =

  Average (Positive Payoffs) – Average (Negative Payoffs)
- Using Monte Carlo sampled from N(0,1) simulate basic case.
  - Equal weighted portfolio (each draw randomly assigned), payoffs summed.
  - Number of draws in portfolio represents breadth.
  - Number of portfolios represent observations : 10000 observations.
  - Skew is a given. Negative payoffs multiplied by (1-skew)

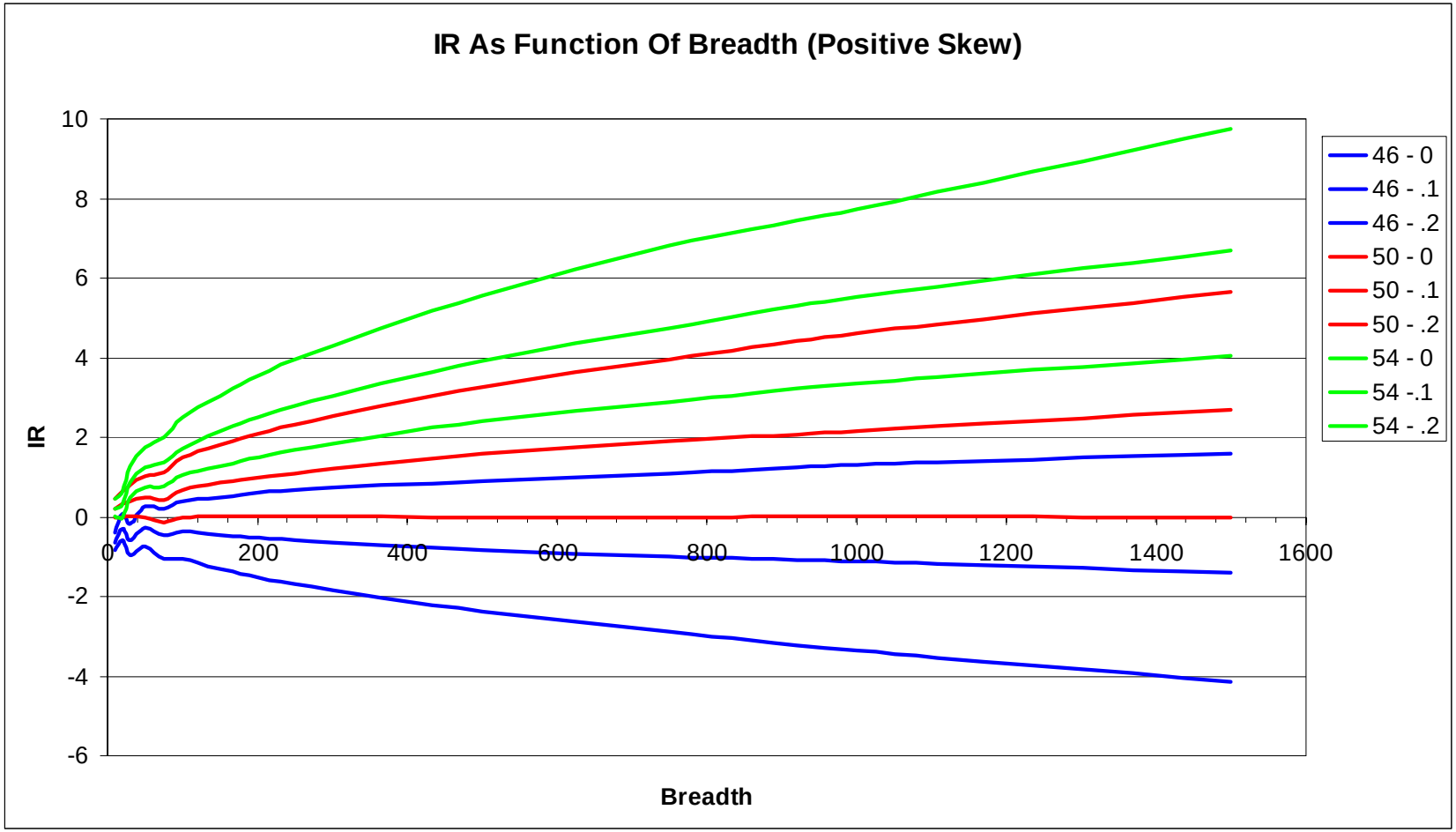
# Monte Carlo 1



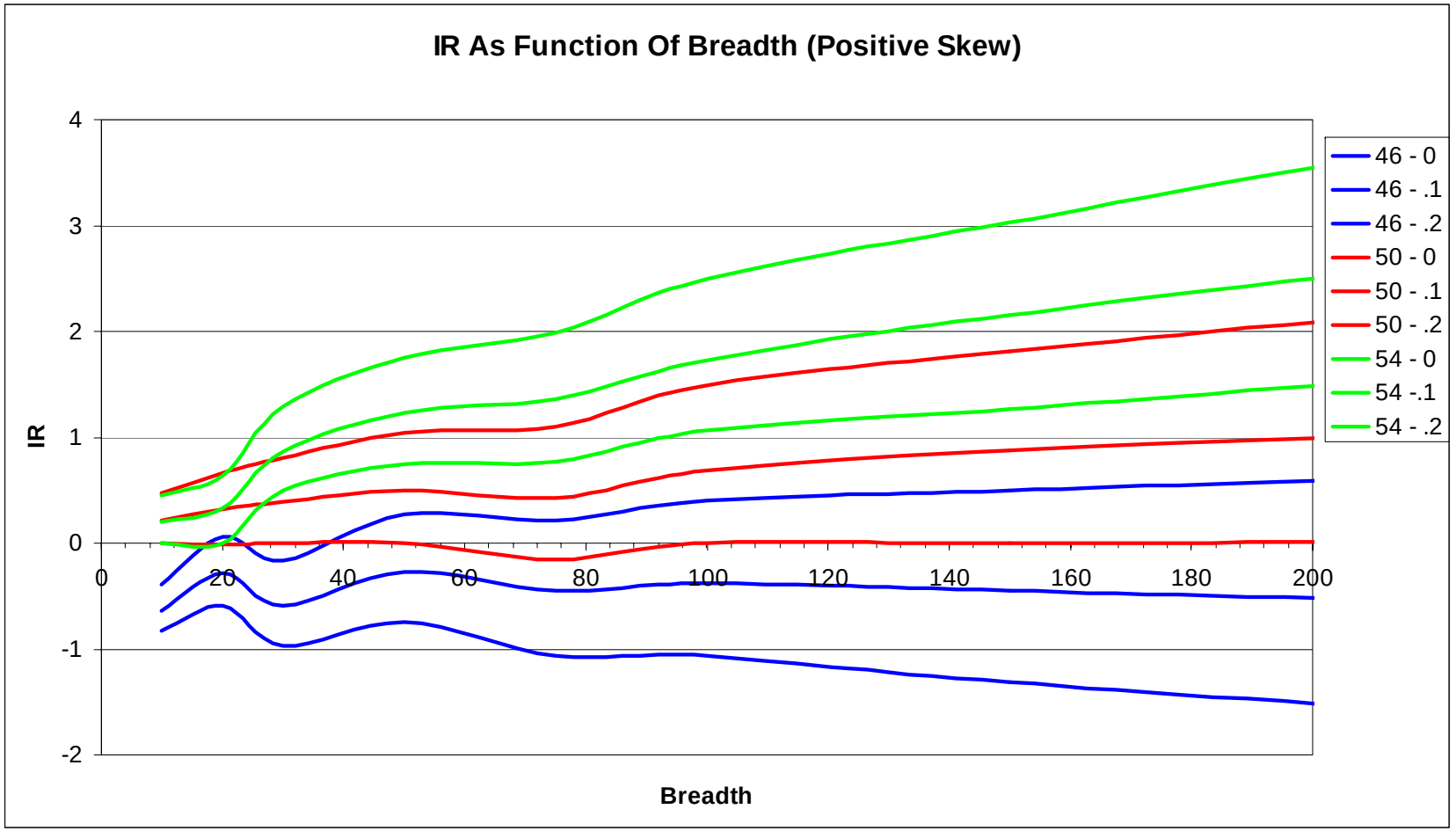
# Zoom In


IR As Function Of Breadth (0 Skew)
IR
Breadth
7
6
5
4
3
2
1
0
-1
-2
-3
0
20
40
60
80
100
120
140
160
180
200
46
48
50
52
54
56
58
60
62
64
66

