Overview

Foundations • *The Valuation Engineer*
Bert Craytor, Editor• July 9, 2026
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Foundations publishes precise, citable treatments of concepts that underlie modern valuation methodology. Entries take terms working appraisers encounter — sometimes by other names, sometimes without recognizing them — and place them in their formal context: where they come from, what they mean technically, where they appear in practice, and why they matter for defensibility.

The inaugural issue establishes the six core concepts of the hedonic framework, arranged so that each entry builds on the vocabulary of the previous ones. The sequence runs from *Heterogeneous Good* (the property of real estate that makes valuation methodology necessary at all), through *Characteristics Space* and the *Hedonic Price Function* (the formal apparatus that organizes the bundle of attributes a property represents), through *Implicit Price* and *Hedonic Regression* (how the marginal contribution of each attribute is recovered from market evidence), and finally to *Latent Variable* (what the unrecovered residual signal in any hedonic model actually represents).

A single running example — eight comparables from a Pacifica, California neighborhood — runs through all six entries and is the issue's pedagogical thread.

Why these six, in this order

The choice of the six entries is not arbitrary. Each concept is load-bearing for modern hedonic methodology, each is genuinely encountered in everyday appraisal practice, and each is misunderstood or unnamed often enough that putting it in a citable form has practical value.

The ordering is dictated by conceptual dependency. *Heterogeneous good* is the root: it names the property of real estate (and used cars, and labor markets, and a few other goods) that makes the entire hedonic framework necessary. *Characteristics space* is the formal apparatus for representing heterogeneous goods as vectors; nothing further can be said precisely without it. The *hedonic price function* is the equilibrium object that maps points in characteristics space to prices. *Implicit prices* are its partial derivatives — the marginal contributions that every adjustment on a sales-comparison grid can be read as asserting, whether or not the appraiser names them as such. *Hedonic regression* is the empirical estimator that recovers implicit prices from observed transactions; this is the entry where theory becomes data analysis. *Latent variables* pick up where the regression's residuals begin: the unobserved attributes whose effects survive in the residual as structured signal rather than discardable noise.

A reader who proceeds in this order should come away with a continuous thread from "why does valuation methodology exist at all?" to "what should we make of the residuals in a fitted model?" — a journey that, in the author's experience, most appraisers traverse only piecemeal over many years of practice.

The running example

A single dataset of eight Pacifica, California residential comparables runs through all six entries:

Comp	GLA (sf)	Lot (sf)	View	Cond.	Sale price
A	1,650	9,000	yes	good	$1,425,000
B	1,650	7,200	no	good	$1,280,000
C	1,850	7,500	no	good	$1,407,500
D	1,450	7,000	no	good	$1,155,000
E	1,700	8,000	yes	excellent	$1,470,000
F	1,550	7,100	no	average	$1,177,500
G	1,700	10,500	no	good	$1,392,500
H	1,600	7,300	no	good	$1,312,500

The example is deliberately small enough to be reasoned about by hand and rich enough to exercise each concept. Entry 001 examines the $145,000 difference between Comps A and B as the joint contribution of two characteristics (view and lot) entangled in a single paired-sales observation. Entry 002 places all eight comps as points in a four-dimensional characteristics space and shows that naive distance metrics misrank them. Entry 003 proposes a functional form for the hedonic price function on this neighborhood. Entry 004 recovers the implicit prices analytically and decomposes the original A-vs-B difference into a $127,039 contribution from view and lot, with $18,000 unaccounted for. Entry 005 fits the model formally in R and reports the full `lm()` output, including standard errors and residuals. Entry 006 examines the one residual that the model cannot explain — a +$46,455 deviation on Comp H — and connects it to the latent-variable framing that underlies the Residual Constraint Approach methodology developed elsewhere by the author.

The dataset is available in the issue's repository at `shared/data/pacifica_comps.csv` for readers who wish to reproduce any of the calculations.

How to read this issue

A reader new to hedonic methodology should read the six entries in order. The dependencies are real: each entry assumes the vocabulary established in the previous ones, and skipping ahead invites confusion that the entries themselves cannot anticipate.

