

房地产估价中的理论与实践差距：功能、边界与张力的结构化阐述（简体中文版）

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摘要。 房地产估价事关重大公共利益，但其官方理论——以过去与当前条件下的市场价值意见为核心——与估价产品在当代金融流程中的实际用途之间的张力正日益加剧。本文分五个阶段构建这一论证，每个阶段均配有明确、可查询的 Prolog 知识库：前两个阶段确立估价所承担的社会与经济功能；第三个阶段指出其主要最终产品——市场价值意见；第四个阶段考察估价相对于量化预测与金融预测的时间取向和方法论取向，以及将两者分隔开来的监管边界。这些内容汇聚为第五个阶段的核心主张：在抵押贷款中，按贷款价值比折算的市场价值实际上充当着未来止赎价值的隐性替代指标——这是一种面向未来的用途，而现值理论并不予以承认。许多估价师并未意识到这一抵押品估值角色，因而未能以应有的审慎态度对待市场价值的未来走势——本文旨在揭示这一问题，并欢迎后续研究。

关键词： 房地产估价，市场价值，估价理论，知识表示，估价准则，止赎价值

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1 社会重要性

房地产及其他资产估价通过帮助买方、卖方、贷款机构、保险公司、投资者、法院、税务机关以及公众，就财产及其他形式财富的转让、融资、税收与管理作出知情且公平的决定，发挥着不可或缺的社会与经济功能。高质量的估价以证据、分析与专业判断为基础，提供独立且论据充分的价值意见，从而促进市场透明度、公众信心、资本的高效配置以及金融机构的稳定。(LaCour-Little and Malpezzi 2003; K'Akumu and Larsen 2024; Hendershott and Kane 1995; Lee, Peng, and Liao 2020)

相反，低质量的估价可能在多个时间层面造成严重后果。短期内，不准确的估价可能使个别买方或卖方因买价过高、卖价过低、税负过重或不当的放贷决定而蒙受直接经济损失。中期内，系统性的估价缺陷可能扭曲市场信号、损害信贷审核、助长投机行为、导致不公平的税收或保

险承保，并加剧诉讼与交易层面的不信任。长期而言，估价质量的持续缺失可能动摇公众对市场与机构的信心，导致金融不稳定、资源错配、社区衰败或过度投资，并造成波及家庭、企业与社区的更广泛的社会不公。(LaCour-Little and Malpezzi 2003; Mayer and Nothhaft 2022)

由于房地产及其他资产往往占个人、企业与公共财富的相当大比重，估价质量不仅仅是私人层面的技术问题，而是关乎经济韧性、公平与长期公共福祉的重大公共利益事项。(Mayer and Nothhaft 2022)

```
%% appraisal_social.pl
%%
%% A Prolog knowledge base encoding the social and public-interest role
%% of real estate and other asset appraisals. Companion to
%% appraisal_economics.pl, which covers the strictly economic axis.
%%
%% All domain-specific predicates are prefixed with `social_` so this
%% module can be loaded alongside appraisal_economics.pl (and any other
%% companion KBs) without name collisions, and so cross-KB rules can
%% mention both vocabularies unambiguously.
%%
%% Conceptual model:
%%   - Appraisals support social DECISION TYPES.
%%   - Each decision involves identifiable PARTIES.
%%   - Appraisal QUALITY (high / low) drives EFFECTS across time HORIZONS.
%%   - Emphasis: equity, public confidence, public interest.
%%
%% Author: generated for Bert Craytor, ValEngr / RCA context.

:- module(appraisal_social,
    [ social_horizon/1
    , social_party/1
    , social_decision_type/1
    , social_involves/2           % DecisionType, Party
    , social_effect/4            % Quality, Horizon, Domain, Effect
    , social_contribution/1
    , social_hallmark/1
    , social_equity_principle/1
    , social_public_interest_claim/1
    , social_positive_effect/3
    , social_negative_effect/3
    , social_horizon_summary/2
    , social_consequences_of_quality/2
    , social_parties_affected_by/2
    , social_public_harm/2
    , social_private_harm/2
    , social_appraisal_is_public_interest/0
    ]).

:- discontiguous social_effect/4.
:- discontiguous social_involves/2.

%% -----
%% 1. Time horizons
%% -----

social_horizon(short_term).
social_horizon(medium_term).
social_horizon(long_term).
```

```

%% -----
%% 2. Parties whose decisions depend on appraisals
%%
%% The opening sentence enumerates these explicitly.
%% -----

social_party(buyers).
social_party(sellers).
social_party(lenders).
social_party(insurers).
social_party(investors).
social_party(courts).
social_party(taxing_authorities).
social_party(general_public).

%% -----
%% 3. Types of decisions appraisals inform
%% -----

social_decision_type(property_transfer).
social_decision_type(financing).
social_decision_type(taxation).
social_decision_type(stewardship).
social_decision_type(insurance_coverage).
social_decision_type(adjudication).          % courts: condemnation, divorce, estate
social_decision_type(public_administration).

social_involves(property_transfer,    buyers).
social_involves(property_transfer,    sellers).
social_involves(financing,            lenders).
social_involves(financing,            buyers).
social_involves(taxation,              taxing_authorities).
social_involves(taxation,              general_public).
social_involves(stewardship,          investors).
social_involves(stewardship,          general_public).
social_involves(insurance_coverage,    insurers).
social_involves(insurance_coverage,    buyers).
social_involves(adjudication,          courts).
social_involves(public_administration, taxing_authorities).
social_involves(public_administration, general_public).

%% -----
%% 4. What high-quality appraisals contribute (second sentence)
%% -----

social_contribution(market_transparency).
social_contribution(public_confidence).
social_contribution(efficient_capital_allocation).
social_contribution(stability_of_financial_institutions).

%% Characteristics of a high-quality appraisal opinion of value.
social_hallmark(independence).
social_hallmark(well_supported).
social_hallmark(grounded_in_evidence).
social_hallmark(grounded_in_analysis).
social_hallmark(grounded_in_professional_judgment).

%% -----

```

```

%% 5. Effects of appraisal quality by horizon
%% -----

%% ---- SHORT TERM: high quality ----
social_effect(high, short_term, property_transfer, fair_pricing_for_parties).
social_effect(high, short_term, financing, appropriate_lending_decisions).
social_effect(high, short_term, taxation, accurate_individual_assessment).

%% ---- SHORT TERM: low quality ----
social_effect(low, short_term, property_transfer, buyer_overpayment).
social_effect(low, short_term, property_transfer, seller_underselling).
social_effect(low, short_term, taxation, excessive_individual_taxation).
social_effect(low, short_term, financing,
↳ inappropriate_lending_decisions).
social_effect(low, short_term, property_transfer,
↳ immediate_financial_harm_to_individuals).

%% ---- MEDIUM TERM: high quality ----
social_effect(high, medium_term, markets, clear_market_signals).
social_effect(high, medium_term, financing, sound_credit_underwriting).
social_effect(high, medium_term, taxation, equitable_tax_assessment).
social_effect(high, medium_term, insurance_coverage,
↳ equitable_insurance_coverage).
social_effect(high, medium_term, adjudication, reduced_litigation_pressure).

%% ---- MEDIUM TERM: low quality ----
social_effect(low, medium_term, markets, distorted_market_signals).
social_effect(low, medium_term, financing,
↳ impaired_credit_underwriting).
social_effect(low, medium_term, markets,
↳ encouragement_of_speculation).
social_effect(low, medium_term, taxation, inequitable_taxation).
social_effect(low, medium_term, insurance_coverage,
↳ inequitable_insurance_coverage).
social_effect(low, medium_term, adjudication, increased_litigation).
social_effect(low, medium_term, markets, transactional_distrust).

%% ---- LONG TERM: high quality ----
social_effect(high, long_term, institutions, public_confidence_in_institutions).
social_effect(high, long_term, markets, public_confidence_in_markets).
social_effect(high, long_term, institutions, financial_stability).
social_effect(high, long_term, communities, equitable_community_outcomes).
social_effect(high, long_term, public_interest, economic_resilience).
social_effect(high, long_term, public_interest, social_fairness).
social_effect(high, long_term, public_interest, long_term_public_good).

%% ---- LONG TERM: low quality ----
social_effect(low, long_term, markets, eroded_market_confidence).
social_effect(low, long_term, institutions, eroded_institutional_confidence).
social_effect(low, long_term, institutions, financial_instability).
social_effect(low, long_term, markets, resource_misallocation).
social_effect(low, long_term, communities, neighborhood_decline).
social_effect(low, long_term, communities, neighborhood_overinvestment).
social_effect(low, long_term, communities, social_inequities_for_households).
social_effect(low, long_term, communities, social_inequities_for_businesses).
social_effect(low, long_term, communities, social_inequities_for_communities).

%% -----

