Buying Cures Versus Renting Health: Financing Health Care with Consumer Loans

Vahid Montazerhodjat, David M. Weinstock, Andrew W. Lo (2016)
Overview

This is the first paper to propose specific methods for implementing a Health Care Loan (HCL) market and to assess one’s financial viability.

Goals:

- Create a market which is attractive to both high-risk and low-risk investors
- Create a market which can finance expensive drug costs
- Correctly model loan default rates - crucial to estimating the financial viability of HCLs
Solutions

- Use Diversification and Securitization to attract both low-risk and high-risk investors
- Estimate loan defaults probabilities using student loan and U.S. Census data
- Run Monte Carlo simulations which can be used to estimate financial viability of HCL markets
Estimating Probability of Loan Default

Create 3 separate models for default probability

\[ \Phi(\frac{f}{\text{DPI} - 1}) - \exp(-\text{DPI}) \]  
\[ \Phi(\frac{g}{\text{DPI} - 1}) - \exp(-\text{DPI}) \]  
\[ 1 + \exp(-\Phi(\frac{f}{\text{DPI} - 1}) - \Phi(\frac{g}{\text{DPI} - 1})) \]

DPI: debt-payment-to-income ratio (a random variable)

Φ: CDF of the normal distribution

α and β: model parameters
Simulation: Structure and Assumptions

- Run 10 million Monte Carlo simulations under each default probability function.

Assumptions

- 12,500 patients (arbitrary)
- $84,000 cost per drug and $40,000 loan (based on HCV cure cost)
- 9.1% interest rate (aims for at least 15% return rate guarantee)
- 9 year repayment term (maximum term for which $40,000 loan is viable)
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<th>Baseline</th>
<th>Optimistic</th>
<th>Pessimistic</th>
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<td>123.5</td>
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<td>15.8</td>
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\( \text{Pr} \left( \text{IRR} \leq 20\% \right) (\%) \)
\( \text{Pr} \left( \text{IRR} \leq 15\% \right) (\%) \)
\( \text{Pr} \left( \text{IRR} \leq 10\% \right) (\%) \)
\( \text{Pr} \left( \text{IRR} \leq 5\% \right) (\%) \)
\( \text{Pr} \left( \text{IRR} > 0 \right) (\%) \)

Standard deviation of IRR (\%)
Median IRR (\%)
Expected IRR (\%)
Challenges and Limitations

- Is it realistic to assume health insurers will pay high up front costs?
- High U.S. drug prices
- Can't help with truly expensive drugs like gene therapies ($1 million cost)
- Still not well suited for lower income households
- Was it right to make default estimates based on student loan data?
- Securitization is risky left unregulated
- Is it realistic to assume health insurers will pay high up front costs?