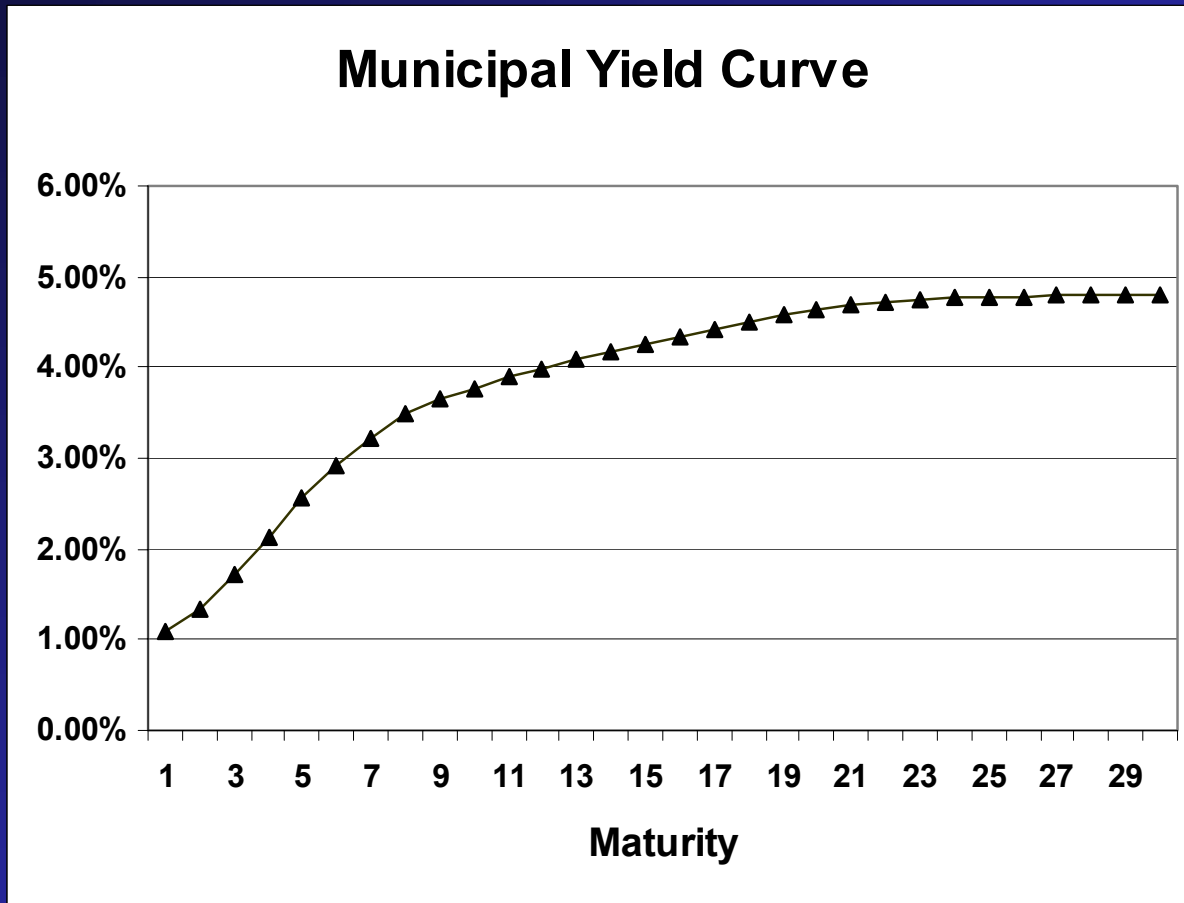

(Thinking About)
Hedging Municipal Portfolios
with Derivatives

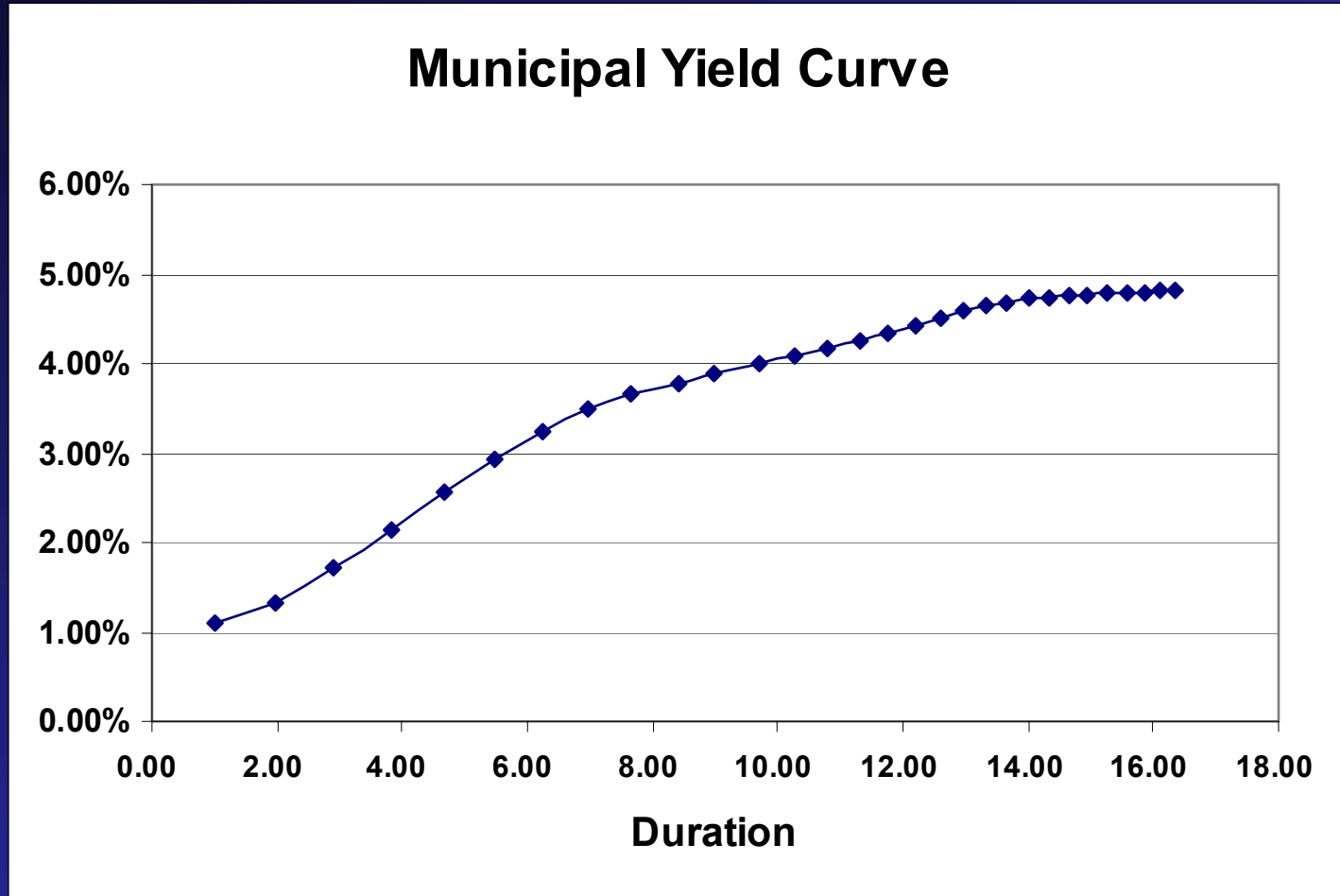
Cadmus Hicks
February 20, 2003

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Why is duration so long?



Why is duration so long?

