

Research Frontiers / Course Synthesis

Session 31 · Open questions · The 8-element framework reviewed

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Primary Text: Liquidity Illusion (Forthcoming, 2026)

Graduate Finance Course · Spring 2027 · Session 31 of 32

What we'll cover today

1

Recap and arc

Where Sessions 1-30 brought us

2

Synthesis: the 8-element checklist

Did GE-LAV meet it?

3

Open question 1: non-stationary parameters

Long horizons

4

Open question 2: heterogeneous agents

LP types differ

5

Open question 3: jump-diffusion L

Crisis-onset modeling

6

Open question 4: cross-asset MFG

Multi-asset generalization

Recap: Session 30 • Project Workshop / Valuation Hierarchy

Three takeaways carried forward:

1

Project drafts peer-reviewed in pairs; instructor walks completed

2

Six common pitfalls identified — most students still revising before Session 32

3

Valuation hierarchy theorem: $DCF \subseteq LAV \subseteq LA-CAPM \subseteq GE-LAV$ (strict)

Synthesis: the 8-element checklist (from Session 8)

Recall: in Session 8 we listed what a correct theory must deliver. How did GE-LAV measure up?

Requirement	GE-LAV result	Session covered
General equilibrium framework	✓ Walrasian + MFG	S17, S28
McKean-Vlasov collective dynamics	✓ Full MFG	S21, S26
Reduces to DCF when π constant	✓ Theorem 5.1	S30
Recovers empirical $\pi(L,T)$	✓ $R^2 = 0.94$	S17, S27
Predicts Jensen bias by class	✓ 0.8 – 3.6%	S23, S29
Predicts GFC amplification	✓ 4.31×	S16
Quantifies welfare gap	✓ 2.3%/yr · \$300B	S24, S29
Out-of-sample (COVID, 2022)	✓ within $\pm 20\%$	S16, S19

All 8 elements verified theoretically AND empirically. GE-LAV is internally consistent and empirically grounded.

Open question 1: non-stationary parameters

GE-LAV assumes κ , σ , \bar{L} are constants. At 30+ yr horizons, this fails.

Empirical motivation

Pre-1985 κ likely larger than post-2000 (deregulation)

Theoretical extension

Time-varying $\kappa(t)$, $\sigma(t)$ — solve via local volatility analogy

Dissertation feasible

Yes — Cont (2006) framework adapts directly

Career relevance

Climate infrastructure (\$500B+ AUM by 2030)

Recommended advisor

Anyone in stochastic volatility (NYU, Princeton)

Open question 2: heterogeneous LPs

Current MFG assumes a continuum of identical LPs. Reality: pension/endowment/SWF differ.

Why it matters

Welfare gap is 5× larger when types differ by liquidity needs

Theoretical extension

Multi-type MFG (Carmona-Lacker 2018)

Dissertation feasible

Yes — direct extension of S21 setup

Open question

What's the optimal Pigouvian schedule with heterogeneous types?

Empirical hook

Pension vs. endowment behavior in 2020 COVID stress

Open question 3: jump-diffusion L process

Current model: continuous OU. Reality: L jumps discontinuously at crisis onset.

Empirical motivation

March 2020: L dropped from -0.2 to -1.5 in 3 weeks (discrete)

Theoretical extension

Add Poisson jump component: $dL = \kappa(\bar{L}-L)dt + \sigma dW + JdN$

Dissertation feasible

Yes — Sato (1999) treatment carries over

Open question

Does jump frequency depend on L itself? (Endogenous jumps)

Career relevance

Systemic risk, banking regulators (Fed, BIS)

Open question 4: cross-asset MFG generalization

Current MFG is single-asset-class. Cross-asset spillovers are documented but unmodeled.

Empirical motivation

PE distress in 2008 drove infra and RE distress (correlated)

Theoretical extension

Multi-dimensional $L(t)$ with cross-coupling

Dissertation feasible

Hard — but high-value. Carmona-Delarue V2 has tools

Open question

What's the right covariance structure between asset-class L 's?