```

```

%% 6. Equity principles and public-interest claims
%% -----

social_equity_principle(informed_decisions).
social_equity_principle(equitable_decisions).
social_equity_principle(fair_treatment_of_parties).
social_equity_principle(independence_of_valuer).

social_public_interest_claim(
    'Real estate and other assets are a substantial portion of personal, corporate,
    ↪ and public wealth.').
social_public_interest_claim(
    'Appraisal quality is not merely a private technical concern.').
social_public_interest_claim(
    'Appraisal quality is tied to economic resilience.').
social_public_interest_claim(
    'Appraisal quality is tied to fairness.').
social_public_interest_claim(
    'Appraisal quality is tied to the long-term public good.').

%% Top-level conclusion of the passage.
social_appraisal_is_public_interest :-
    social_public_interest_claim(_).    % at least one such claim exists

%% -----
%% 7. Derived / query predicates
%% -----

social_positive_effect(Horizon, Domain, Effect) :-
    social_effect(high, Horizon, Domain, Effect).

social_negative_effect(Horizon, Domain, Effect) :-
    social_effect(low, Horizon, Domain, Effect).

social_horizon_summary(Horizon, Effects) :-
    findall(Quality-Effect,
        social_effect(Quality, Horizon, _Domain, Effect),
        Effects).

social_consequences_of_quality(Quality, List) :-
    findall(consequence(Horizon, Domain, Effect),
        social_effect(Quality, Horizon, Domain, Effect),
        List).

social_parties_affected_by(DecisionType, Parties) :-
    setof(P, social_involves(DecisionType, P), Parties).

%% Harms that fall on the public rather than on transaction principals.
social_public_harm(Horizon, Effect) :-
    social_effect(low, Horizon, Domain, Effect),
    member(Domain, [markets, institutions, communities, public_interest,
    ↪ taxation]).

%% Private (transaction-level) harms.
social_private_harm(Horizon, Effect) :-
    social_effect(low, Horizon, Domain, Effect),
    member(Domain, [property_transfer, financing, insurance_coverage]).

```

2 经济重要性

房地产及其他资产估价通过支持信贷市场、投资决策、税收制度、财务报告、保险承保、遗产管理、公司交易以及公共政策规划的高效运行，发挥着基础性的经济作用。可靠的估价有助于建立可信的抵押品价值与市场价值度量，使资本得以在借款人、贷款机构、投资者、政府与企业之间更高效地流动。(LaCour-Little and Malpezzi 2003; Ebrahim and Hussain 2010)

短期内，准确的估价可以降低交易不确定性、改善放贷决策、促进公平谈判，并有助于防止因高估或低估而产生的直接经济损失。中期内，估价质量通过影响抵押贷款风险、投资配置、税收公平、保险充足性以及市场参与者的定价行为，左右着更广泛市场的稳定与效率。在此期间，薄弱或存在系统性偏差的估价可能助长资产泡沫膨胀、损害贷款组合、扭曲开发激励，并加大违约或诉讼风险。(LaCour-Little and Malpezzi 2003; Hendershott and Kane 1992; Griffin and Maturana 2016)

长期来看，估价质量的累积经济后果更为显著，影响着资本形成模式、基础设施投资、代际财富转移、公共收入、住房可负担性以及整个金融体系的韧性。估价实践的长期缺陷可能导致资本的慢性错配、银行体系不稳定、投资者信心下降以及土地与生产性资产的低效利用；而严格的估价准则则有助于支撑稳定的市场、稳健的经济规划和长期经济增长。(Ghent, Torous, and Valkanov 2019; Hendershott and Kane 1992; Ebrahim and Hussain 2010)

```
%% appraisal_economics.pl
%%
%% A Prolog knowledge base encoding the economic role of real estate
%% and other asset appraisals across short-, medium-, and long-term
%% horizons, including both the consequences of high-quality appraisal
%% practice and the consequences of weak or biased practice.
%%
%% All domain-specific predicates are prefixed with `economic_` so this
%% module can be loaded alongside appraisal_social.pl (and any other
%% companion KBs) without name collisions, and so cross-KB rules can
%% mention both vocabularies unambiguously.
%%
%% Conceptual model:
%%   - Appraisals support a set of economic FUNCTIONS.
%%   - Each function operates over one or more time HORIZONS.
%%   - Appraisal QUALITY (high / low) drives EFFECTS on those functions.
%%   - Effects are POSITIVE (benefits) when quality is high and
%%     NEGATIVE (harms) when quality is low/systematically biased.
%%
%% Author: generated for Bert Craytor, ValEngr / RCA context.

:- module(appraisal_economics,
    [ economic_horizon/1
    , economic_function/1
    , economic_supports/2
    , economic_effect/4
    ↪ Effect
    , economic_stakeholder/1
    , economic_benefits/2
    , economic_positive_effect/3
    , economic_negative_effect/3
    , economic_horizon_summary/2
    , economic_consequences_of_quality/2
    , economic_functions_at_horizon/2
    , economic_stakeholders_affected_by/2
    , economic_reliable_appraisals_improve/1
    , economic_appraisal_quality_matters_at/1
    ]).
```

```

:- discontinuous economic_effect/4.
:- discontinuous economic_supports/2.

%% -----
%% 1. Time horizons
%% -----

economic_horizon(short_term).
economic_horizon(medium_term).
economic_horizon(long_term).

%% -----
%% 2. Economic functions supported by appraisals
%% -----

economic_function(credit_markets).
economic_function(investment_decisions).
economic_function(taxation_systems).
economic_function(financial_reporting).
economic_function(insurance_underwriting).
economic_function(estate_administration).
economic_function(corporate_transactions).
economic_function(public_policy_planning).

%% -----
%% 3. Stakeholders whose decisions depend on appraisals
%% -----

economic_stakeholder(borrowers).
economic_stakeholder(lenders).
economic_stakeholder(investors).
economic_stakeholder(governments).
economic_stakeholder(businesses).
economic_stakeholder(insurers).
economic_stakeholder(taxpayers).
economic_stakeholder(homeowners).

%% Capital flows more efficiently when appraisals are reliable.
economic_benefits(borrowers, credit_markets).
economic_benefits(lenders, credit_markets).
economic_benefits(investors, investment_decisions).
economic_benefits(governments, taxation_systems).
economic_benefits(governments, public_policy_planning).
economic_benefits(businesses, corporate_transactions).
economic_benefits(businesses, financial_reporting).
economic_benefits(insurers, insurance_underwriting).
economic_benefits(taxpayers, taxation_systems).
economic_benefits(homeowners, credit_markets).

%% -----
%% 4. Which functions are most salient at each horizon
%% -----

economic_supports(credit_markets, short_term).
economic_supports(investment_decisions, short_term).
economic_supports(corporate_transactions, short_term).

```

```

economic_supports(credit_markets,      medium_term).
economic_supports(investment_decisions, medium_term).
economic_supports(taxation_systems,    medium_term).
economic_supports(insurance_underwriting, medium_term).

economic_supports(credit_markets,      long_term).
economic_supports(taxation_systems,    long_term).
economic_supports(public_policy_planning, long_term).
economic_supports(financial_reporting,  long_term).
economic_supports(estate_administration, long_term).

%% -----
%% 5. Effects of appraisal quality, by horizon and function
%% -----

%% ---- SHORT TERM: high quality ----
economic_effect(high, short_term, credit_markets,
    ↪ reduced_transactional_uncertainty).
economic_effect(high, short_term, credit_markets,
    ↪ improved_lending_decisions).
economic_effect(high, short_term, corporate_transactions, fair_negotiations).
economic_effect(high, short_term, investment_decisions,
    ↪ prevention_of_immediate_losses).

%% ---- SHORT TERM: low quality ----
economic_effect(low, short_term, credit_markets,
    ↪ transactional_uncertainty).
economic_effect(low, short_term, credit_markets,      poor_lending_decisions).
economic_effect(low, short_term, investment_decisions,
    ↪ losses_from_overvaluation).
economic_effect(low, short_term, investment_decisions,
    ↪ losses_from_undervaluation).

%% ---- MEDIUM TERM: high quality ----
economic_effect(high, medium_term, credit_markets,      stable_mortgage_risk).
economic_effect(high, medium_term, investment_decisions,
    ↪ efficient_investment_allocation).
economic_effect(high, medium_term, taxation_systems,    tax_equity).
economic_effect(high, medium_term, insurance_underwriting,
    ↪ adequate_insurance_coverage).
economic_effect(high, medium_term, investment_decisions,
    ↪ rational_market_pricing).

%% ---- MEDIUM TERM: low quality ----
economic_effect(low, medium_term, investment_decisions, inflated_asset_bubbles).
economic_effect(low, medium_term, credit_markets,
    ↪ impaired_lending_portfolios).
economic_effect(low, medium_term, public_policy_planning,
    ↪ distorted_development_incentives).
economic_effect(low, medium_term, credit_markets,      increased_default_risk).
economic_effect(low, medium_term, corporate_transactions,
    ↪ increased_litigation_risk).

%% ---- LONG TERM: high quality ----
economic_effect(high, long_term, investment_decisions, sound_capital_formation).
economic_effect(high, long_term, public_policy_planning,
    ↪ sound_infrastructure_investment).

