



# WHAT SHOULD CPPIs MEASURE? PRICE INDICES & OTHER INDICATORS



PROFESSOR DAVID GELTNER, PHD - MASSACHUSETTS INSTITUTE OF  
TECHNOLOGY  
CPPI HANDBOOK 2<sup>ND</sup> DRAFT CHAPTER 4

PREPARATION OF AN INTERNATIONAL  
HANDBOOK ON  
COMMERCIAL PROPERTY PRICE  
INDICATORS

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## WHAT SHOULD CPPIs AIM TO MEASURE?...

- 1) Start with Quality-controlled (“same-property”) Asset Values:  $VA_t$  (unadjusted). Relates to observed values of same property at two points in time. Diewert-Shimizu terminology: “Asset Value Price Index (PA)”. **Most directly useful CRE Asset Price Index for Financial System Oversight & Investment Industry.**
- Together with data on Capital Improvement Expenditures ( $CE_t$ ) and Depreciation ( $D_t$ ), provides:
- 2) Quality-controlled (“same-property”) Asset Values:  $VA_t$  adjusted for  $CE_t$  and  $D_t$ . **Label this index the “CPPI.”** Diewert-Shimizu terminology: “Accounting Price Index (P).” **Most useful CRE Asset Price Index for National Accounts.** (Can in principle equally well start with (2) and go to (1) with  $CE_t$  &  $D_t$  data.)
- Together with data on Building Construction Prices ( $BCCI_t$ ) and Land Value Fractions ( $VL_t/VA_t$ ), provides:
- 3) Pure Price (Quantity Constant) & Pure Quantity (Price Constant) Entries and Indices for Structures and Land.

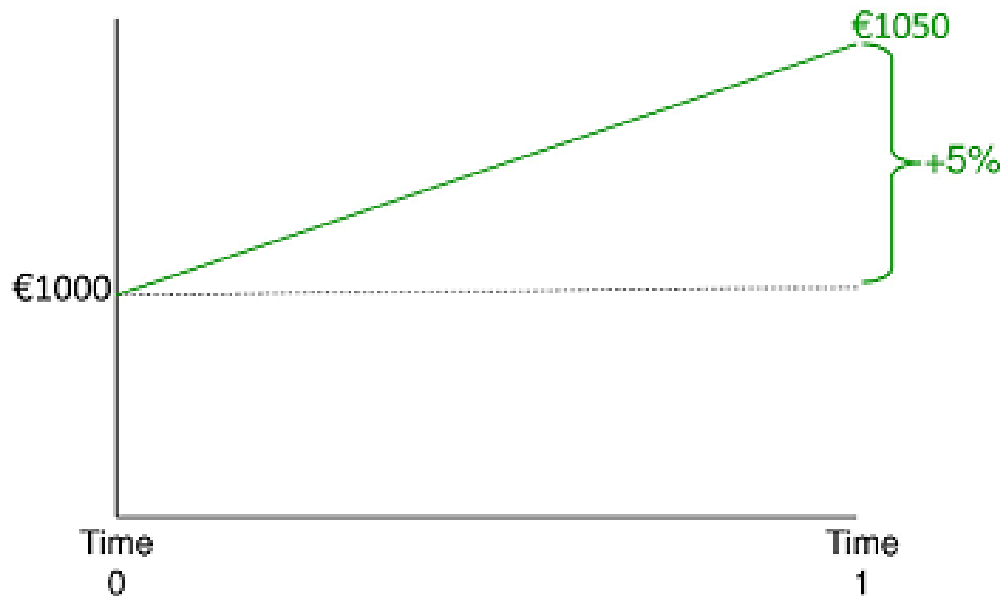
***Considerable Flexibility in Type of “Starting Point Index.”***

See numerical example as follows...