# Monte Carlo 2



# Zoom In

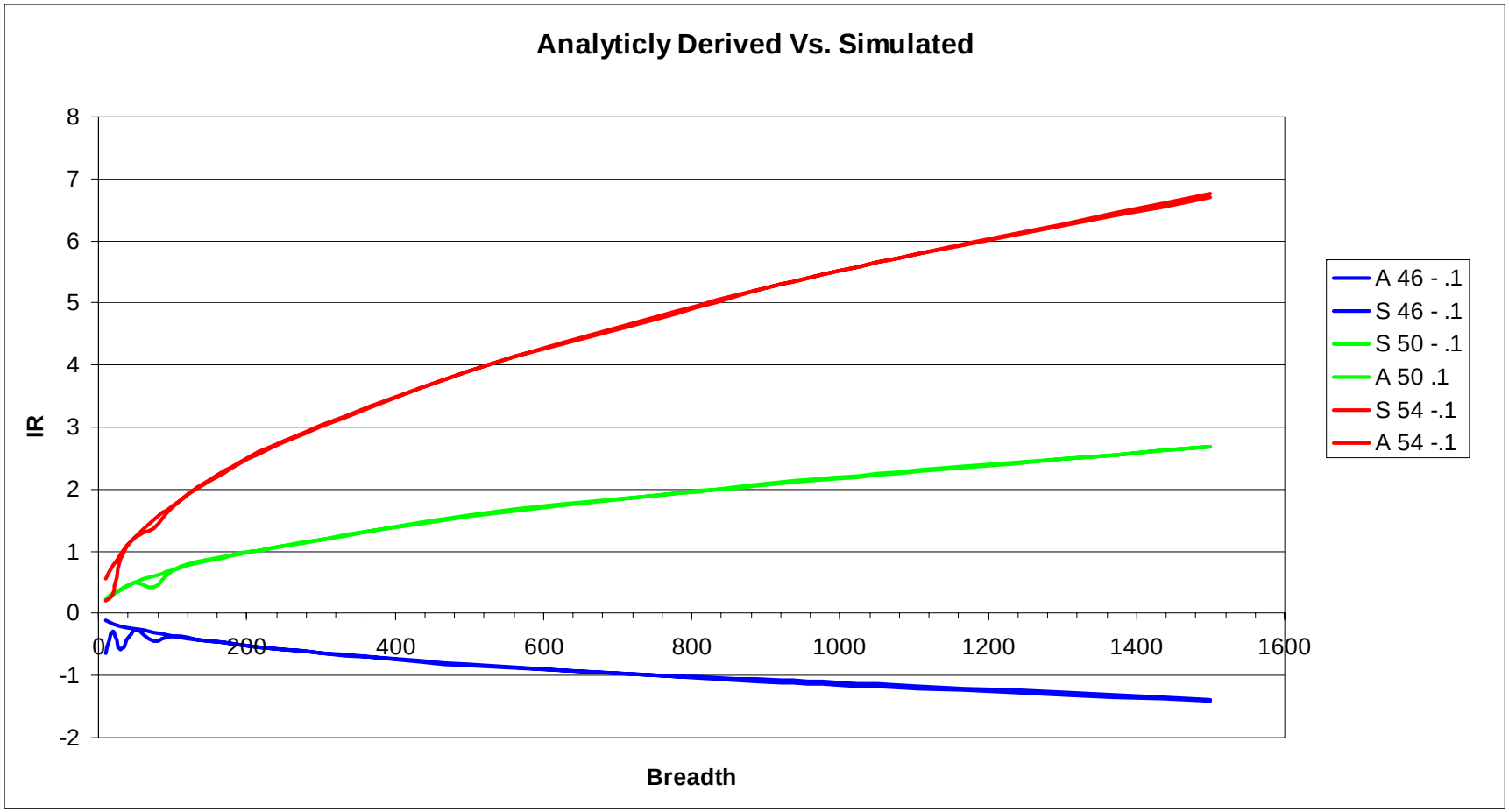

IR As Function Of Breadth (Positive Skew)
IR
Breadth
4
3
2
1
0
-1
-2
0
20
40
60
80
100
120
140
160
180
200
46 - 0
46 - .1
46 - .2
50 - 0
50 - .1
50 - .2
54 - 0
54 -.1
54 - .2

