Optimization & Distressed Assets

- Maximize cash flow from distressed asset
  - Estimate the cash flow for different treatment methods
  - Find the treatment method with highest cash flow
- "Wrinkles" at the loan level
  - Some treatment methods require "borrower cooperation"
  - Trade-off between cash flow in a modification and the probability of achieving that cash flow

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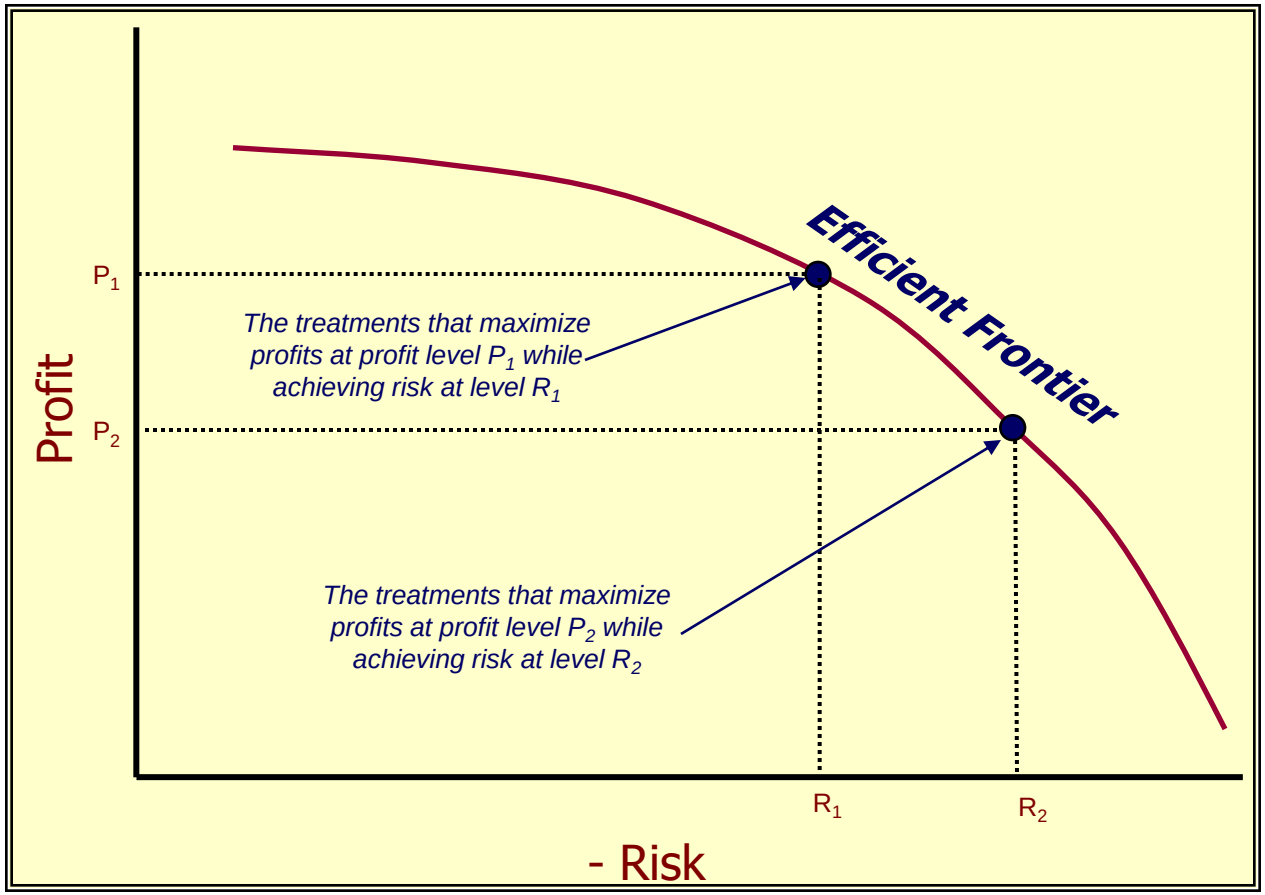
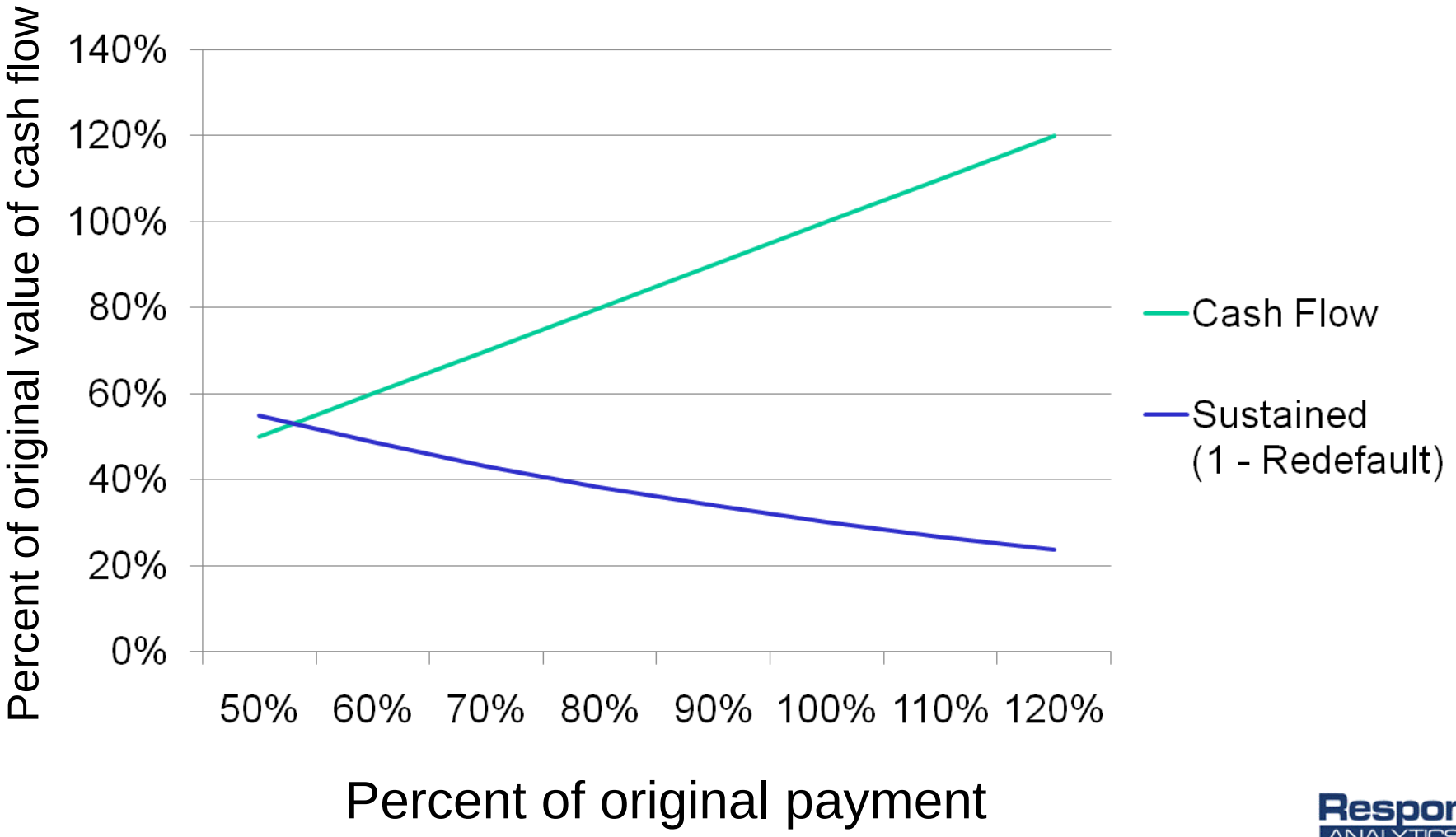
Efficient Frontier