## WHAT SHOULD CPPIs MEASURE?...

Property “A”:  $VA_0$  = Asset value at beginning of period = €1000

$VA_1$  = Asset value at end of period (unadjusted) = €1050



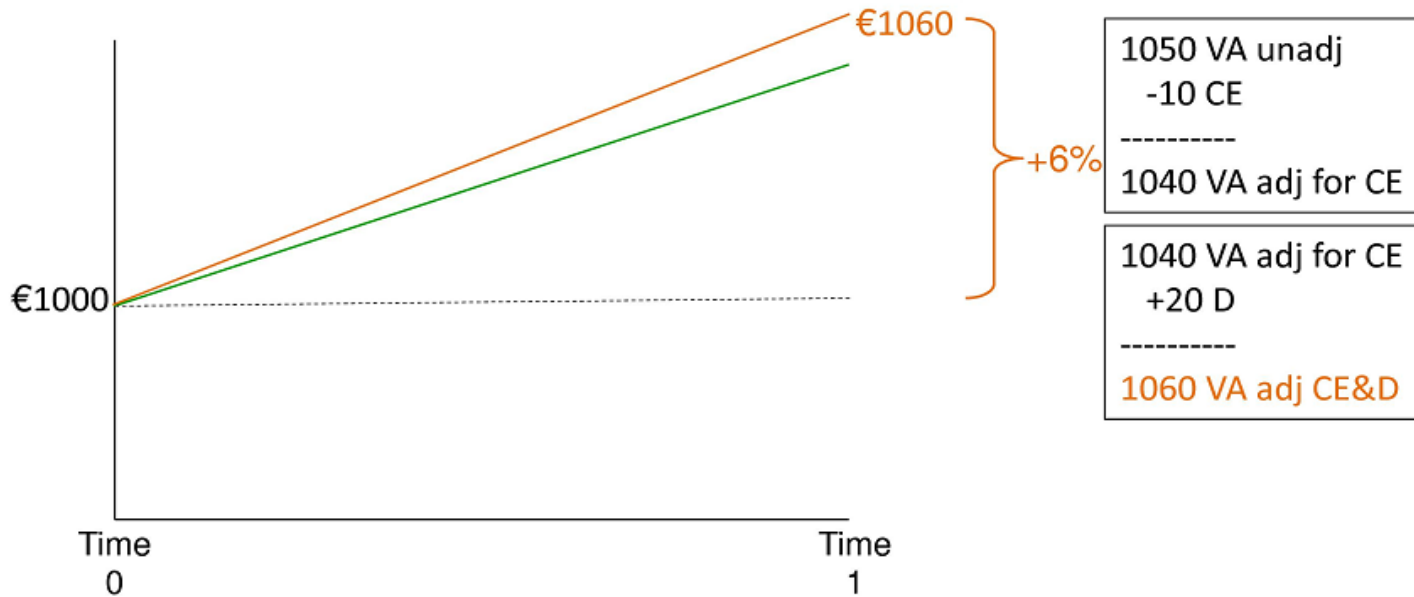
**Same-Property Asset Value Change (VA)** is the starting point :

- Most directly observable empirical metric. Easiest to build a good index.
- Directly reflects the traded good (whole asset), PriceXQuant for Land+Struct.
- Directly relevant & useful for financial oversight (FSIs).
- Directly relevant & useful for investors (what owner experiences).
- Diewert-Shimizu terminology: “Asset Value Price Index (PA).”

# WHAT SHOULD CPPIs AIM TO MEASURE?...

Property “A”: Some of the value increase due to CapEx:  $CE_1 = €10$ .

Some value increase is held down due to structure depreciation:  $D_1 = €20$ .



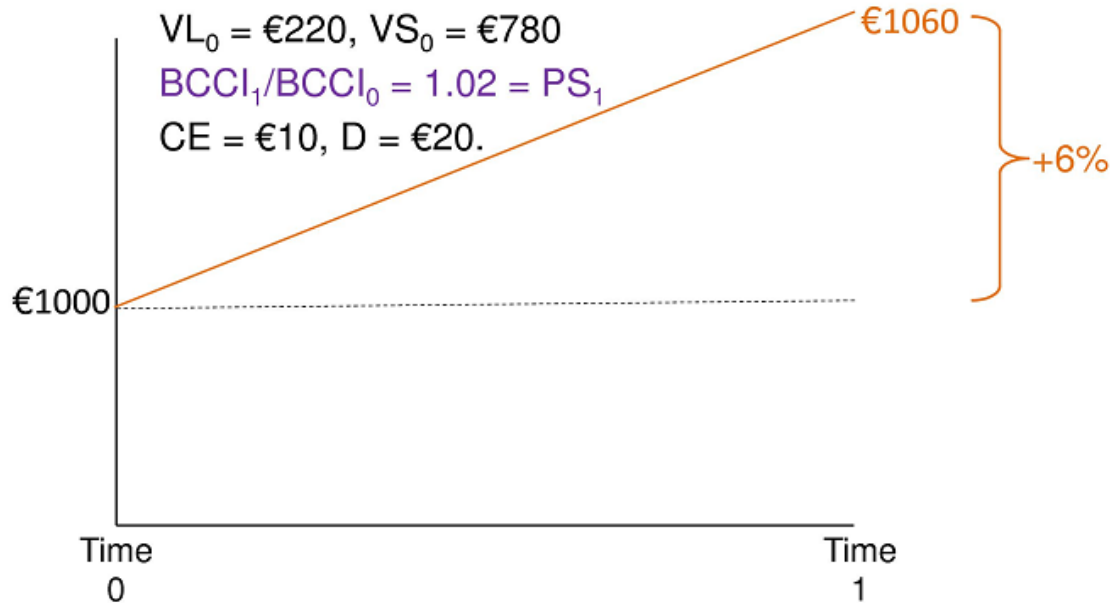
## “CPPI” is Property Price Index Adjusted for CapEx & Depreciation:

- Asset value (VA) net of CapEx and gross of Depreciation.
- Represents Pure Price Change for Whole Asset Holding Quantity Constant.
- Requires Same-property Price Index (VA unadjusted, “starting point”).
- Requires empirical information on Capital Improvement Expenditure (CE).
- Requires empirical information on Structure Depreciation (D).
- Diewert-Shimizu terminology: “Accounting Price Index (P).”

# WHAT SHOULD CPPIs AIM TO MEASURE?...

Property “A”:  $VA_0$  = Asset value (adjusted) at beginning of period = €1000

$VA_1$  = Asset value (adjusted) at end of period = €1060



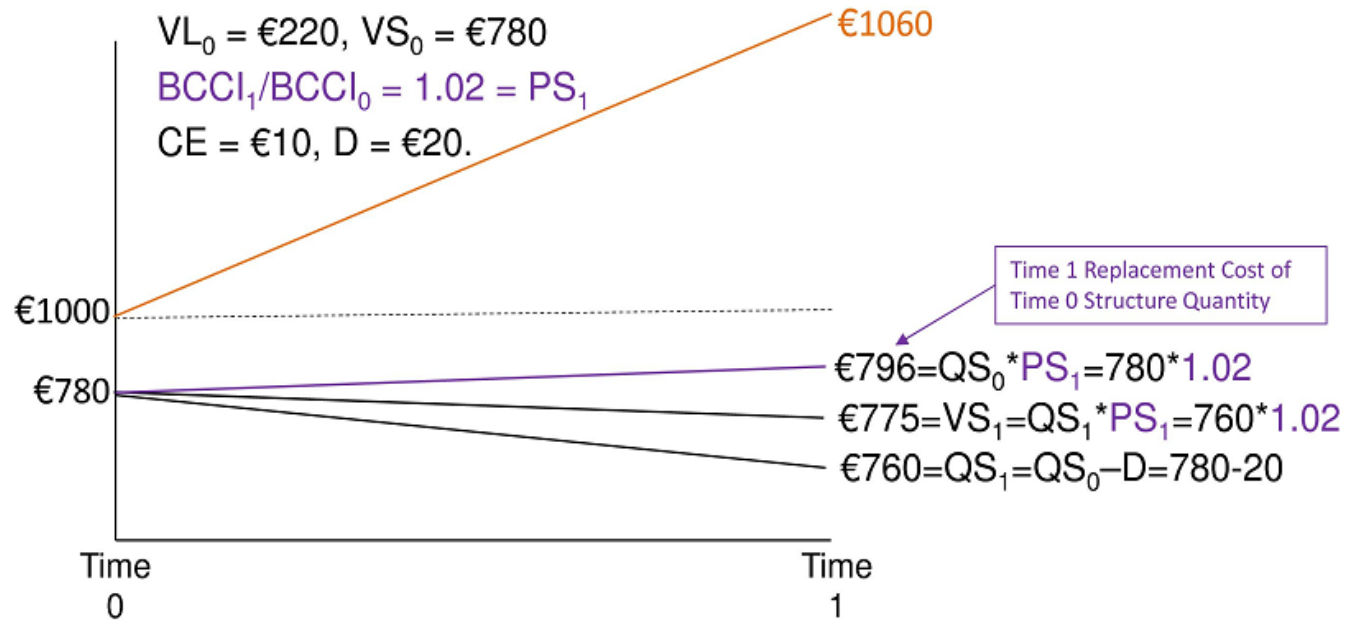
## “CPPI” is Property Price Index Adjusted for CapEx & Depreciation:

- Needs to be broken out into Land & Structure, Price & Quantity components.
- Requires Building Construction Cost Index (BCCI), to track Structure Price (PS).
- Requires Land/Structure Value ( $VL_0, VS_0$ ) Information at Beginning of Period.
- Easiest and most reliable land/structure value observations when structure is newly constructed (asset first enters accounting books).