# Derived Analytically

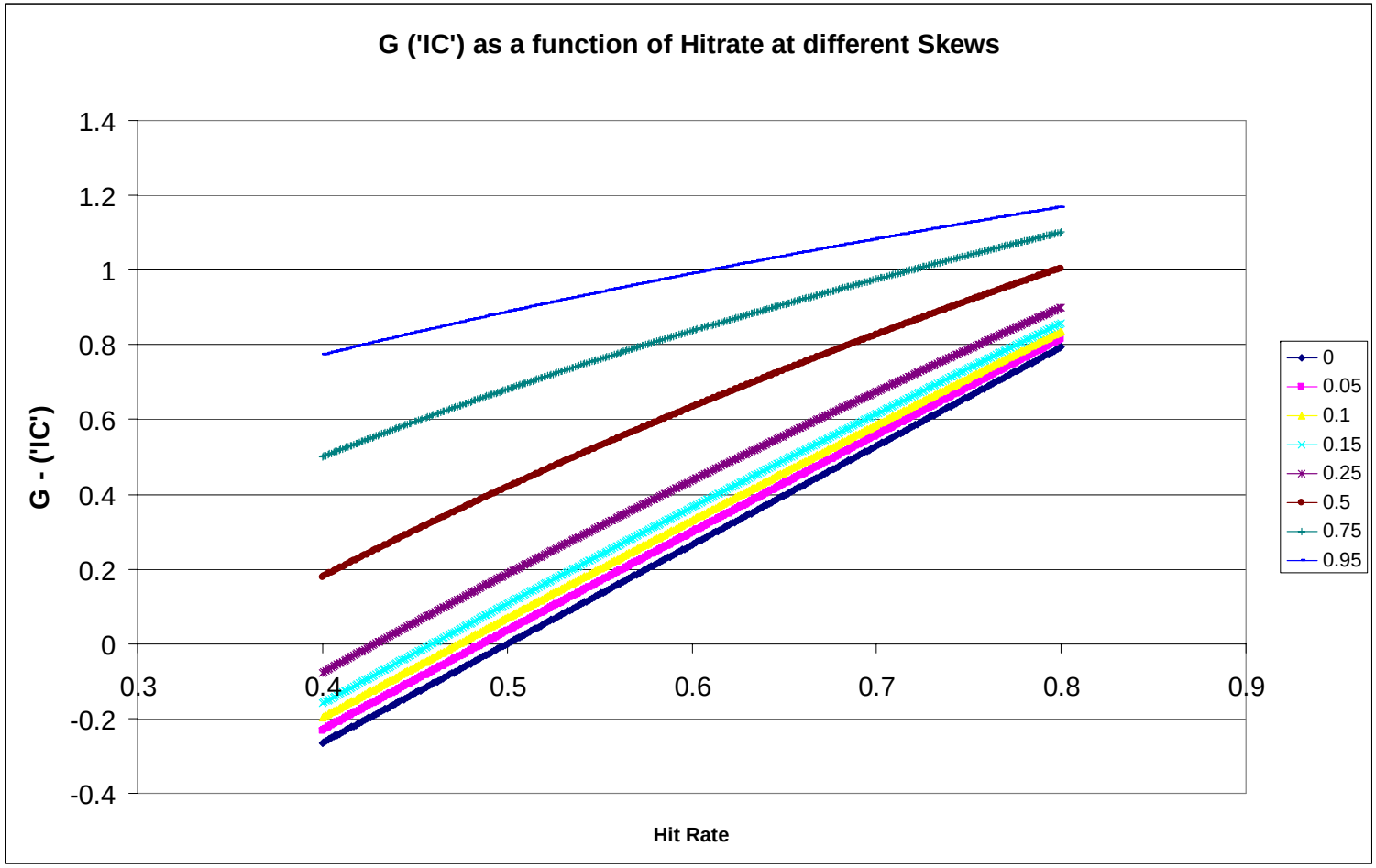
- For the base case (Normal) analytic solution below. Can be extended to other distributions.

$$IR = \frac{\sqrt{\frac{2}{\prod}\left[\frac{Success}{Breadth} - (1 - \frac{Success}{Breadth})(1 - Skew)\right]}}{\left[(1 - \frac{2}{\prod})(\frac{Success}{Breadth} + (1 - \frac{Success}{Breadth})(1 - Skew)^2)\right]^{\frac{1}{2}}} * \sqrt{Breadth}$$

