Discussion of

Advance Refunding of Municipal Bonds

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Advance Refunding

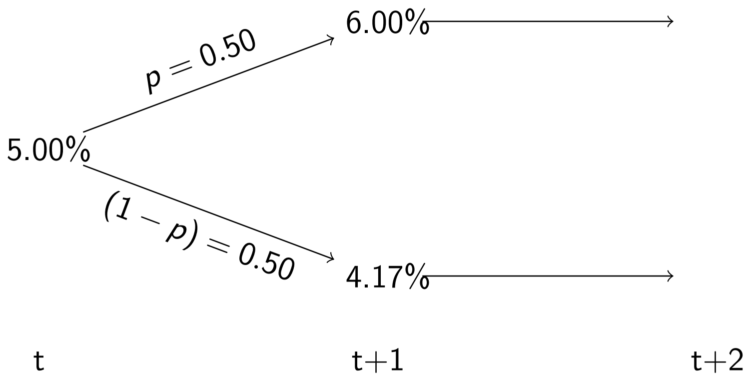
- Most LT muni bonds are callable after 10 years
- Common practice of **advance refunding**
  - Issue new bond before old bond callable
  - Invest proceeds in Treasuries until call date of old bond
  - Pre-commitment to call the old bond
- Destroys option value – bad idea in frictionless market
- Outline of my discussion
  1. Review of option value destruction
  2. Comments: aggregate "losses" from option value destruction?
  3. Comments: explanations for advance refunding?

Review: PV effect of committing to call

Existing bond

- Bond issued at par at $s < t$
- coupon 5.5%
- maturity at $t + 2$
- callable at par at $t + 1$

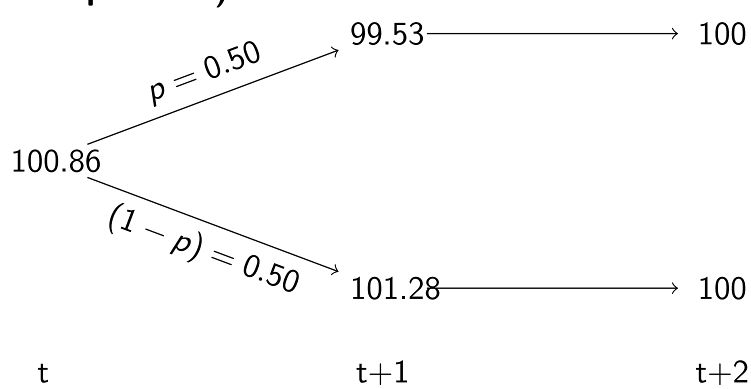
Interest rates



Review: PV effect of committing to call

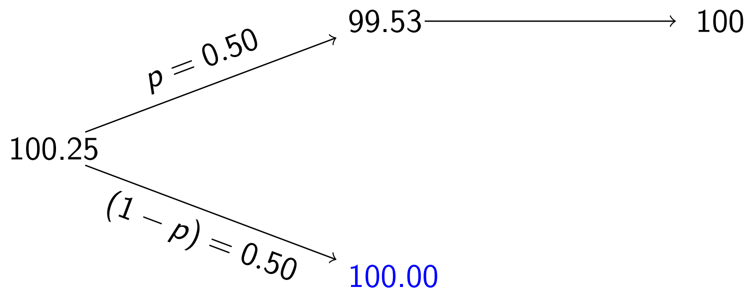
- **New** bond issued in advance refunding is zero NPV
- Focus on present values of remaining cash flows to bondholders of **old** bond

No call (ex-coupon PVs)

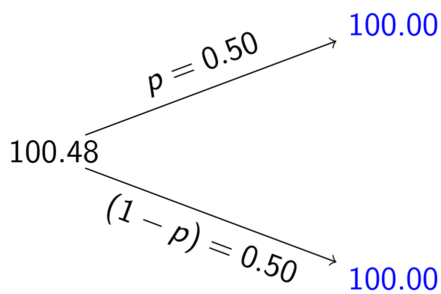


Review: PV effect of committing to call

Optimal call



Pre-commit to call



Comment: Aggregate losses from advance refunding?