# WHAT SHOULD CPPIs AIM TO MEASURE?...

Property "A":  $VA_0$  = Asset value (adjusted) at beginning of period = €1000

$VA_1$  = Asset value (adjusted) at end of period = €1060



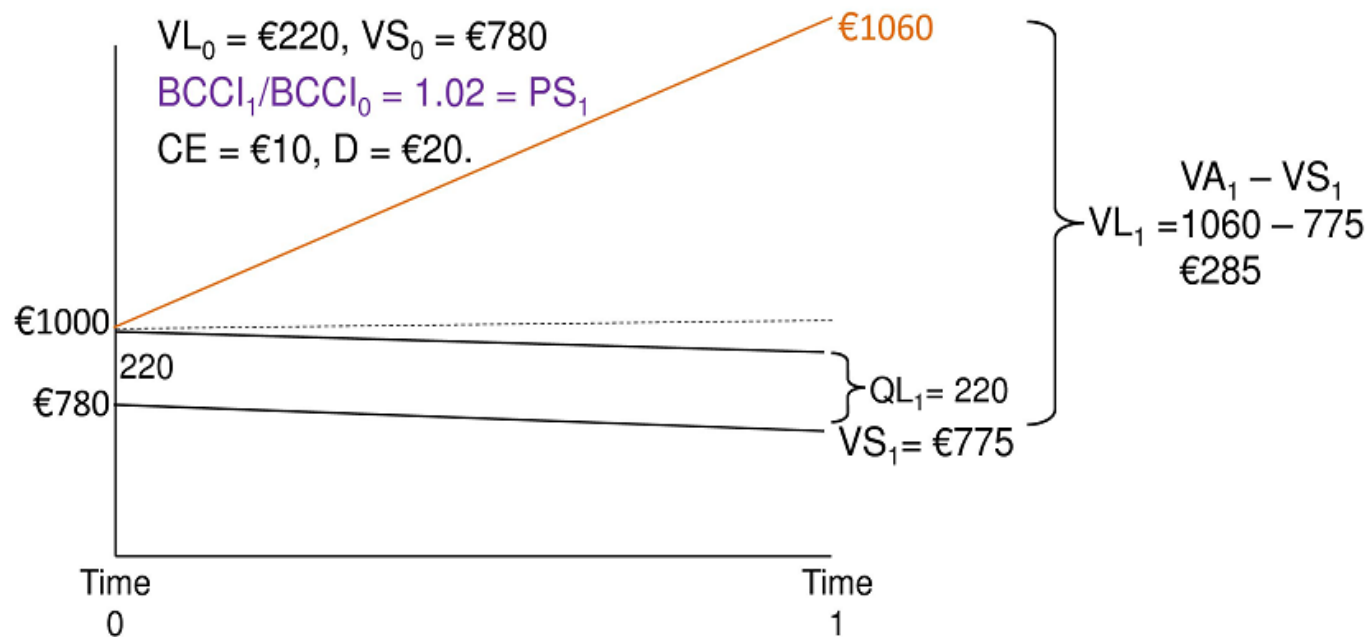
## Structure Price Index (BCCI) & Depreciation Info Tracks Structure Value:

- Structure Quantity (QS) Declines with Depreciation ( $D = €20$ ):  $780 \rightarrow 760$ .
- Structure Price (PS) Changes with BCCI ( $PS_1 = 1.02$ ):  $780 * 1.02 = €796$ .
- Structure Value is Quantity X Price:  $VS_1 = QS_1 * PS_1 = 760 * 1.02 = €775$ .