```

```

economic_effect(high, long_term, estate_administration,
↳ orderly_intergenerational_wealth_transfer).
economic_effect(high, long_term, taxation_systems,      stable_public_revenues).
economic_effect(high, long_term, public_policy_planning,
↳ supported_housing_affordability).
economic_effect(high, long_term, credit_markets,
↳ financial_system_resilience).
economic_effect(high, long_term, investment_decisions,
↳ long_term_economic_growth).

%% ---- LONG TERM: low quality ----
economic_effect(low, long_term, investment_decisions,
↳ chronic_capital_misallocation).
economic_effect(low, long_term, credit_markets,      banking_instability).
economic_effect(low, long_term, investment_decisions,
↳ reduced_investor_confidence).
economic_effect(low, long_term, public_policy_planning, inefficient_land_use).
economic_effect(low, long_term, public_policy_planning,
↳ inefficient_productive_asset_use).

%% -----
%% 6. Derived / query predicates
%% -----

economic_positive_effect(Horizon, Function, Effect) :-
    economic_effect(high, Horizon, Function, Effect).

economic_negative_effect(Horizon, Function, Effect) :-
    economic_effect(low, Horizon, Function, Effect).

economic_horizon_summary(Horizon, Effects) :-
    findall(Quality-Effect,
        economic_effect(Quality, Horizon, _Function, Effect),
        Effects).

economic_consequences_of_quality(Quality, List) :-
    findall(consequence(Horizon, Function, Effect),
        economic_effect(Quality, Horizon, Function, Effect),
        List).

economic_functions_at_horizon(Horizon, Functions) :-
    setof(F, economic_supports(F, Horizon), Functions).

economic_stakeholders_affected_by(Function, Stakeholders) :-
    setof(S, economic_benefits(S, Function), Stakeholders).

%% Overall claim: reliable appraisals improve allocative efficiency.
economic_reliable_appraisals_improve(capital_flow_efficiency).
economic_reliable_appraisals_improve(market_stability).
economic_reliable_appraisals_improve(long_term_economic_growth).

%% Top-level qualitative claim: appraisal quality matters at every horizon.
economic_appraisal_quality_matters_at(Horizon) :-
    economic_horizon(Horizon),
    \+ \+ economic_effect(high, Horizon, _, _),
    \+ \+ economic_effect(low, Horizon, _, _).

```

3 市场价值估计作为估价最终产品的重要性

市场价值估价在抵押品风险分析中发挥着重要作用，因为它就财产或资产在正常市场条件下可能实现的价格提供了专业形成的估计，从而为评估信贷敞口与潜在止赎结果的贷款机构、投资者和抵押品分析师提供了基础性基准。(Agarwal, Ben-David, and Yao 2015) 尽管由于不利的销售条件、缩短的出售周期、法律费用、实物损耗或负面市场情绪，止赎价值或清算价值可能与市场价值相差甚远，抵押品分析师仍经常以市场价值估价作为在压力情景下估算回收潜力的起点。(Campbell, Giglio, and Pathak 2011; Pennington-Cross 2006; Clauretie and Daneshvary 2009)

通过分析市场价值、贷款余额、贷款价值比 (LTV)、市场趋势、房产状况、流动性以及当地供求状况之间的关系，抵押品分析师评估借款人违约情况下损失发生的可能性及其严重程度。(Qi and Yang 2009)

短期内，准确的市场价值估价有助于贷款机构作出审慎的审贷决定并建立适当的抵押品安全边际。中期内，它们通过帮助机构评估经济周期中抵押品充足性的变化，支持组合风险管理、贷款证券化、准备金配置与监管合规。长期而言，持续可靠的估价实践通过降低过度杠杆、担保不足的放贷以及抵押资产系统性错误定价的风险，为金融体系稳定作出贡献——这些风险会在市场承压时期放大止赎损失和更广泛的经济动荡。(Eriksen et al. 2019)

```
%% appraisal_collateral.pl
%%
%% A Prolog knowledge base encoding the role of market value (MV)
%% appraisals in collateral risk analysis. Companion to
%% appraisal_economics.pl and appraisal_social.pl.
%%
%% Naming convention:
%%   - Predicates that have direct counterparts in the companion KBs
%%     (horizon, effect, summary, consequences, etc.) are prefixed
%%     `collateral_` so this module can be loaded alongside the others
%%     without name collisions, and so bridge rules can mention each
%%     vocabulary unambiguously.
%%   - Predicates that are unique to the collateral-analysis domain
%%     (value_basis, divergence_factor, risk_input, etc.) are NOT
%%     prefixed. They have no analogues in the other KBs and no
%%     collision risk, so the prefix would only add noise.

:- module(appraisal_collateral,
    [ collateral_horizon/1
    , collateral_analyst/1
    , collateral_effect/4                                % Quality, Horizon, Domain,
    ↪ Effect
    , collateral_positive_effect/3
    , collateral_negative_effect/3
    , collateral_horizon_summary/2
    , collateral_consequences_of_quality/2
    , value_basis/1
    , uses/2                                              % Analyst, ValueBasis
    , divergence_factor/1
    , stress_scenario/1
    , risk_input/1
    , risk_output/1
    , inputs_for/2
    , mv_is_benchmark_for/1
    ]).

:- disjoint collateral_effect/4.
:- disjoint uses/2.
```

```

%% -----
%% 1. Time horizons (namespaced -- parallel to economic/social_)
%% -----

collateral_horizon(short_term).
collateral_horizon(medium_term).
collateral_horizon(long_term).

%% -----
%% 2. Who uses MV appraisals in collateral risk analysis
%% -----

collateral_analyst(lenders).
collateral_analyst(investors).
collateral_analyst(collateral_analysts).
collateral_analyst(portfolio_risk_managers).
collateral_analyst(regulators).
collateral_analyst(securitization_arrangers).

%% -----
%% 3. Value bases distinguished in the passage
%% -----

value_basis(market_value).           % "normal market conditions"
value_basis(foreclosure_value).       % distressed
value_basis(liquidation_value).       % distressed, accelerated

%% Which value bases each analyst type works with.
uses(lenders, market_value).
uses(investors, market_value).
uses(collateral_analysts, market_value).
uses(collateral_analysts, foreclosure_value).
uses(collateral_analysts, liquidation_value).
uses(portfolio_risk_managers, market_value).
uses(securitization_arrangers, market_value).
uses(regulators, market_value).

%% Top-level claim of the opening sentence.
mv_is_benchmark_for(credit_exposure).
mv_is_benchmark_for(foreclosure_outcomes).
mv_is_benchmark_for(recovery_potential).

%% -----
%% 4. Why foreclosure / liquidation value diverges from MV
%% -----

divergence_factor(distressed_marketing_conditions).
divergence_factor(accelerated_sale_period).
divergence_factor(legal_costs).
divergence_factor(physical_deterioration).
divergence_factor(adverse_market_sentiment).

%% Stressed scenarios in which divergence factors apply.
stress_scenario(borrower_default).
stress_scenario(foreclosure).
stress_scenario(forced_liquidation).
stress_scenario(market_downturn).