Modifications - the “basics”



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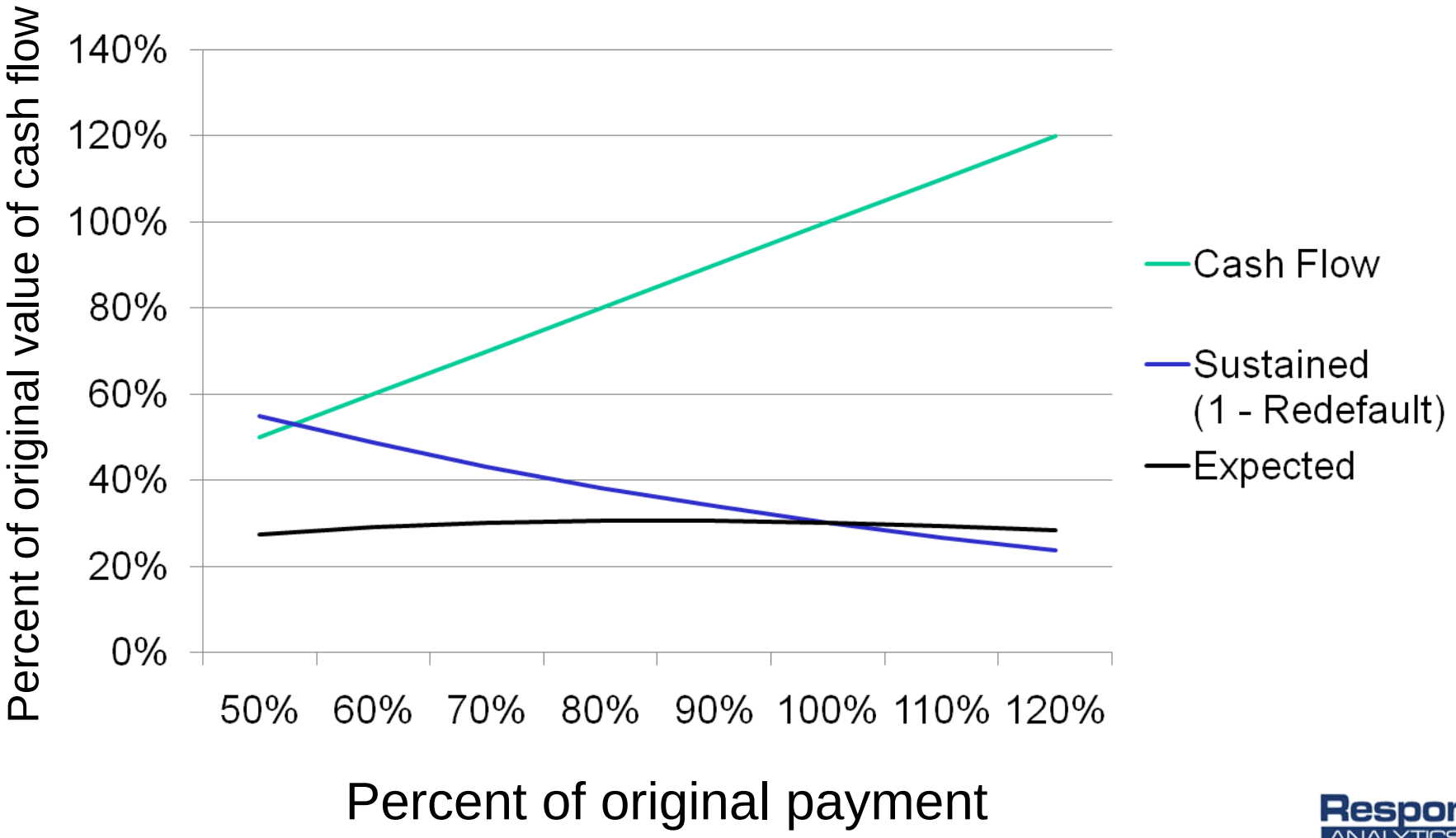
Expected Cash Flow