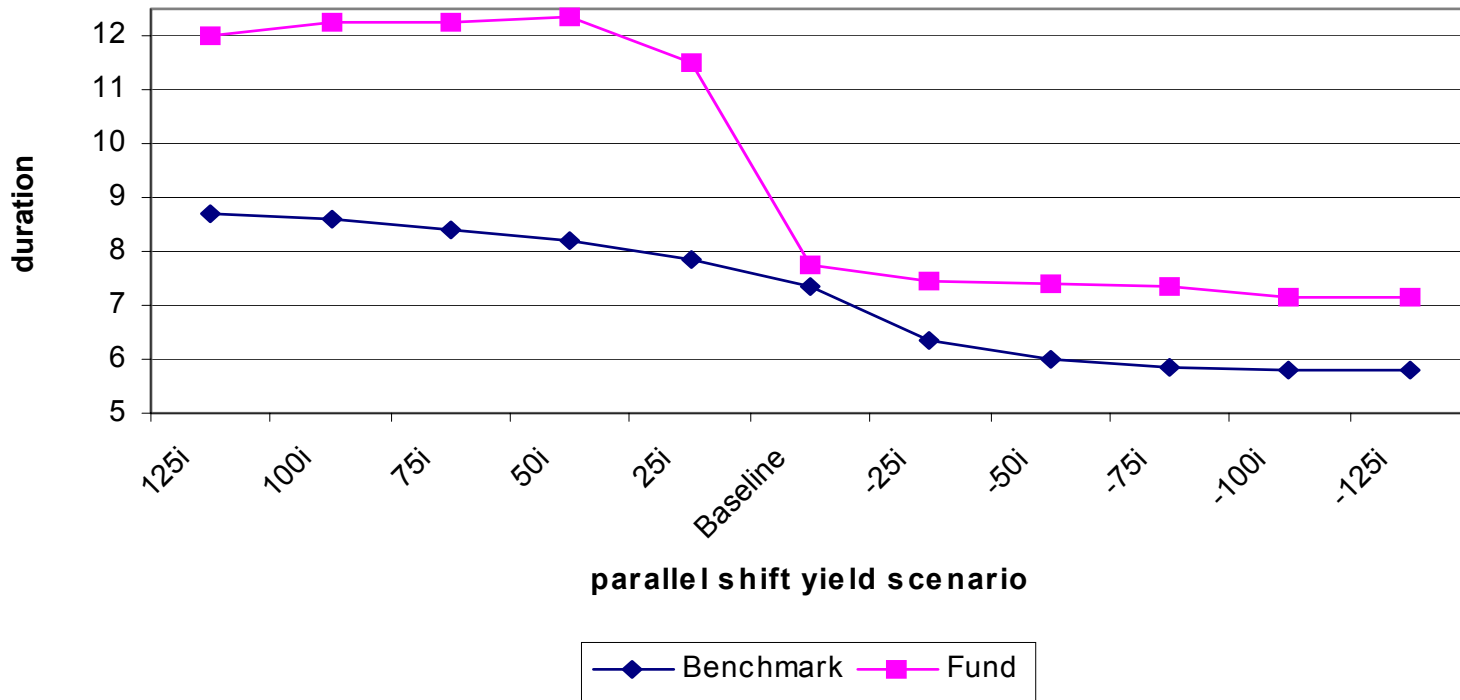


The Challenge

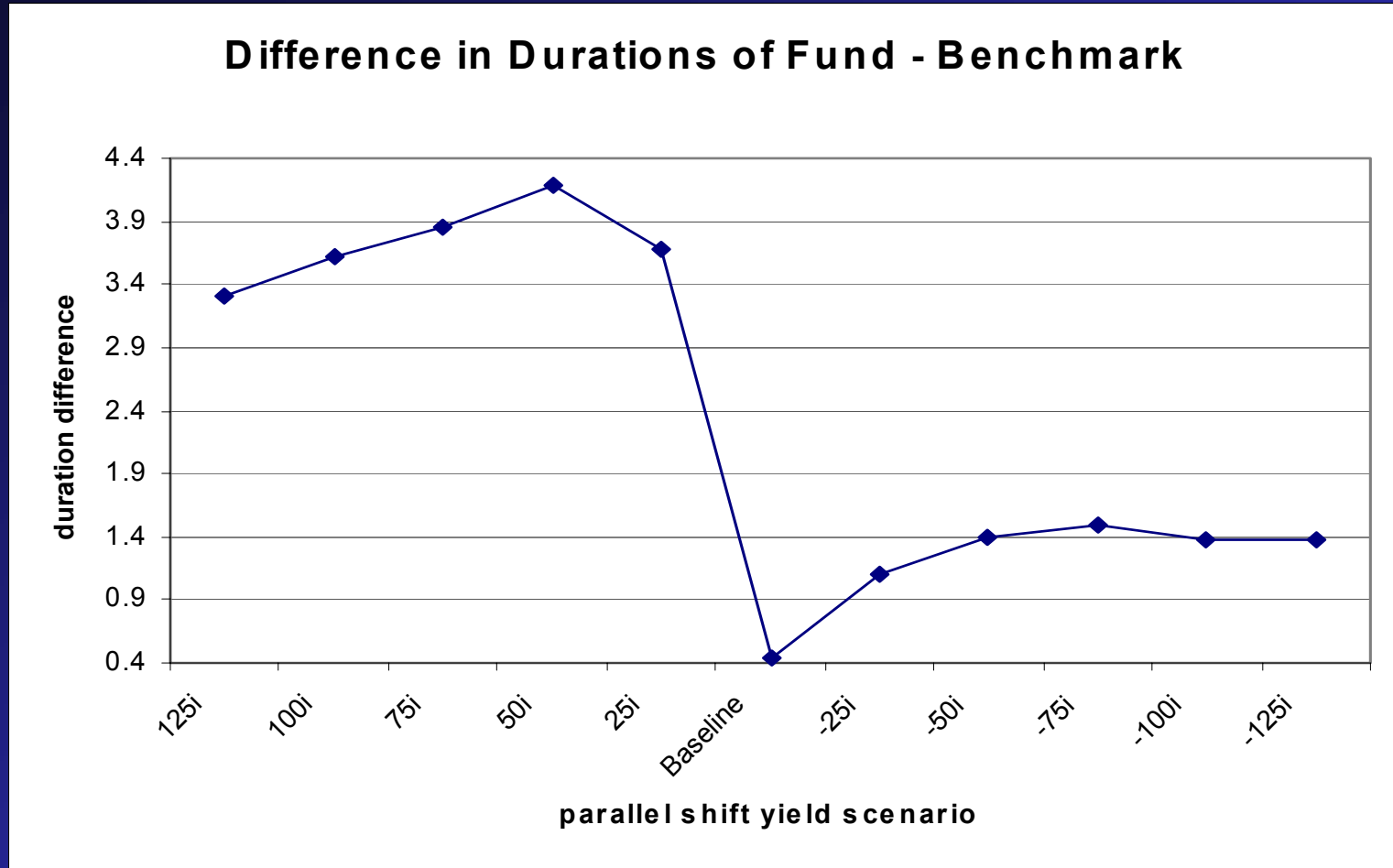
- To reduce the price volatility of a fund to match that of a benchmark.