```

```

%% -----
%% 5. Inputs the collateral analyst combines with MV, and the
%%      outputs they produce
%% -----

risk_input(market_value).
risk_input(loan_balance).
risk_input(loan_to_value_ratio).
risk_input(market_trends).
risk_input(property_condition).
risk_input(liquidity).
risk_input(local_supply_demand).

risk_output(likelihood_of_loss).
risk_output(severity_of_loss).
risk_output(recovery_estimate).
risk_output(loss_given_default).

%% inputs_for(+Output, -Inputs)
%% All risk inputs are used to produce each risk output.
inputs_for(Output, Inputs) :-
    risk_output(Output),
    setof(I, risk_input(I), Inputs).

%% -----
%% 6. Effects of appraisal quality by horizon
%% -----

%% ---- SHORT TERM: high quality ----
collateral_effect(high, short_term, underwriting, prudent_underwriting_decisions).
collateral_effect(high, short_term, underwriting, appropriate_collateral_margins).

%% ---- SHORT TERM: low quality ----
collateral_effect(low, short_term, underwriting,
    ↪ imprudent_underwriting_decisions).
collateral_effect(low, short_term, underwriting, inadequate_collateral_margins).
collateral_effect(low, short_term, underwriting, mispriced_credit_exposure).

%% ---- MEDIUM TERM: high quality ----
collateral_effect(high, medium_term, portfolio,
    ↪ effective_portfolio_risk_management).
collateral_effect(high, medium_term, portfolio, sound_loan_securitization).
collateral_effect(high, medium_term, portfolio, appropriate_reserve_allocation).
collateral_effect(high, medium_term, regulatory, regulatory_compliance).
collateral_effect(high, medium_term, portfolio,
    ↪ cycle_aware_collateral_evaluation).

%% ---- MEDIUM TERM: low quality ----
collateral_effect(low, medium_term, portfolio,
    ↪ weakened_portfolio_risk_management).
collateral_effect(low, medium_term, portfolio, mispriced_securitizations).
collateral_effect(low, medium_term, portfolio, inadequate_loss_reserves).
collateral_effect(low, medium_term, regulatory, regulatory_noncompliance_risk).
collateral_effect(low, medium_term, portfolio, misjudged_collateral_adequacy).

%% ---- LONG TERM: high quality ----
collateral_effect(high, long_term, system, financial_system_stability).
collateral_effect(high, long_term, system, restraint_on_excessive_leverage).

```

```

collateral_effect(high, long_term, system, well_secured_lending).
collateral_effect(high, long_term, system, accurate_systemic_collateral_pricing).
collateral_effect(high, long_term, system, dampened_foreclosure_amplification).

%% ---- LONG TERM: low quality ----
collateral_effect(low, long_term, system, financial_system_instability).
collateral_effect(low, long_term, system, excessive_leverage).
collateral_effect(low, long_term, system, poorly_secured_lending).
collateral_effect(low, long_term, system, systemic_collateral_mispricing).
collateral_effect(low, long_term, system, amplified_foreclosure_losses).
collateral_effect(low, long_term, system,
↳ amplified_economic_disruption_under_stress).

%% -----
%% 7. Derived / query predicates (namespaced)
%% -----

collateral_positive_effect(Horizon, Domain, Effect) :-
    collateral_effect(high, Horizon, Domain, Effect).

collateral_negative_effect(Horizon, Domain, Effect) :-
    collateral_effect(low, Horizon, Domain, Effect).

collateral_horizon_summary(Horizon, Effects) :-
    findall(Quality-Effect,
        collateral_effect(Quality, Horizon, _Domain, Effect),
        Effects).

collateral_consequences_of_quality(Quality, List) :-
    findall(consequence(Horizon, Domain, Effect),
        collateral_effect(Quality, Horizon, Domain, Effect),
        List).

```

4 估价活动的时间取向

估价师通常就某一特定生效日期形成时点性的市场价值意见——回顾性的（过去）、当前的，或在明确限制下前瞻性的（未来）——而不是对较长时间段作出概率性预测。这种时间与方法论取向是受监管的估价实践与量化分析师、金融分析师、投资分析师及经济学家的工作之间的核心区别之一。（Quan and Quigley 1991）

在大多数估价业务中，特别是依据《专业估价实务统一准则》（Uniform Standards of Professional Appraisal Practice, USPAP）或《国际估价准则》（International Valuation Standards, IVS）等准则进行的市场价值估价，估价师给出的是一个经调和的点估计（或在允许的情形下给出一个窄幅区间），锚定于某一生效日期的可观察市场证据、当时的市场条件和公认的方法。USPAP 明确允许价值结论以具体金额、数值区间或与某一基准的关系的形式给出，但经调和的意见仍然是与该日期挂钩的一个可信的点位指示。（The Appraisal Foundation 2024; International Valuation Standards Council 2025）

尽管估价师必然会纳入市场参与者对趋势、供求、折旧、资本化率或折现率以及去化速度的合理预期，但这样做是为了支持生效日期上有市场依据的价值，而非预测投机性波动。前瞻性价值意见（例如项目建成后的稳定价值）需要明示的特殊假设或假定条件，并且仍被限定于一个明确的未来生效日期，且须有源自市场的支持。

相比之下，量化分析师、金融分析师与投资分析师经常通过覆盖各时间段内一系列可能结果的估计来处理不确定性，运用概率分布、蒙特卡洛模拟、情景分析、敏感性检验或风险价值（VaR）等度量。他们的关注点往往是预期的未来表现、经风险调整的收益，或特定主体在不同期限内的投资价值，而不是某一日期上的单一市场价值点位。（Hull 2018）

这类工作还预设了估价师执照既不要求也不认证的技术能力。例如，拟合多元自适应回归样条 (MARS) 模型需要控制模型复杂度的判断力，使得强劲的样本内拟合 (高 R^2) 不是以过拟合为代价换来的，而是能够延续到留出数据上 (高交叉验证 R^2)，而这又以对底层算法的切实理解为前提。(Friedman 1991; Steurer, Hill, and Pfeifer 2021) 除这类量化能力之外，这项工作还要求具备处理高度结构化概念、辨析细微语义差别以及吸收陌生方法的概念能力。这些是技能而非资质：持照估价师可能具备它们，无照分析师也可能欠缺它们——这正是它们本身并不能决定某项任务落在监管界线哪一侧的原因。

估价师也可以从事有限的面向未来的工作，例如在折现现金流分析中预测收入流、空置率、费用和归复价值，或在开发或诉讼情境中估计前瞻性价值。只要立足于当前市场证据，并遵循强调可支持性、避免无依据投机的专业准则，这些内容就仍处于估价的边界之内。(Diaz and Wolverton 1998; Gallimore 1996; Crosby, Lizieri, and McAllister 2010) 现代估价实践越来越多地融合统计工具、情景考量与风险分析——尤其是在批量估价、自动估价模型或组合业务中——但核心交付成果通常仍是时点性的市场价值意见。(International Association of Assessing Officers 2017; Office of the Comptroller of the Currency and Board of Governors of the Federal Reserve System and Federal Deposit Insurance Corporation and National Credit Union Administration and Consumer Financial Protection Bureau and Federal Housing Finance Agency 2024; Alexandrov, Goodman, and Neal 2023)

可以这样概括：估价实践主要是证据导向的，面向从过去到现在 (或有限前瞻) 的点估计；而金融与量化分析则更具概率性、分布性，并且明确面向各个时间跨度上的未来。(Geltner 1991) 估价师问的是：“在现有证据和既定假设下，截至指定生效日期，最有依据的市场价值指示是什么？”金融与量化分析师则更常问：“未来一段时期内可能出现何种结果区间、概率几何，以及应如何配置资源？”

这条边界并非绝对，并且随着市场复杂性的提高而持续演变。尽管如此，在目的 (市场价值与投资价值之别)、证据要求和监管框架方面，根本性差异依然存在。

然而，真正起作用的界线不是由技能而是由法律划定的：决定性的问题只是某项任务在法律上是否要求持有估价师执照。量化分析师、金融分析师、经济学家、投资分析师、投资组合经理及相关专业人士可以在不持有房地产估价师执照的情况下，合法地估计、预测、建模或分析未来资产价值——包括分布式或区间式的预测——只要该工作不构成受监管的估价。(Murphy 2012)

关键区别在于：

1. 价值类型 (例如市场价值点估计，还是投资价值或概率性预测)；
2. 时间焦点 (特定生效日期，还是某一时间段或期限)；
3. 输出形式 (点估计或窄幅区间，还是完整的概率分布)；
4. 预期用途以及该工作是否以估价的名义出具；以及
5. 是否涉及要求遵守 USPAP 等准则的受监管放贷或法律情境。