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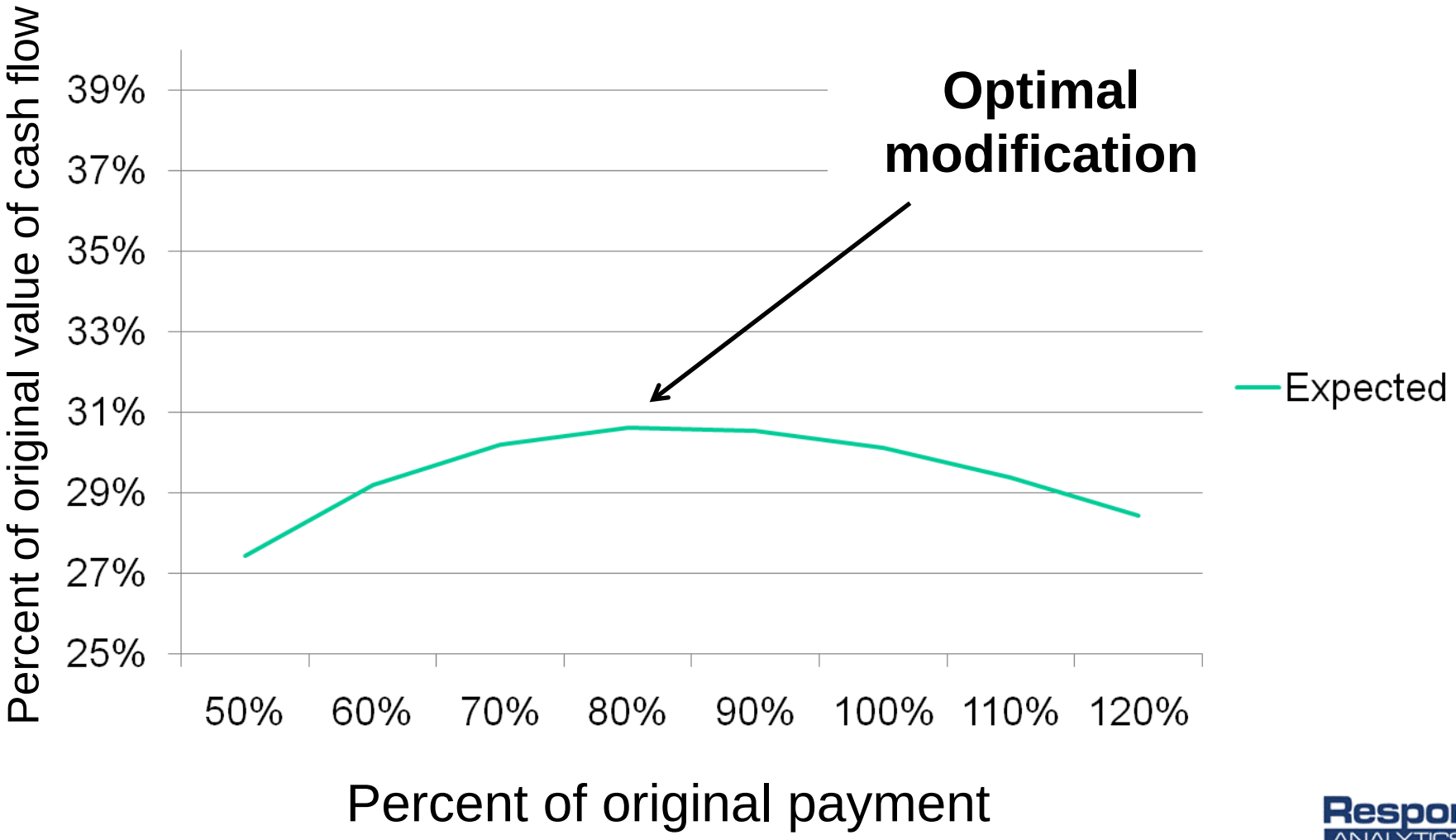
Expected Cash Flow



Redefault Rates Don't Tell the Whole Story

- Typical to measure "redefault" in modifications
  - "Lifetime redefault" is difficult to measure due to data sparsity and lack of history
  - May not even been relevant to distressed asset decisioning
  - Maximize cash flow may admit redefault, as long as short term cash flow beats the overall loss in foreclosure (or other disposition options)
  - We want a curve that measures cash flow month-by-month

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Survival Modeling in Modifications

- Survival model measures cash flow over time
  - Redefault is a flat percentage of outcome over a time period
    - E.g. Chance of redefault in 3 months, 6 months, etc.
    - That may be 100% but ***still*** admits some cash
    - Will that temporary cash flow be more than the loss due to foreclosure – even when delayed and continual housing price declines?
  - Survival models can be build on smaller data sets and projected forward in time
    - Censored data sets are understood in survival modeling
    - Standard Weibull models tend to perform well