# WHAT SHOULD CPPIs AIM TO MEASURE?...

Property "A":  $VA_0$  = Asset value (adjusted) at beginning of period = €1000

$VA_1$  = Asset value (adjusted) at end of period = €1060



## Land Value Tracked As Residual, Land Quantity Constant:

- Residual Theory of Land Value:  $VL_1 = VA_1 - VS_1 = 1060 - 775 = €285$ .
- Land Quantity Constant (SNA: Land neither produced nor consumed):
- $QL_1 = QL_0 = 220 = \text{Fixed at initial: } VA_0 - VS_0 = 1000 - 780 = 220$

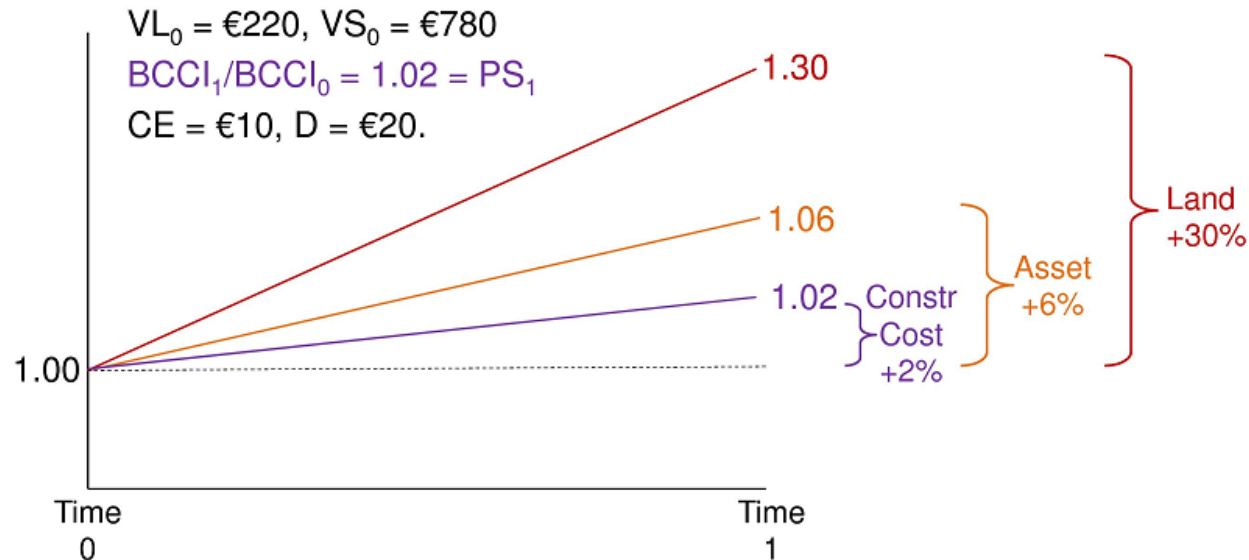




# WHAT SHOULD CPPIs AIM TO MEASURE?...

Property “A”:  $VA_0$  = Asset value (adjusted) at beginning of period = €1000