A reader with prior exposure to hedonic regression — which includes most appraisers who have taken an advanced statistics course, worked with an AVM, or read the mass-appraisal literature — can use the issue as a refresher and a reference. The entries are written to be citable atomically; an article published elsewhere in the journal that references *implicit price* can link to entry 004 by DOI rather than re-deriving the concept.

A reader interested specifically in the Residual Constraint Approach methodology should read entry 006 first to understand the latent-variable framing, then circle back to entries 003-005 for the hedonic apparatus that RCA extends, then to entries 001-002 for the foundational vocabulary on which everything rests.

A reader interested in the question of *what makes an appraisal adjustment defensible* will find that the "Why it matters for defensibility" section of each entry, read in sequence, amounts to a short essay on the methodological standing of adjustment-based valuation. That essay is not assembled explicitly anywhere in the issue, but it is the implicit subject of every entry.

Editorial posture

Foundations is not a textbook department. Each entry is short enough to read in one sitting, written for an audience already fluent in appraisal practice, and designed to give a precise formulation of a

concept rather than a comprehensive exposition. The goal is to provide a stable referent that other articles in the journal can cite.

Entries are reviewed editorially and may carry invited commentary from a subject-matter expert. They are published under a Creative Commons Attribution license and assigned DOIs through both Crossref (as the canonical citation) and Zenodo (as the versioned archive). Each entry may be sharpened over time — minor revisions update the Zenodo version, major revisions update both DOIs with an editorial note describing the change. The Crossref DOI always resolves to the most recent version; specific historical versions are addressable through Zenodo.

Future issues will extend the *Foundations* vocabulary into adjacent areas: spatial dependence, conditional expectation, endogeneity, omitted-variable bias, identification, and the formal apparatus that distinguishes proxy variables from latent variables. Suggestions for concepts that deserve treatment are welcome and may be sent to the editor.

The six entries in this issue:

1. **Heterogeneous Good** — why valuation methodology must exist at all.
2. **Characteristics Space** — the vector representation of bundle attributes.
3. **Hedonic Price Function** — the equilibrium mapping from characteristics to prices.
4. **Implicit Price** — the marginal market price of each characteristic.
5. **Hedonic Regression** — estimating the function from observed transactions, with a full R worked example.
6. **Latent Variable** — recovering structured signal from residuals.

References.

Court, A. T. (1939). Hedonic Price Indexes with Automotive Examples. In *The Dynamics of Automobile Demand*. General Motors Corporation.

Lancaster, K. J. (1966). A New Approach to Consumer Theory. *Journal of Political Economy*, 74(2), 132–157.

Rosen, S. (1974). Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition. *Journal of Political Economy*, 82(1), 34–55.

Craytor, B. (2025). Residual Constraint Approach: Framework & Protocol. Zenodo. doi:10.5281/zenodo.14787917