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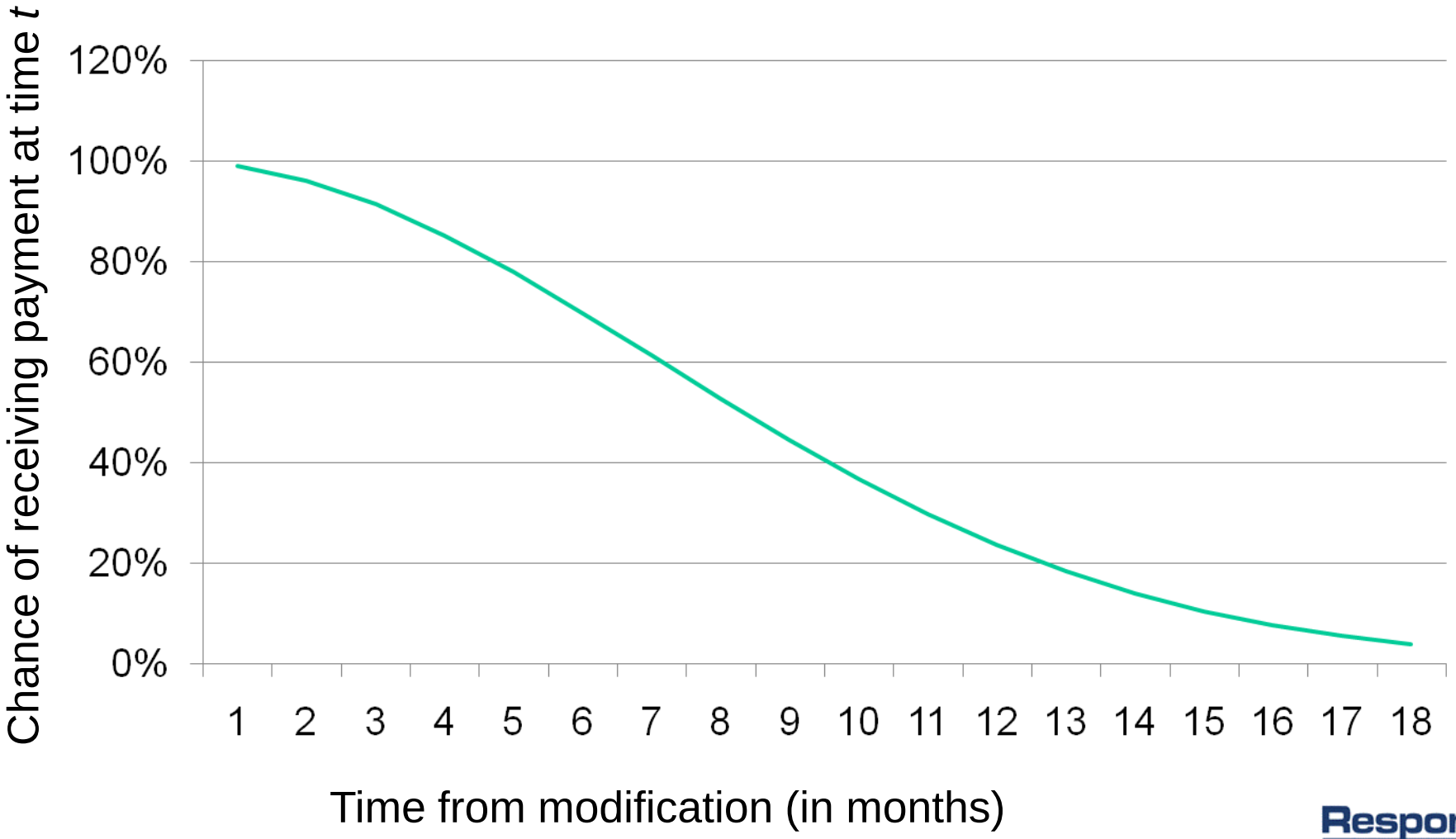
Survival Models



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Optimizing an Expected Cash Flow

- Expected value from survival curve:

$$E(NPV) = \Sigma_{t>t_d} \frac{s_t A_t + (1 - s_t)(HV_t)}{(1+d)^t}$$

- Maximize the *eNPV*: s_t and A_t are functions of the modification type and new payment.
- Solve the resulting optimization problem for the modification type and new payment.

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Considerations for a Portfolio

- Investor constraints may prohibit certain loans from certain treatments
  - This is handle by the loan-level case
- However, certain portfolios' constraints may be global
  - E.g., only a certain percentage of the UPB may be modified
- To build the efficient frontier, the risk metric is a global constraint
  - Or, more commonly Lagrange multipliers are used

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