Columbia Business School

Capital Markets & Investments

Session 6:
Fixed Income (3) – Managing Rate Risk Part 1

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Tax Revenue as Long-Duration Asset

The Present Value of Property Tax Revenues*

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Abstract

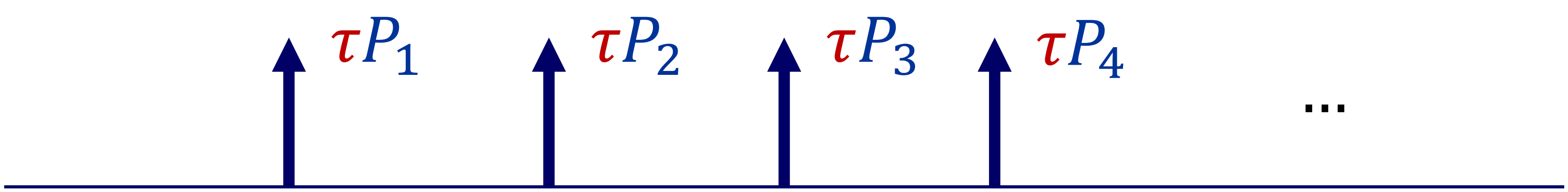
Suppose a local government collects 3% of the market price of regional real estate in taxes each year. We show that this tax payment stream is equivalent to a stream of claims to future rent flows: the government owns 3% of this year's rent, approximately 6% in two years, 9% in three years, and so on. This result implies that seemingly small property taxes extract a large fraction of the value of future rents; that tax revenues are very sensitive to changes in interest rates; and that governments funded by tax revenues have future-biased incentives to invest in public goods.

Property Taxes and Duration

Property Tax:

- 1-3% of a property's assessment value
- 70% of local and 20% of state governments' own-source revenue

Tax (τ) revenue: Stream of cash flows proportionate to house price (P)



Important Considerations

(1) Each cash flow is not fixed

- In bonds, coupons are predetermined (e.g. coupon rate = 4%)
- Here, tax revenues depend on property values and rents, which can change and uncertain.0
- Paper: Property tax = Claim on (fraction) future house prices
  = Claims on future rental income

Why? House Price = Claim on all future rental income

- If you rent the house out, this income is explicit
- If you live in it, you still receive value equivalent to rent savings

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Important Considerations

(2) How do we discount each cash flow?

- In bonds, we used yields to discount each coupon and face value.
- Here, we need "yields" that corresponds to real estate markets
- Paper: Use long-term required rate on housing (5%)

Combining (1) and (2), we arrive at:

$$\frac{\text{NPV of Property Taxes}}{\text{NPV of Rents}} = \frac{\tau}{r+\tau}$$

- If r = 5%, and tax rate is 3%, a seemingly small tax rate extracts over 1/3 of entire rental value over time.

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Duration of Property Tax Revenue

Asset	30-year 2% coupon bond	30-year zero coupon bond	property tax with $\tau = 1.5\%$	property tax with $\tau = 2\%$
Duration	19	30	33.5	76.6

- Property tax revenues behave like a long-duration bond!
- Unlike increasing coupon rates for bonds, here higher tax rates increases duration!
  - This is because fraction of rent extracted increases over time. (Intuitively, early-period rents are taxed only once, but later-period rents are taxed repeatedly)