$VA_1$  = Asset value (adjusted) at end of period = €1060

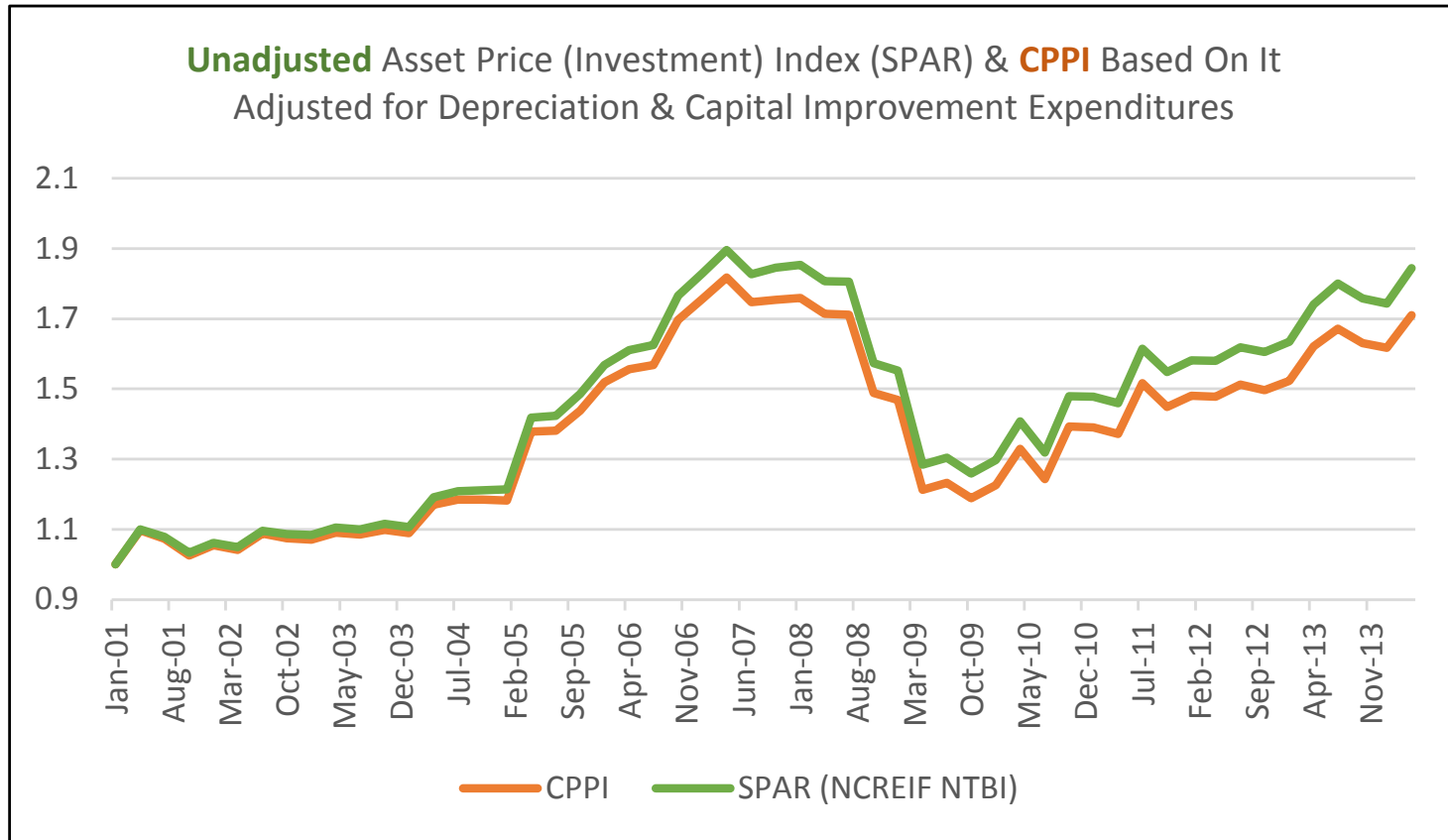


**Price Indexing (set to 1.00 in base period):**

- Commercial Land Price Index (CLPI) Derived From:
- Adjusted Commercial Property Price Index (CPPI), and:
- Building Construction Cost Price Index (BCCI), with CPPI adjusted from original:
- Unadjusted Same-Property (Quality Controlled) Asset Value Index (e.g., SPAR)
- Using data on CapEx (CE) & Depreciation (D)...

# WHAT SHOULD CPPIs AIM TO MEASURE?...

Real World Example with Realistic Data & Values:  
NCREIF-based TBI (SPAR type investment capital return index)...



