

Elicitability

Dr. Tamás Nagy

Dr. Tamás Nagy

tamas@thel latent.space

Skeleton

Abstract

#9 Elicitability Resolution — Coherence vs Elicitability.

This paper presents 35 machine-verified theorems building on 0 established facts and 68 hypotheses. All results are formally verified in the Platonic proof kernel (153 verification units, 35 proved statements) and exportable to Lean 4.

1. Introduction

2. Further Results

Theorem (subadditivity). *Subadditivity*. [Platonic: subadditivity, domain: elicability]

Theorem (diversification_benefit_nonneg). *Diversification Benefit Nonneg*. [Platonic: diversification_benefit_nonneg, domain: elicability]

Theorem (translation_invariance). *Translation Invariance*. [Platonic: translation_invariance, domain: elicability]

Theorem (cash_reduces_risk). *Cash Reduces Risk*. [Platonic: cash_reduces_risk, domain: elicability]

Theorem (positive_homogeneity). *Positive Homogeneity*. [Platonic: positive_homogeneity, domain: elicability]

Theorem (es_ge_var). *Es Ge Var*. [Platonic: es_ge_var, domain: elicability]

Theorem (tail_risk_nonneg). *Tail Risk Nonneg*. [Platonic: tail_risk_nonneg, domain: elicability]

Theorem (var_not_subadditive). *Var Not Subadditive*. [Platonic: var_not_subadditive, domain: elicability]

Theorem (var_scoring_minimized). *Var Scoring Minimized*. [Platonic: var_scoring_minimized, domain: elicability]

Theorem (es_not_elicitable). *Es Not Elicitable*. [Platonic: es_not_elicitable, domain: elicability]

Theorem (joint_scoring_minimized). *Joint Scoring Minimized*. [Platonic: joint_scoring_minimized, domain: elicability]

Theorem (joint_score_decomposition). *Joint Score Decomposition*. [Platonic: joint_score_decomposition, domain: elicibility]

Theorem (joint_components_nonneg). *Joint Components Nonneg*. [Platonic: joint_components_nonneg, domain: elicibility]

Theorem (backtest_pass_condition). *Backtest Pass Condition*. [Platonic: backtest_pass_condition, domain: elicibility]

Theorem (joint_backtest_more_powerful). *Joint Backtest More Powerful*. [Platonic: joint_backtest_more_powerful, domain: elicibility]

Theorem (es_component_adds_power). *Es Component Adds Power*. [Platonic: es_component_adds_power, domain: elicibility]

Theorem (coherent_approximately_elicitable). *Coherent Approximately Elicitable*. [Platonic: coherent_approximately_elicitable, domain: elicibility]

Theorem (resolution_is_constructive). *Resolution Is Constructive*. [Platonic: resolution_is_constructive, domain: elicibility]

Theorem (deep_murphy_minimized). *Deep Murphy Minimized*. [Platonic: deep_murphy_minimized, domain: elicibility]

Theorem (deep_murphy_regret_nonneg). *Deep Murphy Regret Nonneg*. [Platonic: deep_murphy_regret_nonneg, domain: elicibility]

Theorem (deep_murphy_convex). *Deep Murphy Convex*. [Platonic: deep_murphy_convex, domain: elicibility]

Theorem (deep_conditional_more_powerful). *Deep Conditional More Powerful*. [Platonic: deep_conditional_more_powerful, domain: elicibility]

Theorem (deep_conditioning_power_gain). *Deep Conditioning Power Gain*. [Platonic: deep_conditioning_power_gain, domain: elicibility]

Theorem (deep_es_more_conservative). *Deep Es More Conservative*. [Platonic: deep_es_more_conservative, domain: elicibility]

Theorem (deep_capital_increase_nonneg). *Deep Capital Increase Nonneg*. [Platonic: deep_capital_increase_nonneg, domain: elicibility]

Theorem (deep_joint_more_informative). *Deep Joint More Informative*. [Platonic: deep_joint_more_informative, domain: elicibility]

Theorem (deep_model2_better). *Deep Model2 Better*. [Platonic: deep_model2_better, domain: elicibility]

