# 15.482 Healthcare Finance
# Spring 2017

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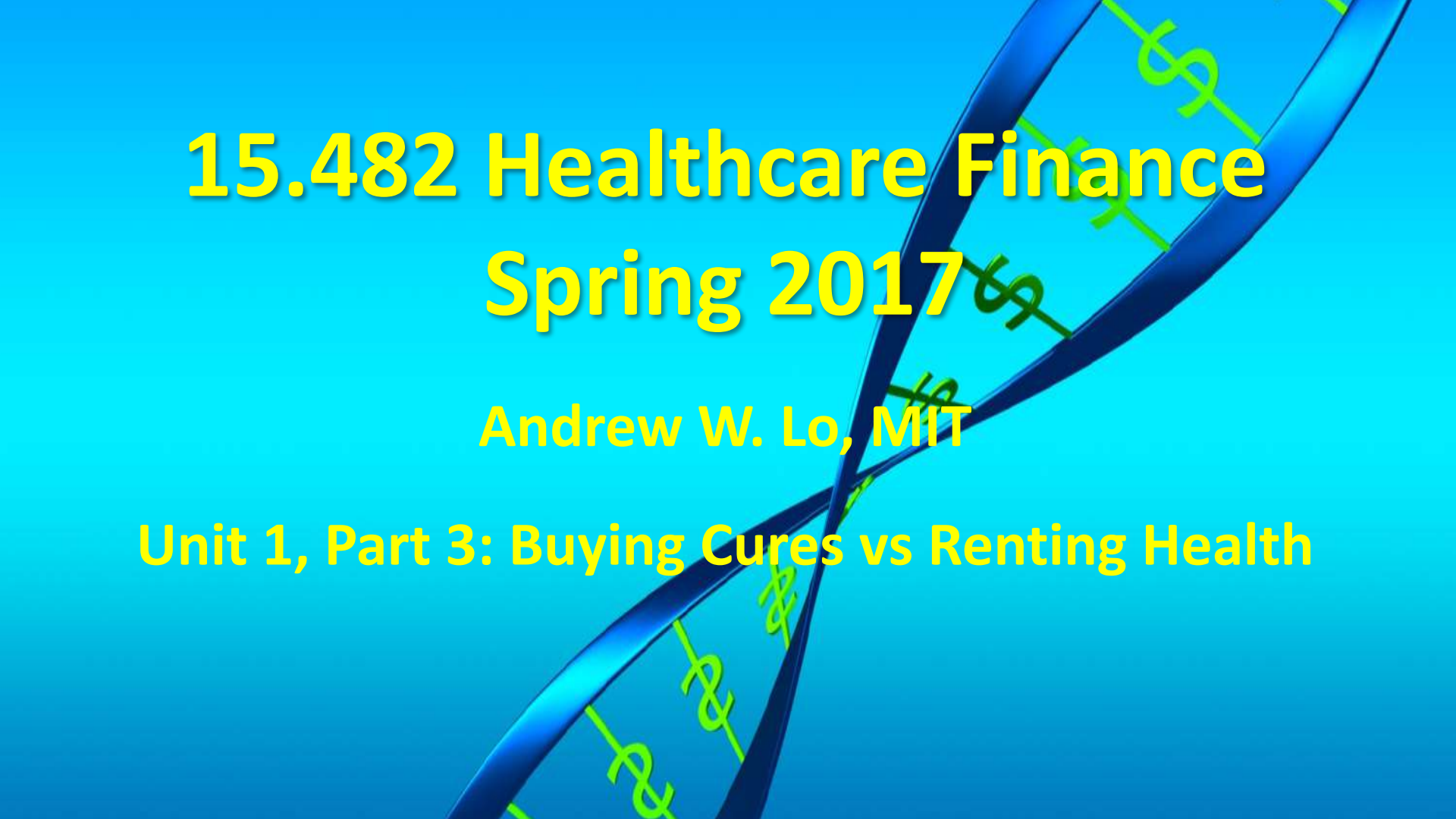
## Unit 1, Part 3: Buying Cures vs Renting Health



# Unit Outline

- Market Efficiency
- The Time Value of Money
- Valuing Special Cashflows
- Inflation

# Valuing Special Cashflows

# Application: Expensive Therapies

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- There's a difference between price-gouging and genuine breakthrough therapies
- Example: hepatitis C
- 12-week treatment cures it!
  - Cost of liver transplant: $577,000 in 2011
  - Value of statistical life: $9.1 million × 2/3?
- But 3 million U.S. patients have hepatitis C!