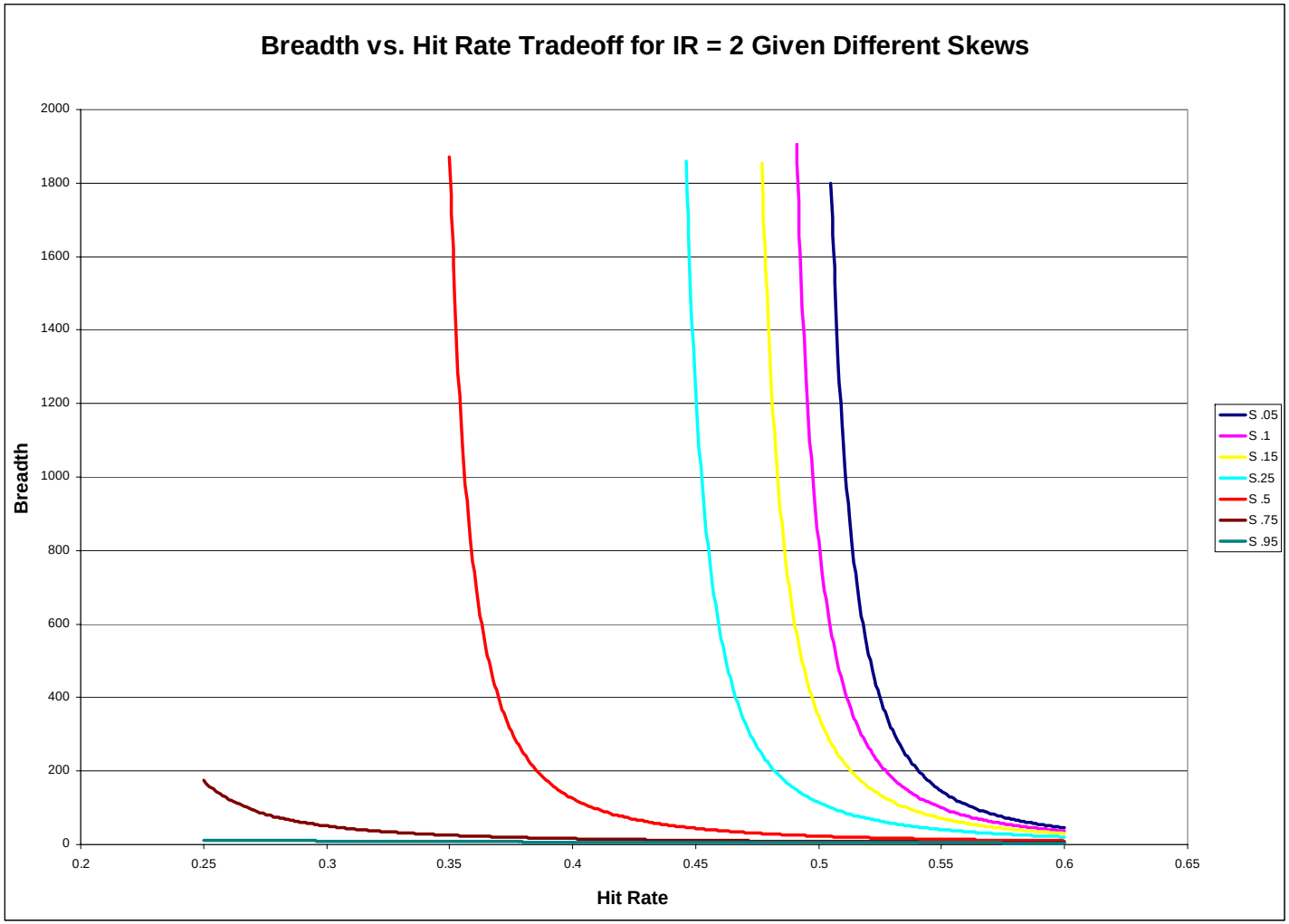
# Compare Analytic vs. Simulation