Moving Target, Moving Train

Parallel Shift: Durations of Fund vs. Benchmark



Moving Target, Moving Train



The Bond Buyer 40

TV = Theoretical value of the contract

I = Index value

SMR= Short-term municipal rate

LMR= Long-term municipal rate

DR = Days remaining until expiration

CGTR= Capital gains tax rate

The Bond Buyer 40

$$TV = I + I \frac{(SMR - LMR) \frac{DR}{360}}{1 - CGTR}$$

The Bond Buyer 40

Advantages:

In use for many years.

No counterparty risk.

Disadvantages:

Low trading volume, low liquidity.

Underlying Index subject to manipulation.

MMD Rate Locks

- Maturity: 2023 Yield:
4.65%
- Value of 1 bp per \$1 million: \$1,289
- 5 bp spread x DV01/\$1MM: \$6,443
- Effect of spread on return: 64 bp
- Annualized effect: 258 bp.

MMD Rate Locks

Assume:

Portfolio = \$100MM

Average Life = 15 Years

Average Duration = 11 years

DV01 = \$110,000

MMD Rate Locks

Assume Target:

Average Life = 10 Years

Average Duration = 8.25 years

DV01/\$MM = \$825

Target DV01 of Portfolio = \$82,500

MMD Rate Locks

Actual DV01 = \$110,000

Target DV01 = \$ 82,500

Hedge Need = \$ 27,500

DV01/\$MM of 10 year MMD = \$825

$\$27,500 / \$825 = 33$ contracts

MMD Rate Locks

Hedge Need = \$ 27,500

DV01/\$MM of 15 year MMD = \$1,100

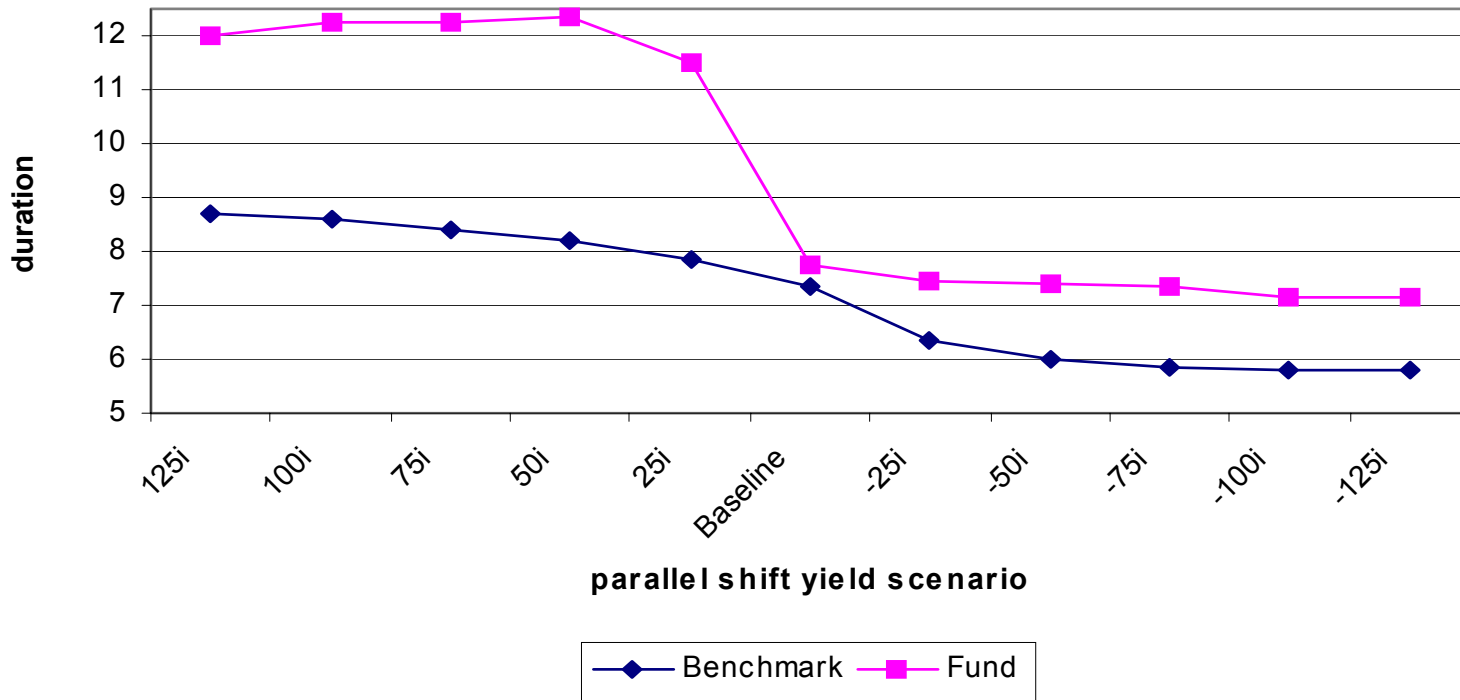
$\$27,500 / \$1,100 = 25$ contracts

DV01/\$MM of 20 year MMD = \$1,300

$\$27,500 / \$1,300 = 21$ contracts

Moving Target, Moving Train

Parallel Shift: Durations of Fund vs. Benchmark



MMD Rate Locks

Advantages:

- Can take position on specific maturity.

- Simple to track value.

Disadvantages:

- Counterparty risk.

- Large bid/ask spread.

BMA Swaps

Advantages:

Can take position on specific maturity.

Bid/Ask spread of 3 basis points.

Disadvantages:

Counterparty risk.

Negative carry lowers tax-exempt income.

Less liquid than LIBOR swaps.

Forward Starting BMA Swaps

R_1 = 1-year BMA rate = 1.26%

R_{20} = 20-year BMA rate = 4.20%

F_{19} = Rate on 19-year swap that starts in
1 year.

(To simplify, illustration assumes annual compounding.)

Forward Starting BMA Swaps

$$(1 + R_1)^1 * (1 + F_{19})^{19} = (1 + R_{20})^{20}$$

$$1.0126^1 * (1 + F_{19})^{19} = 1.042^{20}$$

To simplify, illustration assumes annual compounding

Forward Starting BMA Swaps

$$(1 + F_{19})^{19} = \left(\frac{2.277}{1.0126} \right)$$

$$(1 + F_{19}) = \left(\frac{2.277}{1.0126} \right)^{\frac{1}{19}}$$

Forward Starting BMA Swaps

$$(1 + F_{19}) = 1.0435$$

$$F_{19} = 4.35\%$$

Forward Starting BMA Swaps

Advantages:

Can take position on specific maturity.

Capital gains/losses do not affect income.

Disadvantages:

Counterparty risk.

Less liquid than LIBOR swaps.

Forward start costs more.

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