这一框架在很大程度上源于美国 1989 年《金融机构改革、复苏和执行法》(FIRREA) 等银行监管法规，其目的在于确保联邦相关交易能够获得可信、独立的市场价值意见。(United States Congress 1989; K'Akumu and Larsen 2024) 许多高度复杂的估值活动——股票研究目标价、可行性研究、组合风险建模、期权定价或预测分析——都不在执照管辖范围之内，因为它们服务于投资、预测或咨询目的，而非受监管的估价职能。

```
%% appraisal_scope_regulation.pl
%%
%% Knowledge base for the boundary of regulated appraisal practice.
%%
%% TWO TIERS, deliberately kept separate:
%%
%% TIER 1 -- THE DEFINING TEST (regulation cluster). A task is a
%% regulated appraisal IFF it is one for which an appraiser's
%% license is legally required. requires_license/1 is that test;
%% it -- and only it -- decides regulated_appraisal/1 vs.
%% unregulated_valuation/1.
```

```

%%
%% TIER 2 -- DESCRIPTIVE TENDENCIES (scope cluster). How the two
%% populations -- `appraisal' and `quant_financial' -- typically
%% differ in approach, temporal scope, output form, and skill set.
%% These are CORRELATES, not the boundary: the populations overlap
%% (a licensed appraiser may do quant work; a quant may be
%% unlicensed), and nothing here determines licensure. No claim is
%% made about intelligence -- only about training and methodology.
%%
%% `temporal scope' and `approach' are DISTINCT axes: an approach has a
%% typical (defeasible) temporal mode, but the two are not the same
%% viewpoint -- which is why an appraiser using an AVM (appraisal
%% approach, distributional methods) is possible.

:- module(appraisal_scope_regulation,
  [ % --- TIER 1: the defining test (regulation) ---
    regulation_framework/1
  , regulation_framework_origin/2
  , regulation_distinguishing_factor/1
  , regulation_triggers_licensure/1
  , regulation_definition_of_appraisal/1
  , regulation_unlicensed_activity/2
  , regulation_licensed_activity/2
  , regulation_legal_exposure_condition/1
  , requires_license/1
  , exempt_from_appraisal_license/1
  , regulated_appraisal/1
  , unregulated_valuation/1
  , regulatory_asymmetry/2

    % --- TIER 2: descriptive tendencies (scope) ---
  , valuation_approach/1
  , scope_profession/1
  , scope_orientation/2
  , temporal_scope/1
  , temporal_mode/1
  , scope_temporal_focus/2
  , scope_output_form/2
  , scope_skill/1
  , scope_skill_demanded_by/2
  , scope_inputs_considered/2
  , scope_future_oriented_context/2
  , scope_professional_constraint/1
  , scope_contrast/4
  , scope_question/2
  , scope_convergence_area/1
  ]).

:- discontiguous regulation_unlicensed_activity/2.
:- discontiguous regulation_licensed_activity/2.
:- discontiguous scope_contrast/4.

%% =====
%% TIER 1 -- THE DEFINING TEST (the boundary)
%% =====

regulation_framework(firrea_1989).
regulation_framework(uspap).

```

```

regulation_framework(ivs).
regulation_framework(state_licensing).
regulation_framework(state_certification).

regulation_framework_origin(firrea_1989,      savings_and_loan_crisis).
regulation_framework_origin(uspap,            firrea_1989).
regulation_framework_origin(state_licensing, firrea_1989).

regulation_distinguishing_factor(kind_of_value).
regulation_distinguishing_factor(purpose_of_valuation).
regulation_distinguishing_factor(temporal_focus).
regulation_distinguishing_factor(output_form).
regulation_distinguishing_factor(represented_as_appraisal).
regulation_distinguishing_factor(federally_related_transaction_involvement).

regulation_triggers_licensure(federally_related_mortgage_transaction).
regulation_triggers_licensure(work_represented_as_appraisal).
regulation_triggers_licensure(work_meeting_state_appraisal_definition).
regulation_triggers_licensure(regulated_lending_transaction).

regulation_definition_of_appraisal(formal_opinion_of_value).
regulation_definition_of_appraisal(concerning_identified_real_property).
regulation_definition_of_appraisal(developed_per_recognized_methods).
regulation_definition_of_appraisal(for_compensation).

regulation_unlicensed_activity(equity_analyst,      stock_price_targets).
regulation_unlicensed_activity(investment_bank,
    ↪ enterprise_value_estimates).
regulation_unlicensed_activity(hedge_fund,
    ↪ commercial_real_estate_appreciation_forecasts).
regulation_unlicensed_activity(economist,
    ↪ housing_market_trend_projections).
regulation_unlicensed_activity(insurance_analyst,
    ↪ replacement_cost_estimates).
regulation_unlicensed_activity(developer,          feasibility_studies).
regulation_unlicensed_activity(internal_corporate_analyst,
    ↪ asset_impairment_estimates).
regulation_unlicensed_activity(internal_corporate_analyst,
    ↪ portfolio_value_estimates).
regulation_unlicensed_activity(quantitative_analyst,
    ↪ predictive_valuation_models).
regulation_unlicensed_activity(avm_developer,
    ↪ algorithmic_residential_price_estimates).

regulation_licensed_activity(licensed_appraiser,
    ↪ market_value_for_federally_related_transaction).
regulation_licensed_activity(licensed_appraiser,
    ↪ formal_opinion_of_value_for_compensation).
regulation_licensed_activity(licensed_appraiser,
    ↪ appraisal_for_regulated_mortgage_lending).
regulation_licensed_activity(licensed_appraiser,
    ↪ appraisal_represented_as_such_under_state_law).

regulation_legal_exposure_condition(holding_self_out_as_licensed_appraiser).
regulation_legal_exposure_condition(preparing_appraisal_as_defined_by_state_law).
regulation_legal_exposure_condition(involved_in_transaction_requiring_licensed_app|
    ↪ raisal).

```

```

%% --- The test itself: does the TASK require an appraiser's license? ---
requires_license(Task) :-
    regulation_triggers_licensure(Task), !.
requires_license(Task) :-
    regulation_licensed_activity(_, Task), !.

exempt_from_appraisal_license(Task) :-
    regulation_unlicensed_activity(_, Task),
    \+ requires_license(Task).

:- dynamic activity_satisfies_definition/1.

activity_satisfies_definition(Task) :-
    regulation_licensed_activity(_, Task).

regulated_appraisal(Task) :-
    activity_satisfies_definition(Task),
    requires_license(Task).

unregulated_valuation(Task) :-
    regulation_unlicensed_activity(_, Task),
    \+ regulated_appraisal(Task).

%% Meta-tension: the regulatory asymmetry the passage closes on.
regulatory_asymmetry(current_market_value_for_lending,
    future_oriented_valuation_for_investment).
regulatory_asymmetry(heavily_regulated_appraisal_practice,
    lightly_regulated_quantitative_practice).
regulatory_asymmetry(consumer_and_lending_protection_focus,
    investment_advisory_focus).

regulatory_asymmetry_origin(banking_regulation).
regulatory_asymmetry_origin(consumer_protection).
regulatory_asymmetry_origin(legal_evidentiary_concerns).
regulatory_asymmetry_origin_disclaimer(
    'Not based on any exclusive claim that appraisers alone possess valuation
    ↪ expertise.').

%% =====
%% TIER 2 -- DESCRIPTIVE TENDENCIES (NOT the boundary)
%%
%% Overlapping populations; correlates of who typically lands on each
%% side. None of these determine licensure -- Tier 1 does.
%% =====

%% --- Axis: valuation approach (descriptive populations) ---
valuation_approach(appraisal).
valuation_approach(quant_financial).

scope_profession(appraiser).
scope_profession(quantitative_analyst).
scope_profession(financial_analyst).
scope_profession(investment_analyst).
scope_profession(portfolio_manager).
scope_profession(economist).
scope_profession(investment_strategist).
scope_profession(financial_forecaster).