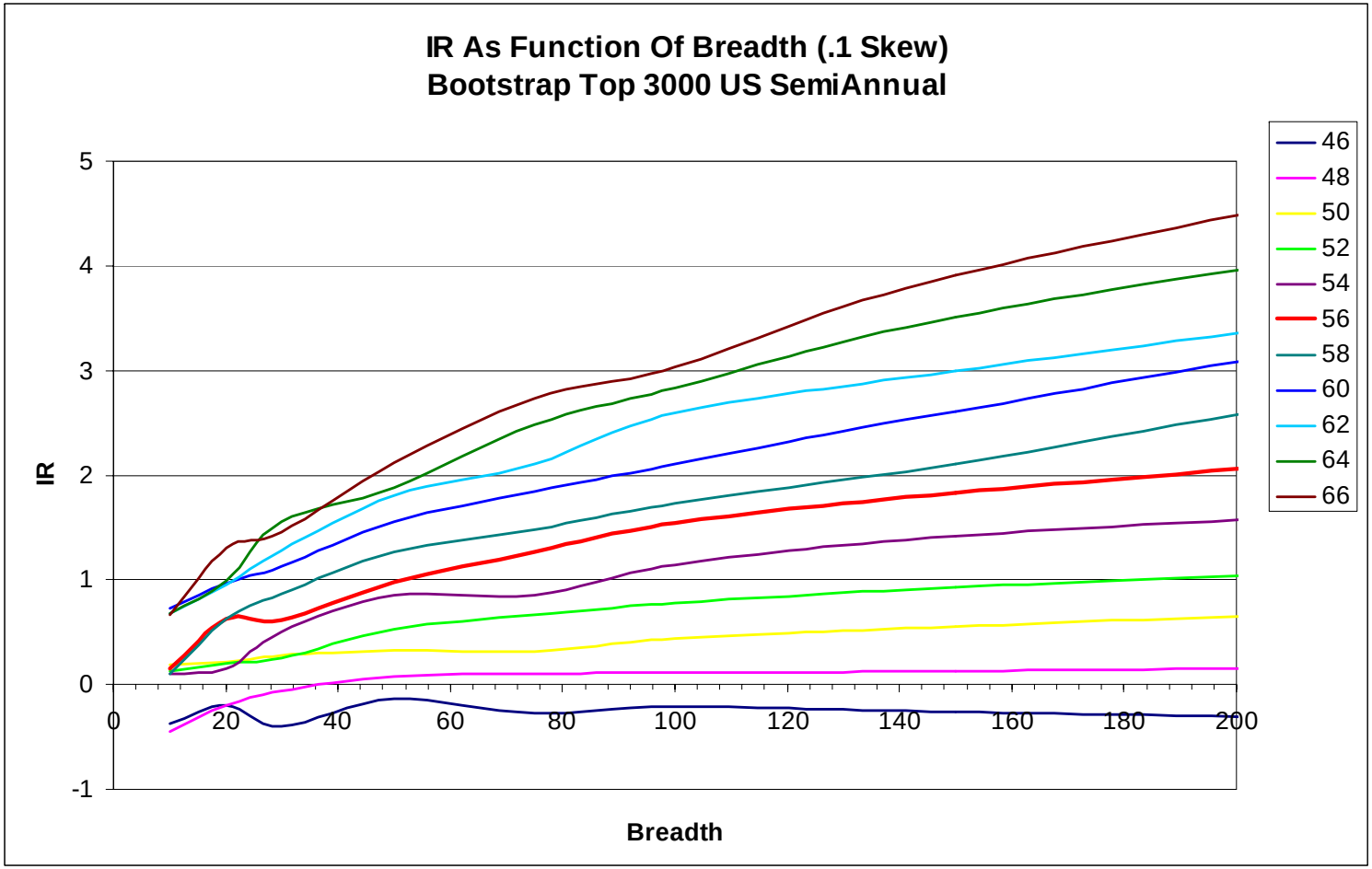
# Call IC part ‘G’ vary with Hit Rate and Skew