Addendum: Prolog Formalization

The following machine-readable companion (`000-overview.pl`) formalizes this entry in the journal's Prolog knowledge base. It is also published as a browsable galley alongside this article.

```
%% 000-overview.pl
%%
%% Prolog companion to Foundations Vol. 1, Issue 1, Overview
%%   Title:    Overview
%%   Author:   Bert Craytor, Editor
%%   Piece ID: foundations_overview
%%   Kind:     editorial_piece (not a concept; sits outside the dep graph)
%%
%% The Overview is an editorial piece, not a defined concept. Its .pl
%% companion records the issue's structure (which entries appear in
```

```
%% what reading order), the running example, and the reader pathways
%% the editor proposes for readers with different backgrounds.

% ====================================================================
% DICTIONARY IMPORT
% ====================================================================

:- use_module('../../../../tools/dictionary/dictionary').
:- dictionary_release('dictionary-2026.1').

% --- From the dictionary (loaded via :- use_module above) -----------
% term(foundations_overview, "Overview", foundations_editorial,
%      "Editorial overview of a Foundations issue. Frames the concepts
%       covered, situates them within appraisal practice, and is not
%       itself a defined concept in the dependency graph.",
%      published, 'dictionary-2026.1').
%
% Plus the six concept terms covered by this issue (heterogeneous_good,
% characteristics_space, hedonic_price_function, implicit_price,
% hedonic_regression, latent_variable).
% --------------------------------------------------------------------

:- use_terms([ foundations_overview,
               heterogeneous_good, characteristics_space,
               hedonic_price_function, implicit_price,
               hedonic_regression, latent_variable,
               residual_constraint_approach ]).
:- use_relations([depends_on/2]).

% ====================================================================
% PIECE METADATA
% ====================================================================

article_piece(foundations_overview).
article_kind(overview).
article_issue(volume(1), number(1), year(2026)).
article_id('foundations.2026.overview').

% ====================================================================
% ISSUE STRUCTURE: the six concept entries in dependency-ordered sequence
% ====================================================================
%
% The published reading order. Each entry assumes vocabulary established
% in the previous ones. This is the same as queries:reading_order/1
% derived from the depends_on graph; recording it here lets readers and
% downstream tools query the issue's structure without invoking the
% topological-sort machinery.

issue_entry(1, heterogeneous_good).
issue_entry(2, characteristics_space).
issue_entry(3, hedonic_price_function).
issue_entry(4, implicit_price).
issue_entry(5, hedonic_regression).
issue_entry(6, latent_variable).

% Each entry's one-line theme as stated in the Overview's closing list.
entry_theme(heterogeneous_good,
    "Why valuation methodology must exist at all.").
entry_theme(characteristics_space,
```

```
    "The vector representation of bundle attributes.").
entry_theme(hedonic_price_function,
    "The equilibrium mapping from characteristics to prices.").
entry_theme(implicit_price,
    "The marginal market price of each characteristic.").
entry_theme(hedonic_regression,
    "Estimating the function from observed transactions, with a full R worked example.").
entry_theme(latent_variable,
    "Recovering structured signal from residuals.").

% ======================================================================
% THE RUNNING EXAMPLE
% ======================================================================
%
% A single dataset of 8 Pacifica residential comparables runs through
% all six entries. The data lives in kb/pacifica_comps.pl and is
% consulted by each entry that uses it. The Overview's role here is
% only to point at it.

running_example_dataset(pacifica_comps).
running_example_n_comps(8).
running_example_location(pacifica_california).

% Which entries exercise the dataset.
:- consult('../../kb/pacifica_comps').

% ======================================================================
% READER PATHWAYS
% ======================================================================
%
% The editor proposes four pathways through the issue, calibrated to
% the reader's background. These are advisory orderings; the canonical
% reading order is issue_entry/2 above.

reader_pathway(new_to_hedonic_methodology,
    "Read entries 1-6 in order. Dependencies are real and skipping invites confusion.",
    [heterogeneous_good, characteristics_space, hedonic_price_function,
     implicit_price, hedonic_regression, latent_variable]).

reader_pathway(prior_exposure_to_hedonic_regression,
    "Use as a refresher and atomic reference. Read in any order.",
    [hedonic_regression, hedonic_price_function, implicit_price,
     characteristics_space, heterogeneous_good, latent_variable]).

reader_pathway(interested_in_rca_methodology,
    "Read 006 first for the framing, then 003-005, then 001-002.",
    [latent_variable, hedonic_price_function, implicit_price,
     hedonic_regression, heterogeneous_good, characteristics_space]).

reader_pathway(interested_in_adjustment_defensibility,
    "Read the 'Why it matters for defensibility' sections in entry order. Forms an implicit short
   ↪essay.",
    [heterogeneous_good, characteristics_space, hedonic_price_function,
     implicit_price, hedonic_regression, latent_variable]).

% ======================================================================
% EDITORIAL POSTURE
% ======================================================================
```

```
editorial_posture(
    "Foundations is not a textbook department. Each entry is short, written for an audience already
   ↪ fluent in appraisal practice, and designed to give a precise formulation rather than a
   ↪comprehensive exposition.").

publication_model(
    [ license(cc_by),
      crossref_doi(canonical_citation),
      zenodo_doi(versioned_archive),
      revision_policy("Minor revisions bump Zenodo version; major revisions bump both DOIs with
   ↪editorial note.") ]).

% ======================================================================
% FUTURE DIRECTIONS
% ======================================================================
%
% Concepts the editor flags as deserving treatment in future Foundations
% issues. Recorded here so the journal's planning is machine-queryable.

future_topic(spatial_dependence).
future_topic(conditional_expectation).
future_topic(endogeneity).
future_topic(omitted_variable_bias_extended).
future_topic(identification).
future_topic(proxy_vs_latent_variable).
```