



# What the Hedonic Art Pricing Model is doing (in plain econometric terms)

Our Hedonic Art Pricing Model (HAPM) treats an artwork as a *bundle of attributes* (artist reputation, size, medium, condition, provenance, exhibition history, subject matter, sale venue, sale timing, etc.). The market price is modelled as the outcome of how buyers implicitly value each attribute.

A standard specification is:

$$\ln(\text{Price}_i) = \beta_0 + \sum_{k=1}^K \beta_k X_{ik} + \gamma_{t(i)} + \delta_{m(i)} + \varepsilon_i$$

- $X_{ik}$ : observable attributes (e.g.,  $\ln(\text{area})$ , oil vs acrylic, signed, condition score, provenance flag, “tier-1 auction house” flag, etc.)
- $\gamma_{t(i)}$ : time effects (year/quarter dummies to capture market cycles)
- $\delta_{m(i)}$ : optional market/venue effects (country, auction house, online vs live, etc.)
- Log-price is common because it makes results interpretable as percentage effects and reduces skewness.

Interpretation (key point): In a log model, a coefficient is (approximately) a % *price impact* per unit change in that attribute, holding others constant.

## Three pillars

### A) Explainable Art Pricing

“Explainable” means the module does not only output a number; it produces a traceable decomposition:

1. Global interpretability (econometrics):
  - Coefficients  $\beta_k$ , robust standard errors, significance, and elasticities.
  - Diagnostics: outliers, heteroskedasticity, stability over time, segment effects (e.g., high-end vs mid-market via quantile regression).

2. Local interpretability (per artwork):
  - A contribution breakdown: “Size added +X%, signature added +Y%, weak provenance reduced -Z%...”
  - A counterfactual explanation: “If institutional exhibition history were present, expected price shifts by ...”
3. Uncertainty:
  - Prediction interval (not a single point), often via bootstrap or Bayesian posterior draws.

## B) Comparable Sales & Attributes

Comparable sales alone can be misleading because no two artworks are identical. The hedonic model solves this by:

1. Selecting comparables via similarity scoring (kNN / cosine distance/rules):
  - Artist (or artist cluster), medium, period, size band, subject/genre, market segment, venue tier, geography, timeframe.
2. Adjusting comparables to the target artwork using the hedonic estimates:
  - If a comparable is smaller, unsigned, or sold in a weaker venue, the model “normalises” it to the target’s attributes.
  - Practically:

$$\text{Adjusted Comp Price} = \text{SalePrice} \times \exp(\hat{y}_{\text{target}} - \hat{y}_{\text{comp}})$$

3. Producing a valuation from both views:
  - Model-based prediction (global fit)
  - Comparable-based hedonic-adjusted estimate (local market anchoring)
  - Weighted blend (often best in production systems)

## C) What-if Scenarios

A scenario engine modifies only the attributes that can realistically change (or that you wish to test), for example:

- Condition improved after conservation
- Provenance strength improved after documentation
- Venue strategy (tier-1 auction vs regional)
- Institutional visibility (museum exhibition, catalogue inclusion)
- Timing (sell during a strong market quarter vs a weak quarter)

It then recomputes the expected value distribution and reports:

- $\Delta\text{Price}$ ,  $\Delta\%$  and updated prediction intervals
- A ranked list of scenario “value levers” (ROI-style)

# Comprehensive example use case (synthetic but realistic)

Target artwork (the one we want to price)

- Type: Oil on canvas, signed
- Size: 80 × 60 cm
- Year: 2020
- Subject: Landscape
- Condition: 3/5 (good, minor issues)
- Provenance: limited documentation
- Institutional exhibition: none
- Sale venue: non-tier-1 venue
- Artist market position: emerging (modelled via an Artist Market Index)

Artist Market Index (AMI) is a constructed quantitative variable (often a z-score) blending signals such as: auction turnover, exhibition count/quality, critical citations, museum acquisitions, awards, collection visibility, and market liquidity.

Step 1 — Hedonic model output (point estimate + uncertainty)

Assume the fitted model produces a point estimate:

- Estimated fair market price (baseline): €108,050
- Illustrative uncertainty (log-scale prediction error):
  - 80% range: ~€78,460 to €148,799
  - 95% range: ~€66,194 to €176,372

(Intervals matter because art is thinly traded and idiosyncratic.)