```

```

scope_orientation(appraisal,      evidentiary).
scope_orientation(quant_financial, probabilistic).

%% --- Axis: temporal scope (its OWN viewpoint, distinct from approach) ---
temporal_scope(retrospective).
temporal_scope(current).
temporal_scope(prospective_point).
temporal_scope(future_range_horizon).

temporal_mode(point_in_time).
temporal_mode(distribution_over_horizon).

%% Typical (defeasible) pairing of approach to temporal mode -- a LINK
%% between two distinct axes, not an identity.
scope_temporal_focus(appraisal,      point_in_time).
scope_temporal_focus(quant_financial, distribution_over_horizon).

%% --- Axis: output form ---
scope_output_form(appraisal,      point_estimate).
scope_output_form(appraisal,      narrow_range).
scope_output_form(quant_financial, probability_distribution).
scope_output_form(quant_financial, range_of_outcomes).

%% --- Axis: skills / methodological toolkit (training, NOT intelligence) ---
scope_skill(mars_without_overfitting).
scope_skill(fit_vs_generalization_balance).    % balancing  $R^2$  against  $CV-R^2$ 
scope_skill(algorithmic_understanding).
scope_skill(handling_structured_concepts).
scope_skill(discerning_fine_distinctions_in_meaning).
scope_skill(assimilating_new_methods).

%% Skills typically demanded by advanced quantitative valuation; an
%% appraisal license neither requires nor certifies them.
scope_skill_demanded_by(quant_financial, mars_without_overfitting).
scope_skill_demanded_by(quant_financial, fit_vs_generalization_balance).
scope_skill_demanded_by(quant_financial, algorithmic_understanding).
scope_skill_demanded_by(quant_financial, handling_structured_concepts).
scope_skill_demanded_by(quant_financial, discerning_fine_distinctions_in_meaning).
scope_skill_demanded_by(quant_financial, assimilating_new_methods).

%% --- Inputs the appraiser weighs to support a value at the effective date ---
scope_inputs_considered(appraisal, current_market_evidence).
scope_inputs_considered(appraisal, observable_transactions).
scope_inputs_considered(appraisal, prevailing_market_conditions).
scope_inputs_considered(appraisal, recognized_methodologies).
scope_inputs_considered(appraisal, market_trends).
scope_inputs_considered(appraisal, anticipated_supply_demand).
scope_inputs_considered(appraisal, depreciation).
scope_inputs_considered(appraisal, capitalization_rates).
scope_inputs_considered(appraisal, absorption_patterns).
scope_inputs_considered(appraisal, expectations_already_priced_in).

%% --- Bounded future-oriented contexts that remain within appraisal ---
scope_future_oriented_context(income_property, future_income_streams).
scope_future_oriented_context(income_property, vacancy_rates).
scope_future_oriented_context(income_property, expenses).
scope_future_oriented_context(income_property, reversion_values).
scope_future_oriented_context(income_property, dcf_analysis).

```

```

scope_future_oriented_context(development, prospective_stabilized_value).
scope_future_oriented_context(conservation, future_damages).
scope_future_oriented_context(environmental, future_damages).
scope_future_oriented_context(insurance, future_damages).
scope_future_oriented_context(litigation, future_damages).
scope_future_oriented_context(eminent_domain, future_damages).
scope_future_oriented_context(general, remaining_economic_life).
scope_future_oriented_context(general, anticipated_market_reactions).
scope_future_oriented_context(market_analysis, price_trend_direction).

%% --- Professional constraints on any future-oriented component ---
scope_professional_constraint(supportability).
scope_professional_constraint(market_evidence).
scope_professional_constraint(extraordinary_assumptions_or_hypothetical_conditions ↪
↪ _disclosed).
scope_professional_constraint(avoidance_of_unsupported_speculation).

%% --- Contrasts across the descriptive axes:
↪ scope_contrast(A,B,Dimension,Distinction) ---
scope_contrast(appraisal, quant_financial, orientation,
evidentiary_vs_probabilistic).
scope_contrast(appraisal, quant_financial, temporal_mode,
point_in_time_vs_distribution_over_horizon).
scope_contrast(appraisal, quant_financial, output_form,
point_or_narrow_range_vs_probability_distribution).
scope_contrast(appraisal, quant_financial, purpose,
market_value_vs_investment_worth).
scope_contrast(appraisal, quant_financial, skill_set,
appraisal_licensing_toolkit_vs_advanced_statistical_toolkit).
scope_contrast(appraisal, quant_financial, typical_methods,
sales_comparison_cost_income_vs_simulation_option_pricing_var).

%% --- The orienting question each population asks (verbatim from the passage) ---
scope_question(appraisal,
'What is the most supportable market value indication as of the specified
↪ effective date, given current evidence and defined assumptions?').
scope_question(quant_financial,
'What range of outcomes is likely over a future period, with what
↪ probabilities, and how should resources be allocated?').

%% --- Where the two converge (appraisal borrows distributional methods) ---
scope_convergence_area(complex_commercial_valuation).
scope_convergence_area(mass_appraisal).
scope_convergence_area(automated_valuation_models).
scope_convergence_area(institutional_portfolio_analysis).

```

5 市场价值 × LTV 作为止赎价值的替代指标

前面各节阐明了估价的用途、估价的产出，以及估价的理论边界与监管边界之所在；本节则触及它们一路铺垫而来的那个张力。

抵押贷款与抵押品分析背后一个更深层的实际现实是：就实际经济功能而言，用于抵押贷款审核的市场价值估价往往充当着对未来某一持有期内预期抵押品可回收性的隐性替代指标，尽管在形式上该估价被表述为截至特定生效日期的当前市场价值意见。(Foster and Van Order 1984; Kau et al. 1995; Deng, Quigley, and Van Order 2000)

80% 的贷款价值比并非随意设定。从历史上看，它在一定程度上是作为保护贷款机构的风

险缓冲而演变形成的，用以抵御：

- 温和的市场下行、
- 止赎费用、
- 清算折价、
- 持有成本、
- 法律费用、
- 应计利息、
- 以及违约后处置抵押品所需时间内的不确定性。(Foote, Gerardi, and Willen 2008; Qi and Yang 2009)

这一缓冲也解释了为何贷款金额本身——市场价值与允许的贷款价值比之乘积——可以被解读为贷款机构对可回收止赎价值的工作估计：将贷款上限设定为市场价值的某一比例，实际上是在押注强制出售所得不会跌破贷款余额。然而，这一折减应当有多大，远比 80% 这个整数所暗示的更难确定。对止赎折价的估计因市场、方法和时期而差异巨大；一项被频繁引用的强制出售研究将其定在比可比正常交易价格低约 27% 的水平 (Campbell, Giglio, and Pathak 2011)，而其他分析——在校正房产状况、区位和样本选择之后——报告的幅度则大不相同。(Pennington-Cross 2006; Clauretie and Daneshvary 2009)

相比之下，常规的 80% 门槛本质上是一个全国统一的单一参数，被套用于千差万别的地方市场和信贷周期的先后阶段。它无法追踪任何特定市场的折价，因此只是一个非常粗略的、一刀切的近似，而非从市场价值到止赎回收额的精确映射。真要说的话，它还是一个偏薄的缓冲：20% 的折减低于上述研究报告的 27% 折价，因此即便尚未扣除前文列举的处置成本，常规贷款的最高额度就可能超过强制出售的毛收入。

在借款人权益过薄、不足以构成这一缓冲的情形下，便以抵押贷款保险取而代之。对此最好的理解不是把它当作一个政策旋钮，而是一种风险分配的权衡：有一部分借款人资产薄弱但收入稳定，向他们发放 LTV 超过 80% 的贷款所带来的增量违约与损失风险由保险人预测并承担——私人渠道是高 LTV 常规贷款上的私人抵押贷款保险，公共渠道则是联邦住房管理局 (Federal Housing Administration)。然而，使这种权衡成为常态的市场本身是联邦住房政策的产物：主导常规贷款市场的政府支持企业依其特许章程被禁止在缺乏此类信用增级的情况下购买 LTV 超过 80% 的贷款 (United States Code 1970)。保险终止的条件同样是制度选择而非风险计算的结果，并且在不同项目之间差异悬殊。¹

因此，尽管估价师在官方口径上估计的是“当前市场价值”，贷款机构在经济上却是透过一个前瞻性风险视角来解读这一价值的。实际上，贷款机构问的问题更接近于：

“如果这位借款人在可预见的未来某个时候违约，抵押品是否仍可能足以覆盖未偿债务和与止赎相关的损失？”

这在本质上是一个面向未来的问题。

这有赖于以下两者之间刻意的概念区分：

- 估价师的“当前市场价值”意见，以及
- 贷款机构在实践中将该意见用作抵御未来抵押品减值的预测缓冲。

从历史与法律上看，监管机构曾力图防止估价师变成投机性预测者，因为：

- 投机性预测曾是以往放贷危机的成因之一，
- 法院希望估价与可观察的证据挂钩，
- 而银行监管机构则寻求标准化、可辩护的估价实践。

于是，估价理论朝着以下方向演进：

- 现值、

¹根据 1998 年《房主保护法》(Homeowners Protection Act)，常规贷款中由借款人支付的私人抵押贷款保险在 LTV 降至 78% 时自动终止，在 80% 时可申请终止。(United States Congress 1998) 联邦住房管理局的保费规则更为严格：对于 2013 年 6 月 3 日及以后发放、原始贷款价值比高于 90%（例如首付 3.5%）的贷款，年度保费贯穿贷款整个存续期，而 LTV 不高于 90% 的贷款则在十一年后取消。(U.S. Department of Housing and Urban Development 2013) 因此，许多 FHA 借款人只能通过再融资转为接近 80% LTV 的常规贷款来摆脱抵押贷款保险。