Career relevance

Multi-asset PE allocators (\$trillion-AUM)

Where to go next: practitioner pathways

LP role

Apply GE-LAV term structure to your firm's allocation. Most LPs still using DCF.

GP role

Build GE-LAV-consistent IC memo template. Differentiates from peers.

Regulator role

Push for Pillar 2 ORSA to incorporate state-dependent capital.

Consultant role

Build GE-LAV calibration service. Lazard/Evercore equivalent.

Academic role

Pick one open question above; 3-5 yr PhD program

Where to go next: research pathways (T2)

If you're applying to PhD programs, here's how to leverage what you learned.

Stochastic analysis programs

Princeton ORF • NYU Courant • Chicago Booth

Mathematical finance

Imperial College • ETH Zurich • CMU

Empirical asset pricing

Berkeley Haas • Wharton • Booth

Public policy / regulation

Harvard Kennedy • LSE • Sciences Po

Dissertation prep

Open questions 1-4 above are all dissertation-feasible

Course retrospective: the arc

From Session 1's diagnosis to Session 31's open questions.

Unit 1 (S1-4)

Why DCF fails: secondary market, OU process, term structure

Unit 2 (S5-10)

What to measure: IRR/PME/LA-IRR, the 8-element checklist, midterm

Unit 3 (S11-15)

Decisions under stochastic π : exit timing, capital calls, distress, rebalancing

Unit 4 (S16-18)

Regulation: Solvency II, Basel, ORSA, platform architecture

Unit 5 (S19-24)

Math bridges: OU, McKean-Vlasov, MFG, Jensen, Pigouvian

Unit 6 (S25-31)

Split track: cases + proofs paired

Both tracks reconvene: what we agree on

What we've built together (Sessions 1-31)

Track 1 produced

A practitioner's toolkit: GE-LAV term structure, LA-IRR/LA-PME, state-dependent capital, exit-timing discipline.

Track 2 produced

A theorist's framework: rigorous MFG existence + uniqueness, Pigouvian optimality, valuation hierarchy, master equation.

Common ground

GE-LAV is the first comprehensive framework that diagnoses DCF's three failures AND prescribes the fix. Track 1 and Track 2 students have each contributed to making it real.

Your responsibilities going forward

When you leave this course, what should you do differently?

If you're an LP

Replace 'illiquidity premium = 2-3%' with ' $\pi(L,T)$ term structure'

If you're a GP

Build a GE-LAV-consistent IC memo template · differentiates

If you're a fundraiser

Use LA-IRR/LA-PME alongside (not replacing) IRR/PME

If you're a regulator

Push state-dependent capital into the next Solvency revision

If you're a consultant

Offer GE-LAV calibration as a service · gap in the market

If you're a student

Use Session 30's open questions as your dissertation topic

Session 31 summary

What we accomplished today

- 1 All 8 elements of the 'correct theory' checklist met by GE-LAV
- 2 Four open research questions identified — each dissertation-feasible
- 3 Practitioner pathways: LP, GP, regulator, consultant
- 4 Research pathways: stochastic analysis, math finance, empirical asset pricing

Next session

Session 32: Capstone project presentations • 12-min slots • 32 of 32

Acknowledgments and credit

GE-LAV builds on giants. Recognize the lineage.

Foundational

Markowitz · Sharpe · Modigliani-Miller · Black-Scholes

Stochastic asset pricing

Karatzas-Shreve · Duffie · Cochrane

Liquidity-adjusted

Acharya-Pedersen (LA-CAPM) · Amihud-Mendelson

Mean-field games

Lasry-Lions (2007) · Carmona-Delarue (2018)

Private capital empirics

Kaplan-Schoar · Korteweg · Robinson

GE-LAV synthesis

Asaf (2026), Liquidity Illusion — adds to the conversation, not replaces it