- Clear: pre-committing to call destroys option value from perspective of **individual issuers**, taking market yield as given.
- But does this mean there a loss in **aggregate**?
- Paper sums up option value lost relative to **optimal** call policy

Panel A: Option Value Lost

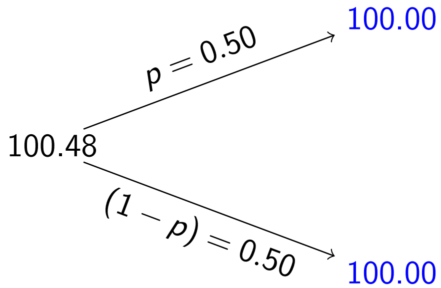
	Vasicek	Hull-White
Total Option Value Lost ($ Billions)	7.269	9.254
Total Par Value Pre-Refunded	669.061	669.061
Percent of Par Lost	1.086	1.383
Total Value Lost From CUSIPs below 95% Quantile	1.949	1.785
Total Value Lost From CUSIPs above 95% Quantile	5.320	7.469

- Implicit assumption: At time of issue, market does **not** anticipate the actual **sub-optimal** call policy

Aggregate losses from advance refunding?

Suppose advance refunding is common and market efficient:

- Market expects pre-commitment to call prior to call date
- Lower muni yield at issue due to lower option value



- In aggregate, **zero** value loss for issuers as long as actual propensity to pre-commit is, on average, **consistent** with market expectations
- NB: Option-adjusted muni yield curves based on assumed optimal exercise can be misleading

Heterogeneity in losses from advance refunding

- No losses in aggregate
- But issuers that forgo the most option value subsidize those that call optimally
- Is financing complexity in the muni market a way for the smart issuers to exploit the not-so-smart/dysfunctional ones?
- Some evidence in the paper points in this direction: Option value destruction higher in states with
  - high rate of criminal convictions of public officials
  - low median income
- Caveat: These variables could also be correlated with financial/political constraints

Motivation for advance refunding

Possible explanations

- Tax (exemption) arbitrage: limited by IRS rules
- Lack of awareness of option value?
- Lack of suitable alternative interest-rate risk hedges/instrument?
- Implicit borrowing to alleviate financial constraints?

Do muni issuers ignore option value?

From presentation of CFO of California ISO at Board of Governors meeting 2013 regarding Refinancing of 2009 Series A Bonds: Does not mention option value

Management has explored a number of options available to the ISO prior to the call date.

- Wait and execute a current refunding on call date, Feb-2015
  - ✓ Pro: No negative arbitrage or escrow costs
  - ✓ Con: Remain exposed to interest rate risk until February 2015
- Hedge the current level of interest rates with derivatives
  - ✓ Pro: Allows a partial lock of current interest rate levels
  - ✓ Con: Introduces a number of risk factors that could reduce the effectives of the hedge
- **Execute an advance refunding today**
  - ✓ **Pro: Eliminate interest rate risk and lock in savings**
  - ✓ **Con: Reduced savings due to negative arbitrage and escrow costs**

Do muni issuers ignore option value?

In contrast, Massachusetts State Treasurer's Office guidelines explicitly ask for consideration of option value

Massachusetts State Treasurer's Office (STO)