- 当前市场证据、
- 明确的生效日期、
- 以及受约束的假设。

与此同时，贷款机构、投资者和抵押品分析师却在概率性的未来风险框架中例行使用这些同样的估价。

现实中，抵押贷款审核是一个综合系统，涉及：

1. 当前市场估值、
2. 未来风险估计、
3. 违约概率、
4. 止赎时点、
5. 清算损失严重度、
6. 宏观经济预期、
7. 以及组合压力分析。

估价师正式贡献的主要是第 (1) 项，而贷款机构在内部将这一结果与其余各项相结合。

这一区分在实践中变得模糊。如果贷款机构只有在相信抵押品未来大概率能保有足够价值时才肯放贷，那么估价实际上就间接地充当了未来价值保护模型的一部分——即使估价准则在正式表述上回避这样描述它。

随着以下因素的出现，这一张力愈发突出：

- 自动估价模型 (AVM)、
- 机构组合分析、
- 证券化模型、
- 机器学习估值系统、
- 巴塞尔资本建模、
- 以及大规模抵押贷款压力测试。

现代抵押品分析日益将财产价值视为随时间变化的概率量，而非单点静态估计。(Basel Committee on Banking Supervision 2017; Steurer, Hill, and Pfeifer 2021; Board of Governors of the Federal Reserve System 2021)

可以认为，传统的估价监管反映了一种历史性妥协：

- 估价师提供有纪律的、基于证据的现值之锚，
- 而金融机构承担未来风险解读的责任。

这种分工在现代金融体系中是否仍然完全自治，是一个正当且日益受到讨论的问题。

由此可以得出对估价实践本身的一个现实启示。大多数估价师并未意识到这一抵押品估值角色——贷款机构将市场价值用作前瞻性缓冲的做法在估价业务内部很难看到——因而没有以该角色所要求的、对未来价值走势的审慎态度来对待自己的市场价值结论。认识到现值意见实际上是如何被使用的，是弥合这一差距的第一步，也是本文希望为后续研究开启的领域。

```
%% appraisal_proxy.pl
%%
%% A Prolog knowledge base encoding the thesis that market value
%% appraisals, while formally framed as present-value opinions, function
%% in practice as implicit proxies for future collateral recoverability
%% within mortgage underwriting and lender risk management.

:- module(appraisal_proxy,
    [ % --- central thesis ---
      proxy_thesis/1

      % --- LTV-as-buffer mechanism ---
      , proxy_ltv_buffer_against/1
      , proxy_historical_ltv_threshold/1
```

```

    % --- formal vs practical interpretation ---
    , proxy_formal_framing/1
    , proxy_practical_interpretation/1
    , proxy_underlying_question/1

    % --- the artificial separation ---
    , proxy_separation_party/2          % Party, Role
    , proxy_doctrine_practice_gap/2     % FormalSide, PracticalSide

    % --- historical compromise ---
    , proxy_historical_reason/1
    , proxy_doctrine_emphasis/1
    , proxy_routine_practical_use/1

    % --- modern intensifiers ---
    , proxy_modern_driver/1
    , proxy_modern_treatment/1

    % --- responsibility allocation ---
    , proxy_appraiser_responsibility/1
    , proxy_lender_responsibility/1

    % --- meta-claim about coherence ---
    , proxy_open_question/1

    % --- practical implication for appraisal practice ---
    , proxy_practical_implication/1
    , proxy_appraiser_blindspot/1
    , proxy_recommended_practice/1
    , proxy_further_work/1

    % --- underwriting system view ---
    , underwriting_component/2          % Number, Component
    , underwriting_responsibility/2     % Component, Party
  ]).

:- discontiguous proxy_thesis/1.
:- discontiguous underwriting_component/2.

%% =====
%% PART 1: THE CENTRAL THESIS
%% =====

proxy_thesis(
  'A market value appraisal used in mortgage underwriting often serves as an
  ↪ implicit proxy for expected collateral recoverability over a future holding
  ↪ period.').
proxy_thesis(
  'The appraisal is formally framed as a present-market-value opinion as of a
  ↪ specific effective date.').
proxy_thesis(
  'The lender economically interprets the appraisal through a forward-looking
  ↪ risk lens.').
proxy_thesis(
  'There is a deliberate conceptual separation between the appraiser''s
  ↪ current-market-value opinion and the lender''s use of it as a forecast
  ↪ buffer.').

```

```

proxy_thesis(
    'The appraisal indirectly functions as part of a future-value protection model,
    ↪ even though appraisal standards formally avoid describing it that way.').
proxy_thesis(
    'Whether the separation between appraisal doctrine and lender practice remains
    ↪ fully coherent in modern financial systems is an open and increasingly
    ↪ debated question.').

%% =====
%% PART 2: THE LTV-AS-BUFFER MECHANISM
%% =====

proxy_historical_ltv_threshold(eighty_percent).

proxy_ltv_buffer_against(moderate_market_declines).
proxy_ltv_buffer_against(foreclosure_expenses).
proxy_ltv_buffer_against(liquidation_discounts).
proxy_ltv_buffer_against(carrying_costs).
proxy_ltv_buffer_against(legal_expenses).
proxy_ltv_buffer_against(accrued_interest).
proxy_ltv_buffer_against(uncertainty_during_disposition).

%% =====
%% PART 3: FORMAL FRAMING VS. PRACTICAL INTERPRETATION
%% =====

proxy_formal_framing(present_market_value_opinion).
proxy_formal_framing(opinion_as_of_specific_effective_date).
proxy_formal_framing(grounded_in_current_market_evidence).

proxy_practical_interpretation(forward_looking_risk_lens).
proxy_practical_interpretation(forecast_buffer_against_future_impairment).
proxy_practical_interpretation(input_to_future_collateral_recoverability_estimate).

proxy_underlying_question(
    'If this borrower defaults sometime in the foreseeable future, is the
    ↪ collateral likely to remain sufficient to cover the outstanding debt and
    ↪ foreclosure-related losses?').

%% =====
%% PART 4: THE ARTIFICIAL SEPARATION
%% =====

proxy_separation_party(appraiser, opinion_of_current_market_value).
proxy_separation_party(lender, forecast_buffer_against_future_impairment).
proxy_separation_party(appraiser, evidence_based_present_value_anchor).
proxy_separation_party(lender, future_risk_interpretation).

proxy_doctrine_practice_gap(present_market_value_opinion,
                             implicit_future_value_proxy).
proxy_doctrine_practice_gap(opinion_as_of_effective_date,
                             forecast_over_foreseeable_holding_period).
proxy_doctrine_practice_gap(evidence_based_present_anchor,
                             future_risk_buffer).
proxy_doctrine_practice_gap(static_single_point_estimate,
                             probabilistic_value_over_time).

%% =====

```

```

%% PART 5: HISTORICAL COMPROMISE
%% =====

proxy_historical_reason(speculative_forecasting_contributed_to_past_crises).
proxy_historical_reason(courts_required_observable_evidence).
proxy_historical_reason(regulators_sought_standardized_defensible_practices).

proxy_doctrine_emphasis(present_value).
proxy_doctrine_emphasis(current_market_evidence).
proxy_doctrine_emphasis(defined_effective_dates).
proxy_doctrine_emphasis(constrained_assumptions).

proxy_routine_practical_use(lenders_use_in_probabilistic_future_risk_frameworks).
proxy_routine_practical_use(investors_use_in_probabilistic_future_risk_frameworks).
proxy_routine_practical_use(collateral_analysts_use_in_probabilistic_future_risk_f
↪ rameworks).

%% =====
%% PART 6: MODERN INTENSIFIERS
%% =====

proxy_modern_driver(avms).
proxy_modern_driver(institutional_portfolio_analytics).
proxy_modern_driver(securitization_models).
proxy_modern_driver(machine_learning_valuation_systems).
proxy_modern_driver(basel_capital_modeling).
proxy_modern_driver(large_scale_mortgage_stress_testing).

proxy_modern_treatment(probabilistic_over_time).
proxy_modern_treatment(distributional_rather_than_point_estimate).
proxy_modern_treatment(dynamic_rather_than_static).

%% =====
%% PART 7: ALLOCATION OF RESPONSIBILITY UNDER THE COMPROMISE
%% =====

proxy_appraiser_responsibility(disciplined_present_value_anchor).
proxy_appraiser_responsibility(evidence_based_valuation).
proxy_appraiser_responsibility(current_market_value_opinion).

proxy_lender_responsibility(future_risk_interpretation).
proxy_lender_responsibility(default_probability_estimation).
proxy_lender_responsibility(foreclosure_timing_estimation).
proxy_lender_responsibility(liquidation_severity_estimation).
proxy_lender_responsibility(portfolio_stress_analysis).
proxy_lender_responsibility(macroeconomic_expectation_integration).

%% =====
%% PART 8: OPEN QUESTION (META-CLAIM)
%% =====

proxy_open_question(
    'Whether the separation between disciplined present-value appraisal and
    ↪ lender-side future-risk interpretation remains fully coherent in modern
    ↪ financial systems.').
proxy_open_question(
    'Whether modern probabilistic-over-time collateral analytics make the
    ↪ formal/practical separation untenable in some sectors.').