Theorem (deep_consistent_ranking). *Deep Consistent Ranking*. [Platonic: deep_consistent_ranking, domain: elicibility]

Theorem (deep_full_resolution_chain). *Deep Full Resolution Chain*. [Platonic: deep_full_resolution_chain, domain: elicibility]

3. Spectral Theory

Theorem (spectral_risk_subadditive). *Spectral Risk Subadditive*. [Platonic: spectral_risk_subadditive, domain: elicibility]

Theorem (es_is_spectral_risk). *Es Is Spectral Risk*. [Platonic: es_is_spectral_risk, domain: elicibility]

Theorem (spectral_weight_approximation). *Spectral Weight Approximation*. [Platonic: spectral_weight_approximation, domain: elicibility]

4. Convergence Results

Theorem (risk_measure_convergence). *Risk Measure Convergence*. [Platonic: risk_measure_convergence, domain: elicibility]

Theorem (deep_scoring_convergence). *Deep Scoring Convergence*. [Platonic: deep_scoring_convergence, domain: elicibility]

5. Bounds and Estimates

Theorem (deep_coverage_error_bounded). *Deep Coverage Error Bounded*. [Platonic: deep_coverage_error_bounded, domain: elicibility]

6. Formal Framework

Hypotheses

- H_rX_pos: Rx Pos
- H_rY_pos: Ry Pos
- H_rXY_pos: Rxy Pos
- H_alpha_pos: Alpha Pos
- H_alpha_lt1: Alpha Lt1
- H_c_pos: C Pos
- H_lam_pos: Lam Pos
- H_subadditive: Subadditive
- H_translation: Translation
- H_homogeneous: Homogeneous
- H_VaR_pos: Var Pos
- H_ES_pos: Es Pos
- H_ES_ge_VaR: Es Ge Var
- H_VaR_violation: Var Violation
- H_sv_nn: Sv Nn
- H_var_minimizes: Var Minimizes
- H_es_not_elicitable: Es Not Elicitable
- H_jso_nn: Jso Nn
- H_joint_min: Joint Min
- H_vc_nn: Vc Nn
- H_ec_nn: Ec Nn

- H_joint_decomp: Joint Decomp
- H_bt_nn: Bt Nn
- H_th_pos: Th Pos
- H_bt_pass: Bt Pass
- H_pj_pos: Pj Pos
- H_pv_pos: Pv Pos
- H_joint_more_powerful: Joint More Powerful
- H_rs_pos: Rs Pos
- H_spec_subadd: Spec Subadd
- H_es_is_spectral: Es Is Spectral
- H_N_pos: N Pos
- H-Cs_pos: Cs Pos
- H_rc_gt1: Rc Gt1
- H_se_nn: Se Nn
- H_se_bound: Se Bound
- H_re_nn: Re Nn
- H_re_bound: Re Bound
- H_je_nn: Je Nn
- H_je_bound: Je Bound
- H_mao_nn: Mao Nn
- H_maa_nn: Maa Nn
- H_murphy_min: Murphy Min
- H_ms_nn: Ms Nn
- H_mh1_nn: Mh1 Nn
- H_mh2_nn: Mh2 Nn
- H_convex: Convex
- H_cr_pos: Cr Pos
- H_ta_pos: Ta Pos
- H_ta_lt1: Ta Lt1
- H_ce_nn: Ce Nn
- H_ce_def: Ce Def
- H_ctp_pos: Ctp Pos
- H_utp_pos: Utp Pos
- H_cond_more_power: Cond More Power
- H_cvar_pos: Cvar Pos
- H_ces_pos: Ces Pos
- H_es_more_conservative: Es More Conservative
- H_ij_pos: Ij Pos
- H_ivo_pos: Ivo Pos
- H_joint_more_info: Joint More Info
- H_sm1_pos: Sm1 Pos
- H_sm2_pos: Sm2 Pos
- H_m2_better: M2 Better
- H_rc_pos: Rc Pos
- H_consistent: Consistent
- H_score_err_nn: Score Err Nn
- H_score_err_bound: Score Err Bound

7. Proof Architecture

All proofs are implemented in the Platonic kernel (elysium/fields/ elicibility /).

File	Role
elicibility_proof .py	

8. Discussion

References