# Application: Expensive Therapies

## Sovaldi Is A Bargain, But The Cost Impact Is Huge!

- Suppose we "mortgaged" Sovaldi?

$$\$84{,}000 = \frac{P}{r/12}\left[1 - \frac{1}{(1+r/12)^{12n}}\right] \Rightarrow P = \frac{\$84{,}000 r/12}{1 - \frac{1}{(1+r/12)^{12n}}}$$

### Monthly Payment

| Years | Interest Rate | | | | |
|---|---|---|---|---|---|
| | 1% | 3% | 5% | 10% | 15% |
| 1 | $7,038 | $7,114 | $7,191 | $7,385 | $7,582 |
| 5 | $1,436 | $1,509 | $1,585 | $1,785 | $1,998 |
| 10 | $736 | $811 | $891 | $1,110 | $1,355 |
| 15 | $503 | $580 | $664 | $903 | $1,176 |
| 30 | $270 | $354 | $451 | $737 | $1,062 |

# Application: Expensive Therapies


## Now Pool Health Care Loans:

- Create SPEs, tranches, securitization, i.e., CDOs
- CDS to guarantee senior tranche
- Tap into debt markets

# Application: Expensive Therapies

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PERSPECTIVE

HEALTH ECONOMICS

## Buying cures versus renting health: Financing health care with consumer loans

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A crisis is building over the prices of new transformative therapies for cancer, hepatitis C virus infection, and rare diseases. The clinical imperative is to offer these therapies as broadly and rapidly as possible. We propose a practical way to increase drug affordability through health care loans (HCLs)—the equivalent of mortgages for large health care expenses. HCLs allow patients in both multipayer and single-payer markets to access a broader set of therapeutics, including expensive short-duration treatments that are curative. HCLs also link payment to clinical benefit and should help lower per-patient cost while incentivizing the development of transformative therapies rather than those that offer small incremental advances. Moreover, we propose the use of securitization—a well-known financial engineering method—to finance a large diversified pool of HCLs through both debt and equity. Numerical simulations suggest that securitization is viable for a wide range of economic environments and cost parameters, allowing a much broader patient population to access transformative therapies while also aligning the interests of patients, payers, and the pharmaceutical industry.

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PERSPECTIVE

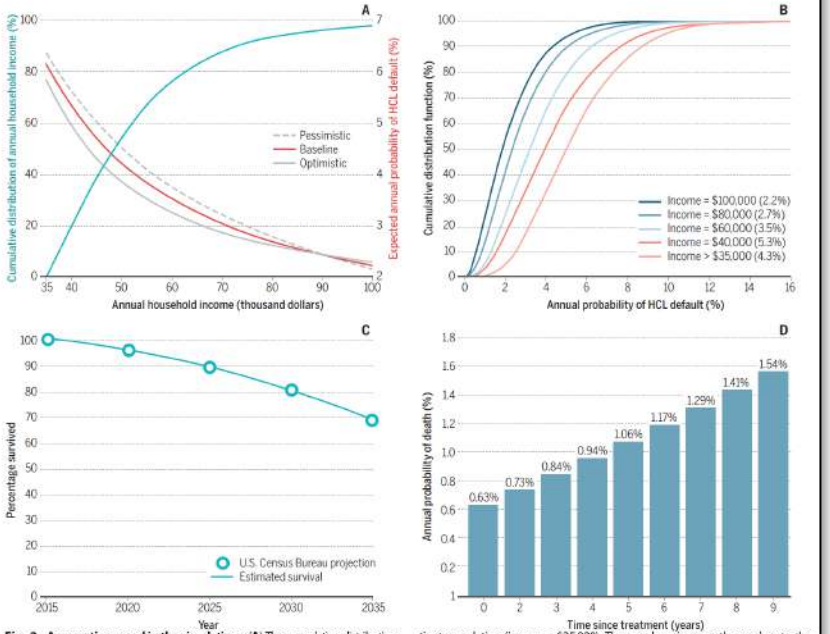


**Fig. 2. Assumptions used in the simulations.** (**A**) The cumulative distribution function (CDF) of the annual household income for patients with chronic HCV (blue line and left axis) and the estimated expected default probability as a function of income for three different scenarios (right axis). (**B**) The CDF of annual default probability, in the baseline scenario, for multiple incomes as well as the whole patient population (income >$35,000). The numbers in parentheses denote the expected default probability associated with that category. (**C**) The U.S. Census Bureau's projected numbers for the baby-boomer generation as well as our estimated postmedication survival curve for each patient (*16*). (**D**) The annual probability of death based on the survival curve in (C) over the 9-year HCL term.

Senior tranche: **2.1%**

Junior tranche: **2.5%**

Equity tranche: **12.5%**

# Who Pays?

## In The Very Long Run, Taxpayers

- That's what government is for

## In The Long Run, Insurers

- That's what health insurance is for

## In The Short Run, Patients, Families, Foundations

- That's what consumer loans and charities are for
- Mortgaging your health is offensive
- Letting patients die is even more offensive