```

```

%% =====
%% PART 9: THE INTEGRATED MORTGAGE UNDERWRITING SYSTEM
%% =====

underwriting_component(1, current_market_valuation).
underwriting_component(2, future_risk_estimation).
underwriting_component(3, default_probability).
underwriting_component(4, foreclosure_timing).
underwriting_component(5, liquidation_severity).
underwriting_component(6, macroeconomic_expectations).
underwriting_component(7, portfolio_stress_analysis).

underwriting_responsibility(current_market_valuation, appraiser).
underwriting_responsibility(future_risk_estimation, lender).
underwriting_responsibility(default_probability, lender).
underwriting_responsibility(foreclosure_timing, lender).
underwriting_responsibility(liquidation_severity, lender).
underwriting_responsibility(macroeconomic_expectations, lender).
underwriting_responsibility(portfolio_stress_analysis, lender).

%% =====
%% PART 10: PRACTICAL IMPLICATION FOR APPRAISAL PRACTICE
%% =====

proxy_practical_implication(
    'Most appraisers are not aware that market value functions, via the
    ↪ loan-to-value ratio, as a proxy for future foreclosure value.').
proxy_practical_implication(
    'The lender''s forward-looking use of market value is rarely visible from
    ↪ within the appraisal assignment.').
proxy_practical_implication(
    'Appraisers therefore do not treat market value conclusions with the caution
    ↪ toward future value trends that the collateral-valuation role warrants.').

proxy_appraiser_blindspot(collateral_valuation_role).
proxy_appraiser_blindspot(forward_looking_use_of_market_value).
proxy_appraiser_blindspot(market_value_as_ltv_proxy_for_foreclosure_value).

proxy_recommended_practice(recognize_how_present_value_opinion_is_consumed).
proxy_recommended_practice(treat_market_value_with_caution_re_future_trends).

proxy_further_work(closing_the_doctrine_practice_gap).
proxy_further_work(equipping_appraisers_for_the_collateral_valuation_perspective).

```

6 结论

前述知识库所编码的五段论述，从五个互补的视角描述了同一个职业。孤立地看，每段论述都是一份自成一体的阐述：它们所承载的社会与公共利益关切、估价所支持的经济功能、其在抵押品风险分析中的操作角色、将其与相邻量化工作分隔开来的监管边界，以及其正式表述与实际用途之间的张力。合在一起，并借助 Prolog 将结构显性化之后，它们描述的是某种更有意味的东西——一个其官方理论与经济功能被刻意分置的职业，其内在自治性正日益受到如今施加于其产出之上的分析工具的考验。

前三个知识库共享一个共同模式：effect(Quality, Horizon, Domain, Effect)。每一个都将估价质量框定作为一种因果输入，其后果在短期、中期与长期跨度上传播，区别仅在于解读

这些后果所经由的领域。经济视角通过信贷市场、投资配置、税收和资本形成来解读；社会视角通过公平、公众信心和社区结果来解读；抵押品视角通过审贷、组合管理和金融体系稳定来解读。共享模式并非巧合。它反映了贯穿三段论述的一个实质性主张：估值工作的质量是有后果的，这些后果随时间放大，而同样的底层失效模式会因所关注利益主体的不同而以不同方式显现。谓词参数侧的共享原子——尤其是质量与时间跨度词汇——使三套词汇表可以互联，从而像系统性高估这样的单一失效能够同时经由经济上的错误定价、社会上的不公与抵押品上的错误计量得到追踪。

第四个知识库转换了论域。它描述的不是估价质量的后果，而是估价在方法论和法律意义上是什么。其谓词是分类性的而非因果性的，其推理机制回答的是管辖问题而非影响问题。这一转换是必要的，因为前三段论述的后果式框架预设了对被评价活动的定义，而这一定义本身是有争议的。scope 谓词记录估价师做什么——基于证据的现值意见，辅以边界狭窄的前瞻性成分——而 regulation 谓词记录该活动落入持照执业范围的条件。前向链推理规则 (requires_license/1、exempt_from_appraisal_license/1、regulated_appraisal/1) 提供了一种机制，用以询问某项估值工作落在受监管边界之内还是之外——这个问题是前三个知识库默认已经得到回答的。

第五个知识库提出了一个论题。其他知识库或描述、或分类、或追踪后果，而 proxy 知识库则论证：现值估价与未来价值预测之间审慎的理论分隔——即 regulation 知识库所记录的那种分隔——与估价在抵押贷款中的实际经济功能存在张力。80% 的贷款价值比惯例、它所缓冲的七类具体风险、逐字记录的贷款机构的底层问题（“如果这位借款人在可预见的未来某个时候违约，抵押品是否仍可能足以...”），以及由七个组成部分构成的综合审贷系统，都支持同一个主张：估价在形式上是现值意见，在经济上是未来价值缓冲。促成这一安排的历史性妥协——估价师充当有纪律的现值之锚，贷款机构充当未来风险解读的中枢——在估价执照制度形成的历史条件下是一种可以辩护的应对，但文中列举的现代强化因素（AVM、机器学习估值系统、巴塞尔资本建模、证券化分析、大规模压力测试）将财产价值作随时间变化的概率化处理。这些工具把在理论上被分隔的层次重新拉回同一条计算管道，层与层之间的概念分隔也因此愈发难以维系。

这种调和是否可以实现、以何种条件实现，正是 proxy 段落收束时提出的问题。这些知识库并未回答它。但它们确实为回答该问题提供了一份明确、可查询的相关考量清单：估值质量在各时间跨度与领域中的后果、决定哪些后果落入受监管实践的管辖边界，以及该边界如今承压的结构性原因。这份阐述是进一步构建更具体论证——关于方法论、关于准则改革、关于估价实践与更广泛的量化估值体系之间关系——的基础。

关于知识表示的说明

有三个结构性模式值得明确记录，因为它们产生于编码过程本身，而非源自任何单独一段论述。

第一，这一知识库家族并不是扁平的。五个知识库中有三个共享同一模式：一个提供决定该模式何时适用的管辖性限定；一个就正式表述与经济功能之间的差距提出论题。将五者结合的桥接层并不把它们当作同一矩阵的五个列。它把前三者视为对后果的描述，把第四个视为对这些描述在何处有效的约束，把第五个视为对该约束本身承压之处的识别。这种非对称结构是特性而非缺陷：它映照了职业实践的实际组织方式——在其中，描述性主张、管辖性主张与批判性主张占据着确实不同的认识论角色。

第二，区分各模块的前缀纪律 (economic_、social_、collateral_、scope_/regulation_、proxy_/underwriting_) 只有在存在冲突风险之处才真正发挥作用。在各模块间有直接对应物的谓词才配得上前缀；某一概念领域独有的谓词则不需要。参数侧的共享取值词汇——质量、时间跨度和领域原子——恰恰是各模块得以互通的关键，给这些取值加前缀反而会破坏这一点。由此浮现的模式具有普遍性：谓词加前缀，参数共享原子，并且在谓词为单一视角独有时采用选择性前缀而非一律加前缀。

第三，proxy 知识库所识别的核心张力与 scope/regulation 知识库所识别的监管不对称密切相关，却又彼此不同。两者通过平行的二元谓词——regulatory_asymmetry/2 与 proxy_doctrine_practice_gap/2——加以记录，并刻意采用不同的名称，因为它们描述的是同一底层安排的不同轴线。监管不对称关乎谁受监管、监管程度多深；理论与实践差距关乎对估价师产品的正式表述与其实际经济用途之间的落差。两种张力相互强化。监管把估价师推

向现值理论；经济功能把他们的产出拉向未来价值用途。合起来的图景是：这一职业的官方自我描述，与其产品所汇入的分析管道之间，正变得越来越难以调和。

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