Step 2 — Comparable sales, then hedonic-adjust them to the target

Below are six “closest” sales and the model’s *attribute-adjusted* equivalents to your target artwork.

| Comparable | Observed sale price (€) | Hedonic-adjusted to target (€) |
|------------|-------------------------|--------------------------------|
| Comp 1     | 110,540                 | 115,493                        |
| Comp 2     | 130,256                 | 113,624                        |
| Comp 3     | 98,552                  | 106,334                        |
| Comp 4     | 183,991                 | 102,840                        |
| Comp 5     | 59,448                  | 108,294                        |
| Comp 6     | 162,292                 | 105,996                        |

- Average adjusted comparable value: ~€108,763
- This triangulates closely with the baseline model estimate (€108,050), increasing confidence that the model is not “floating away” from market reality.

### Step 3 — Explainability: “Why that number?”

A local explanation can be expressed as a contribution story relative to a reference lot in the same segment.

Example contribution summary (illustrative):

- Larger size (80×60 vs reference): +49.8%
- Signed: +7.3%
- Landscape subject premium: +5.1%
- More recent year: +3.0%
- Emerging artist AML (below segment average): –32.0%
- Net effect → lands near the €108k baseline.

This is the core of Explainable Art Pricing: a defensible narrative backed by model mechanics.

### Step 4 — Cultural value module (financial value + cultural significance)

#### 4) What-if scenario outputs (actionable levers)

Starting from €108,050 baseline:

| Scenario   | New estimate (€) | Change  |
|--|------------------|---------|
| Institutional provenance + museum exhibition + tier-1 sale | 151,805          | +40.5%  |
| Conservation improves condition 3 → 4                      | 121,826          | +12.7%  |
| Artist AML improves (career momentum)                      | 142,964          | +32.3%  |
| Larger comparable size case (100×80 vs 80×60)              | 148,310          | +37.3%  |
| All upside factors combined                                | 310,849          | +187.7% |

**This is precisely how the module becomes a decision tool (not just a valuation): it quantifies strategy (venue choice, documentation, conservation, institutional positioning) in monetary terms.**

**5) Deliverables: your “econometric module” should output (production-grade)**

- 1. Price estimate (point + interval + confidence score)**
- 2. Comparable set (ranked) + hedonic adjustments table**
- 3. Explainability report (top positive/negative drivers; contribution waterfall)**
- 4. Cultural Significance Score + breakdown**
- 5. Scenario matrix (what-if levers, deltas, and recommended actions)**
- 6. Model governance (data provenance, last training date, drift monitoring, segment validity)**

**Want a defensible valuation you can use for selling, insurance,  
financing, or a collection strategy?  
Request your Euroglobo-Art Art Valuation & Cultural Significance  
Report now.**

**Please get in touch with Econometrician D. Loukas  
[loukas@velticon.com](mailto:loukas@velticon.com)**



# Art Valuation & Cultural Significance Report

Client-Ready Template (One-Pager + Annex Tables)

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## 1

### Executive One-Pager (Client Deliverable)

#### Artwork Overview

- **Artist:** [Artist Name]
- **Title:** [Artwork Title]
- **Year / Period:** [Year / Period]
- **Medium:** [Oil/Acrylic/Mixed/...]
- **Dimensions:** [H × W (cm)]
- **Signature / Marks:** [Signed/Unsigned/Inscribed]
- **Condition:** [1–5] + Notes: [Short note]
- **Provenance:** [Summary + documentation level]
- **Exhibitions / Publications:** [Key references]
- **Market Segment:** [Emerging / Mid-career / Blue-chip]
- **Intended Sale Route:** [Auction / Private sale / Gallery / Online]

### Financial Value Estimate (Explainable Hedonic Pricing)

**Estimated Fair Market Value (FMV):** €[Point Estimate]

**Indicative Range (80%):** €[Low] – €[High]

**Indicative Range (95%):** €[Low] – €[High]

**Confidence Score:** [High / Medium / Low] (based on data density & comp similarity)

## What Drives This Price (Top Value Levers)

### Positive drivers

- [Driver 1] → +[x%]
- [Driver 2] → +[x%]
- [Driver 3] → +[x%]

### Negative drivers / constraints

- [Constraint 1] → −[x%]
- [Constraint 2] → −[x%]

### Summary:

This valuation reflects how the market prices your artwork's **attributes** (artist profile, medium, size, provenance strength, venue tier, timing), benchmarked against **comparable sales**, and normalised through a hedonic econometric model.

## Cultural Significance Score (0–100)

### Cultural Significance Score (CSS): [xx.x]/100 Breakdown

- Provenance quality: [x/20]
- Institutional visibility: [x/25]
- Artist cultural position: [x/20]
- Scholarly/critical footprint: [x/15]
- Public engagement: [x/10]
- Rarity/condition factors: [x/10]

### Interpretation:

A higher CSS indicates stronger cultural positioning, usually improving **collectability**, **sale readiness**, and **buyer confidence**.