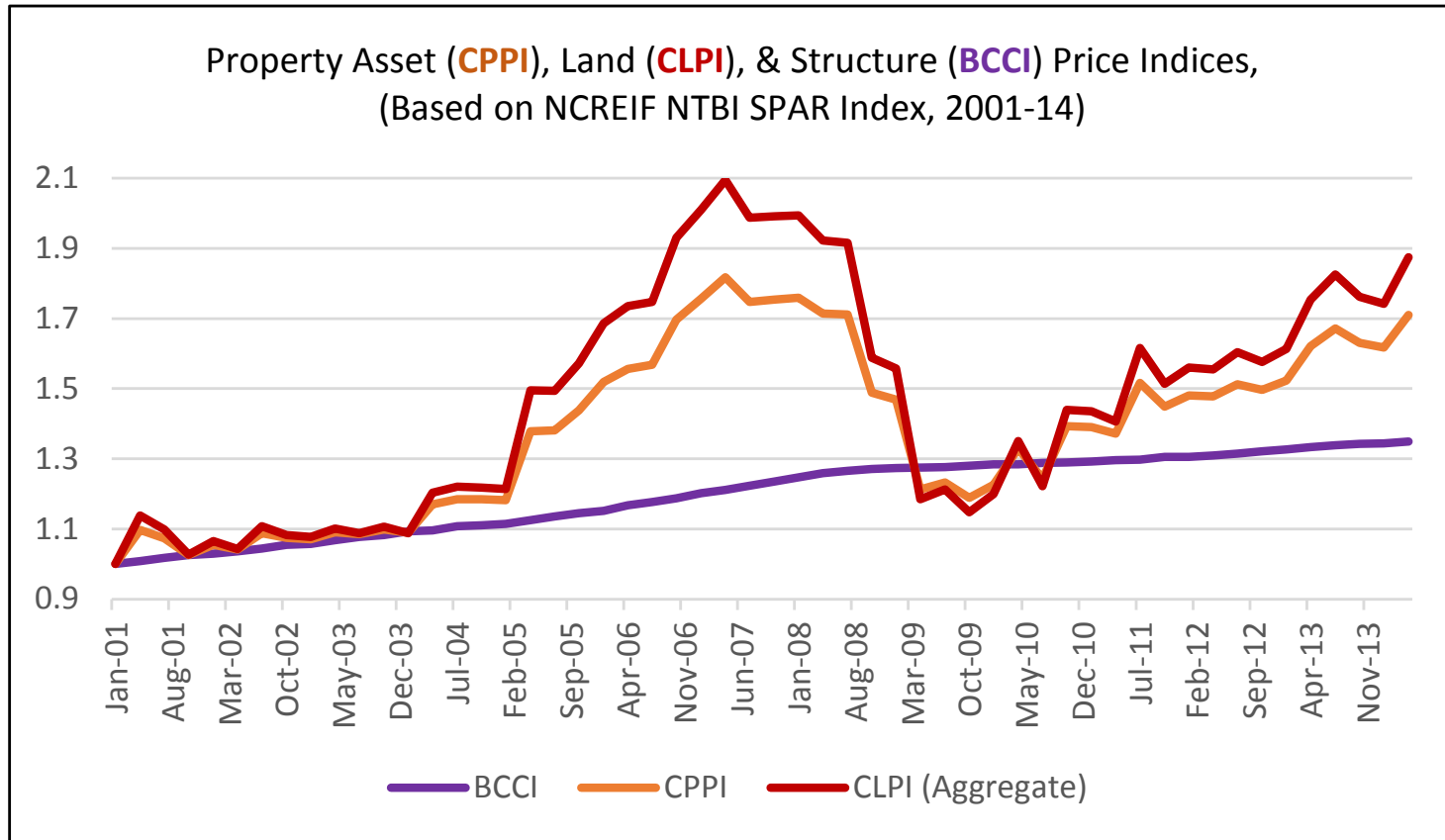
Step 1:

Adjusting the Investment Capital Return Index for CE & Depreciation  
From **SPAR** to **CPPI**.

Diewert-Shimizu labels: From **PA** → **P**

# WHAT SHOULD CPPIs AIM TO MEASURE?...

Real World Example with Realistic Data & Values:  
NCREIF-based TBI (SPAR type investment capital return index)...



Step 2:

Deriving the **Land Price Index** from the **CPPI** & **BCCI** using the Residual Theory:

From **CPPI** & **BCCI** to **CLPI**.

Diewert-Shimizu labels: From **P** → **PS** & **PL**

## WHAT SHOULD CPPIs AIM TO MEASURE?...

### Required Data:

1. Starting Point: The Best Possible Same-Property (Quality-Controlled) Property Asset Value Index (maybe SPAR, maybe Repeat-Sales, maybe Hedonic, maybe Appraisal-based, maybe Stock Market-based, etc. Topic for Chs.5&6 Session 2 this afternoon). Note: This Starting Point is valuable in its own right, and private sector tends to produce & publish (without burdening govt budget).
2. The Best Possible Capital Improvement Expenditure (CE) data (many NSIs already obtain some such data for GFC & Cap Svcs accounts).
3. The Best Possible Depreciation (D) data (many NSIs already obtain some such data for GFC & Cap Svcs accounts).
4. The Best Possible Construction Cost Price Index (BCCI) data (many NSIs already obtain some such data for GFC & Cap Svcs accounts).
5. Data on land value fractions at time of development (an area that needs improvement but NSIs are working on this).

