

Resolution:

$$(P + A)[1 + (r/s)(i/2)] = [(r'/s)(C/2)]v + (C/2) a_n + 100 v^n \quad \text{or}$$

$$(P + .825820)[1 + (30/183)(.0979/2)] = [(61/183)(9.75/2)](.953334) + (9.75/2)(8.915975) + 100(.563563)$$

$$(1) (P + .825820)[1 + .008025] = 1.549168 + 43.465378 + 56.3563$$

$$(2) (P + .825820)[1.008025] = 101.370846$$

$$(3) (P + .825820) = 101.370846 / 1.008025$$

$$(4) (P + .825820) = 100.563821$$

$$(5) P = 100.563821 - .825820$$

$$(6) P = 99.738001$$

$$(7) P = 99.738$$

### III. Formulas for Conversion of Inflation-Protected Security Yields to Equivalent Prices

Definitions:

P = unadjusted or real price per 100 (dollars)

P<sub>adj</sub> = inflation adjusted price; P × Index Ratio<sub>Date</sub>

A = unadjusted accrued interest per \$100 original principal

A<sub>adj</sub> = inflation adjusted accrued interest; A × Index Ratio<sub>Date</sub>SA = settlement amount including accrued interest in current dollars per \$100 original principal; P<sub>adj</sub> + A<sub>adj</sub>

r = days from settlement date to next coupon date

s = days in current semiannual period

i = real yield, expressed in decimals (e.g., 0.0325)

C = real annual coupon, payable semiannually, in terms of real dollars paid on \$100 initial, or real, principal of the security

n = number of full semiannual periods from issue date to maturity date, except that, if the issue date is a coupon frequency date, n will be one less than the number of full semiannual periods remaining until maturity. Coupon frequency dates are the two semiannual dates based on the maturity date of each note or bond issue. For example, a security maturing on July 15, 2026 would have coupon frequency dates of January 15 and July 15.

v<sup>n</sup> = 1/(1 + i/2)<sup>n</sup> = present value of 1 due at the end of n periodsa<sub>n</sub> = (1 - v<sup>n</sup>)/(i/2) = v + v<sup>2</sup> + v<sup>3</sup> + \* \* \* + v<sup>n</sup> = present value of 1 per period for n periods

Date = valuation date

D = the number of days in the month in which Date falls

t = calendar day corresponding to Date

CPI = Consumer Price Index number

CPI<sub>M</sub> = CPI reported for the calendar month M by the Bureau of Labor StatisticsRef CPI<sub>M</sub> = reference CPI for the first day of the calendar month in which Date falls,e.g., Ref CPI<sub>April</sub> is the CPI<sub>January</sub>Ref CPI<sub>M+1</sub> = reference CPI for the first day of the calendar month immediately following DateRef CPI<sub>Date</sub> = Ref CPI<sub>M</sub> + [(t - 1)/D][Ref CPI<sub>M+1</sub> - Ref CPI<sub>M</sub>]Index Ratio<sub>Date</sub> = Ref CPI<sub>Date</sub>/Ref CPI<sub>IssueDate</sub>

A. For inflation-protected securities with a regular first interest payment period:

Formulas:

$$P = \frac{(C/2) + (C/2)a_n + 100v^n}{1 + (r/s)(i/2)} - [(s-r)/s](C/2)$$

P<sub>adj</sub> = P × Index Ratio<sub>Date</sub>

A = [(s - r)/s] × (C/2)

A<sub>adj</sub> = A × Index Ratio<sub>Date</sub>SA = P<sub>adj</sub> + A<sub>adj</sub>Index Ratio<sub>Date</sub> = Ref CPI<sub>Date</sub>/Ref CPI<sub>IssueDate</sub>

Example:

We issued a 10-year inflation-protected note on January 15, 1999. The note was issued

at a discount to yield of 3.898% (real). The note bears a 3 7/8% real coupon, payable on July 15 and January 15 of each year. The base CPI index applicable to this note is 164. (We normally derive this number using the interpolative process described in Appendix B, section I, paragraph B.)

Definitions:

C = 3.875

i = 0.03898

n = 19 (There are 20 full semiannual periods but n is reduced by 1 because the issue date is a coupon frequency date.)

r = 181 (January 15, 1999 to July 15, 1999)

s = 181 (January 15, 1999 to July 15, 1999)

Ref CPI<sub>Date</sub> = 164Ref CPI<sub>IssueDate</sub> = 164