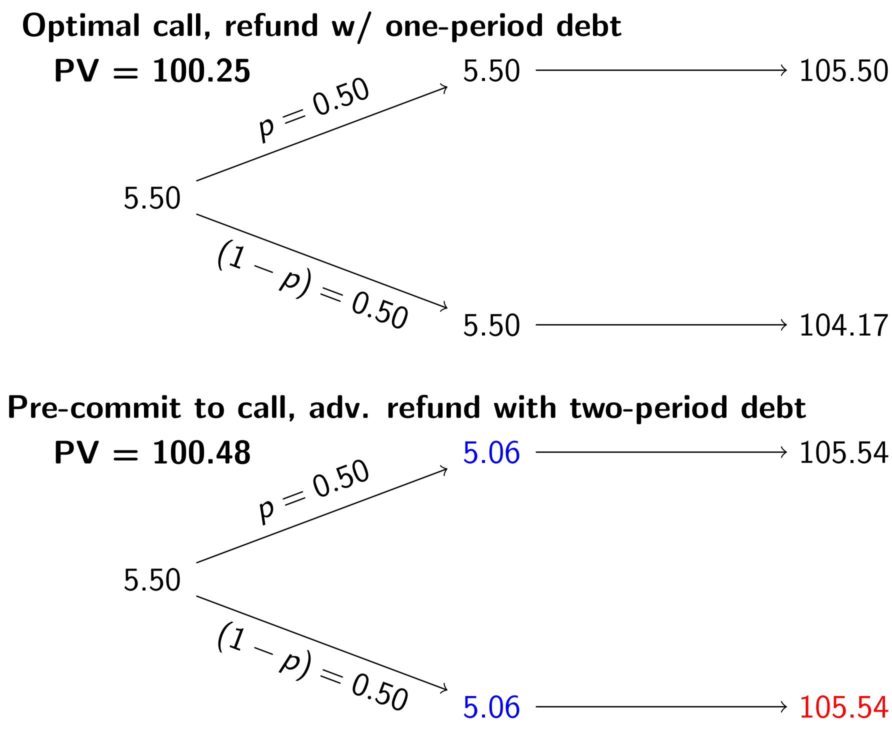
Guidelines for Current and Advance Refundings

The STO intends to evaluate refunding opportunities for Massachusetts bonds based on a refunding efficiency approach.[1] In the past, refunding decisions by the STO were based solely on a present value (PV) cashflow savings threshold test. In the future, in addition to PV savings, the STO will also consider in its decision the forfeited option value of the refunded bonds. In case the refunding bonds are also callable, their option value should also be incorporated.

Hedging motivation & implicit borrowing

- Practitioners emphasize desire to "lock-in" of interest "savings" in advance refunding
- As paper shows, really two effects
  - Interest-rate hedging
  - Implicit borrowing w/ advance refunding rather than interest savings

Cash flows of alternative funding strategies



Comments: Hedging in an imperfect world

- Hedging component: Shift resources from post-call date low-interest rate states to high-interest rate states
  - Can be replicated with (forward) interest-rate swap
- Transaction costs comparison not clear
  - Paper emphasizes costs of advance refunding (most of which are not incremental), but interest-rate derivatives are costly, too (incl. political risk – see recent wave of derivative terminations & lawsuits)
  - Some estimates suggest swap costs of 2% of notional for muni clients
- Basis risk
  - Paper: *''Thus, for municipal rates in general, most of the variation is due to variables that are trivial to hedge using widely traded instruments.''*
  - But conventional interest-rate derivatives do not hedge muni-specific credit and liquidity risks
  - Example: Post-2008 many muni issuers faced swap losses and rising variable muni yields at the same time

Comments: Implicit borrowing in an imperfect world

- Implicit borrowing component: Shift issuer resources from from post-call date periods pre-call date periods
  - A financially/politically constrained issuer may not have access to other instruments to replicate this
  - Selling interest-rate puts (i.e., floors) would allow to replicate. Not clear whether feasible.
- Advance refunding may not necessarily be an unreasonable policy for a financially constrained issuer
  - May be used to circumvent political budget constraints, but are these constraints always socially optimal?
  - If not, tradeoff: option value vs. benefit from relaxing constraint

Conclusion

- Paper is clear about option value destruction, but too casual in dismissing possible motivations for advance refunding in an imperfect world
- Aggregate "loss" numbers in this paper misleading concerning true damage for taxpayers
  - aggregate loss zero in efficient muni bond market
  - heterogeneity between "winners" and "losers" among muni taxpayers
- More research needed to understand reasons for advance refunding
  - is borrowing from future low-interest rate states a sensible policy?
  - provide estimates of incremental transaction costs of advance refunding compared with alternatives
  - how much should municipalities be concerned about basis risk?
  - dig deeper on characteristics that drive heterogeneity between "winner" and "loser" issuers