# Recommended Strategy (Highest ROI Actions)

## Priority actions to unlock value

- 1. **[Action]** → Expected impact: **+[x%]** | Effort: [Low/Med/High] | Time: [x weeks]
- 2. **[Action]** → Expected impact: **+[x%]** | Effort: [Low/Med/High] | Time: [x weeks]
- 3. **[Action]** → Expected impact: **+[x%]** | Effort: [Low/Med/High] | Time: [x weeks]

# What-If Scenarios (Decision Intelligence)

| Scenario                          | Expected FMV (€) | Change |
|-----------------------------------|------------------|--------|
| Baseline (as-is)                  | €[ ]             | —      |
| Improved provenance documentation | €[ ]             | +[x%]  |
| Conservation improves condition   | €[ ]             | +[x%]  |
| Tier-1 venue strategy             | €[ ]             | +[x%]  |
| Combined upside strategy          | €[ ]             | +[x%]  |

# Deliverables Included

- **Econometric Hedonic Valuation** (price + intervals)
- **Comparable Sales selection** + hedonic adjustments
- **Explainability: value-driver breakdown**
- **Cultural Significance Score** + component diagnostics
- **Scenario engine** (“what-if” outcomes)
- **Client-ready PDF** + annex tables



# Call-to-Action

Want a defensible valuation you can use for selling, insurance, financing, or a collection strategy?

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Please contact Econometrician D. Loukas at [loukas@velticon.com](mailto:loukas@velticon.com)

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## 2) Annex A — Comparable Sales (Client Appendix Table)

| Rank | Comparable ID | Artist/Cluster | Medium | Size (cm) | Year | Venue Tier | Sale Date | Sale Price (€) | Similarity Score | Hedonic-Adjusted (€) |
|------|---------------|----------------|--------|-----------|------|------------|-----------|----------------|------------------|----------------------|
| 1    | []            | []             | []     | []        | []   | []         | []        | []             | []               | []                   |
| 2    | []            | []             | []     | []        | []   | []         | []        | []             | []               | []                   |
| 3    | []            | []             | []     | []        | []   | []         | []        | []             | []               | []                   |
| 4    | []            | []             | []     | []        | []   | []         | []        | []             | []               | []                   |
| 5    | []            | []             | []     | []        | []   | []         | []        | []             | []               | []                   |

### Notes:

- Similarity score is computed from attribute distance (artist/cluster, medium, size band, year/period, subject, venue, geography).
  - Hedonic adjustment normalises each comparable to the target’s attribute profile.
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### 3) Annex B — Attribute Inputs (Model Feature Sheet)

Artwork attributes (inputs)

- Artist Market Index (AMI): [ ]
- Medium category: [ ]
- Size (area / ln area): [ ]
- Condition score: [ ]
- Signature flag: [ ]
- Provenance strength: [ ]
- Exhibition / publication flags: [ ]
- Subject / genre: [ ]
- Sale venue tier: [ ]
- Geography: [ ]
- Sale timing (quarter/year index): [ ]
- Rarity markers (edition size if print): [ ]
- Other: [ ]

Data quality flags

- Provenance verified: [Yes/No]
- Condition report available: [Yes/No]
- Authenticity documentation: [Yes/No]
- Liquidity risk (thin comps): [Low/Med/High]

### 4) Annex C — Explainability (Value Driver Breakdown)

| Driver                | Direction | Estimated Impact | Evidence                  |
|-----------------------|-----------|------------------|---------------------------|
| Size / scale          | +         | + $[x\%]$        | Model coefficient + comps |
| Provenance            | +         | + $[x\%]$        | Documentation strength    |
| Venue tier            | +         | + $[x\%]$        | Historical venue premium  |
| Condition             | +/-       | $\pm[x\%]$       | Condition elasticity      |
| AMI (artist momentum) | +/-       | $\pm[x\%]$       | Market index trend        |

# 5) Euroglobo-Art Workflow

## Placeholders (Internal Ops)

### Step 1 — Intake (Client)

- Client uploads: photos, dimensions, medium, signature, provenance docs, condition notes
- Euroglobo-Art creates case ID: [CASE-ID]

### Step 2 — Data & Comps

- Comparable sourcing: [Auction DB / Gallery records / Internal dataset]
- Comp validation: [Rules + manual review]

### Step 3 — Econometric Run

- Model version: [vX.X]
- Segment: [Emerging / Mid / Blue-chip]
- Output pack generated: PDF + annex tables

### Step 4 — Advisory Delivery

- Pricing range + scenario strategy
- Optional: sale route recommendation and timeline

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**Transform uncertainty into leverage.**

**Get an explainable valuation anchored in comparable sales, plus a cultural significance score and scenario-based strategy to maximise outcomes.**

**Please contact Econometrician D. Loukas — [loukas@velticon.com](mailto:loukas@velticon.com)**

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