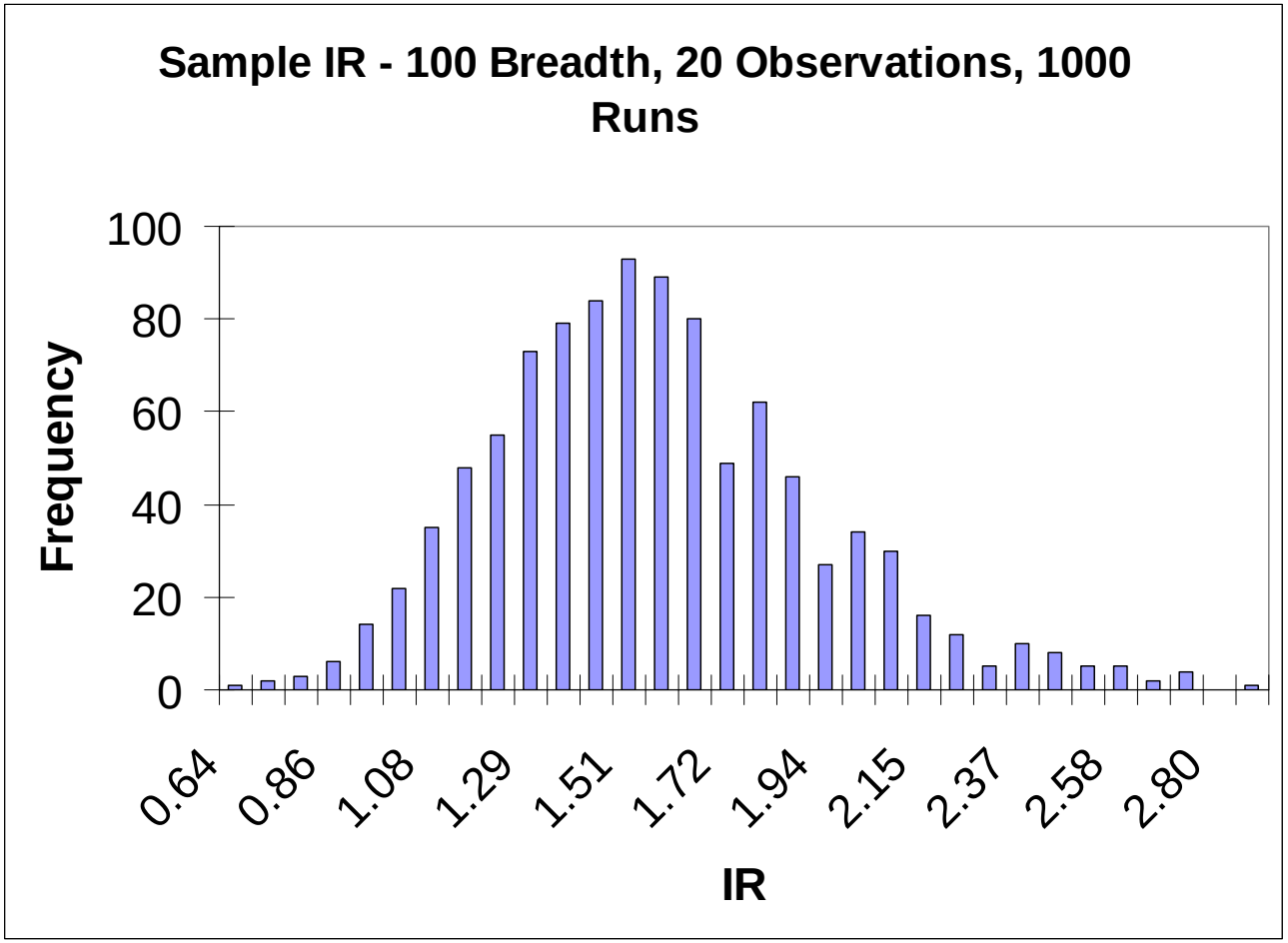
# Breadth, Hitrate and Skew for a given IR



# Can Use Some Real Data



# 100 Breadth, 56% hit rate, .1 skew
# IR sample distribution – 1.53 Avg, .35 Std



# Why Does This Matter - 1

- Fundamental vs. Systematized strategies
  - Typical fundamental analyst 20 hours a month on a name to maintain knowledge base
  - Increasing Breadth may rapidly cause decrease in HitRate / Skew or require more resources
  - Use framework to examine how probable are the IR targets managers promise given style and resources

# Why Does This Matter - 2

- Making money on Skew vs. Hit Rate
  - Strategies for Skew:  CTA, Venture, Growth Managers
  - Strategies for Hit Rate: Stat Arb, Quant Investing, Multi Strat? Equity L/S?
  - Manager should be able to answer where he makes money one or the other or both.
  - Different environments (cross sectional vol) may favor one or the other

# Why Does This Matter - 3

- Not all Skews created equal.
  - Dynamic vs. Structural Skews
  - Options and structurally skewed instruments are better but you pay premium
  - Stop Loss most common form of Dynamic Skew. Much less stable. Vol Assumptions.
  - What happens when everyone wants stop?
  - Skew generally less stable / tractable than hit rates.