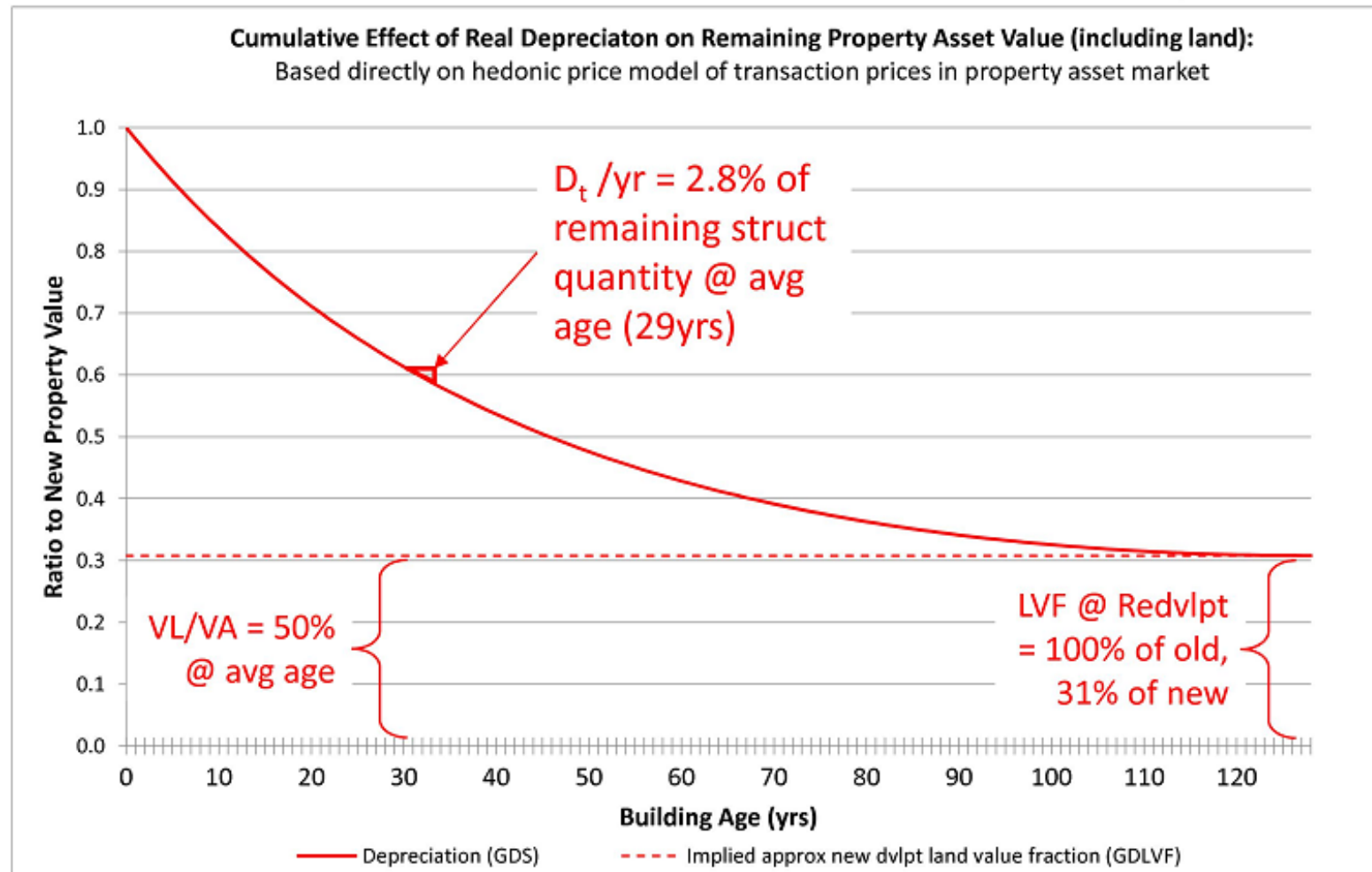
***This framework allows great flexibility in the type of starting-point index.***

# WHAT SHOULD CPPIs AIM TO MEASURE?...

## Required Data:

Example of **Depreciation & Land Value Fraction Empirical Data**

(From U.S. Real Capital Analytics Inc. Commercial Property Transactions Database:  
73,000 transaction observations 2001-14...)







# Thank you!

Comments to: Prof. David Geltner -  
[dgeltner@mit.edu](mailto:dgeltner@mit.edu)

Project WorkSpace: HENDYPLAN –  
[www.hendyplan.com](http://www.hendyplan.com)