Digital Finance 3: Technology in Finance

Lesson 34: Market Prediction Limitations

FHGR

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Understanding limitations prevents costly overconfidence in predictions.

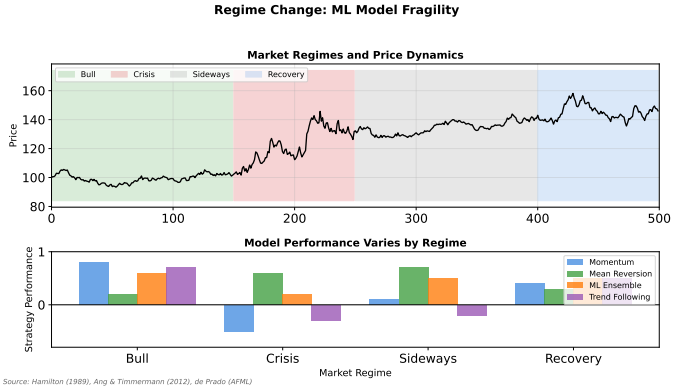
Learning Objectives

By the end of this lesson, you will be able to:

- Explain why markets are hard to predict (EMH)
- Recognize regime changes and structural breaks
- Understand model decay and concept drift
- Apply robust model governance frameworks
- Identify common pitfalls in ML trading systems
- Evaluate realistic performance expectations

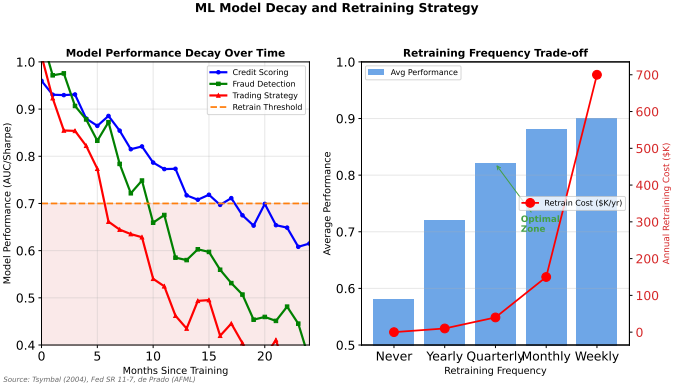
Regime changes invalidate models trained on different market conditions.

Market Regime Changes



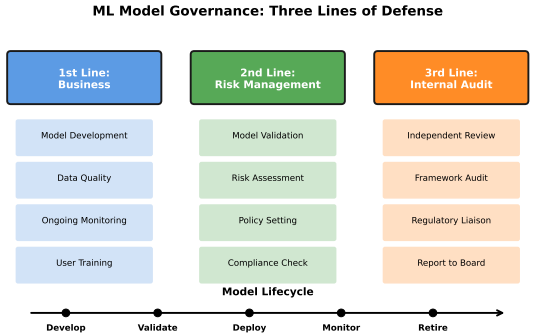
Market regimes shift abruptly, causing models trained on past data to fail in new conditions.

Model Decay Over Time



Predictive models degrade as market dynamics evolve, requiring continuous retraining and monitoring.

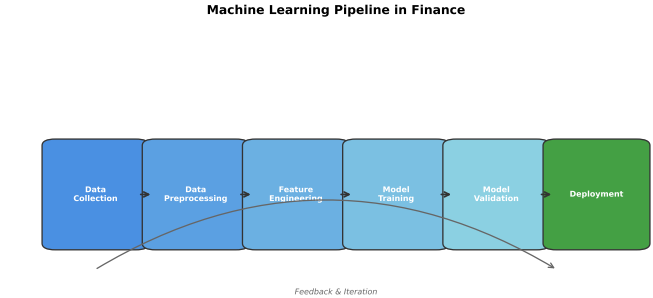
Model Governance Framework



Source: Fed SR 11-7, IIA Three Lines, OCC 2011-12

Robust governance includes validation, monitoring, versioning, and documented approval processes.

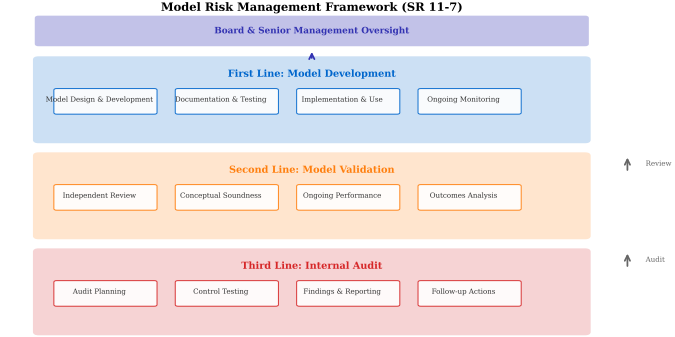
End-to-End ML Pipeline



Source: scikit-learn.org, Geron (Hands-On ML), cloud.google.com/MLOps

Production ML systems require data pipelines, feature stores, model registries, and monitoring infrastructure.

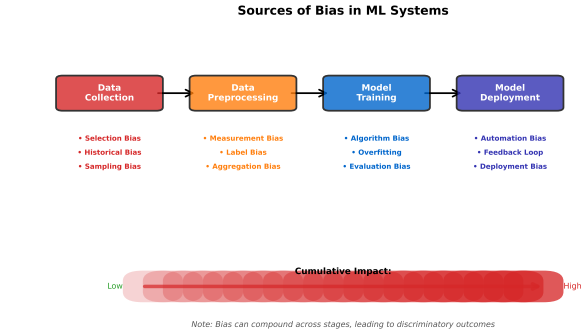
Model Risk Management Framework



Source: Fed SR 11-7, OCC 2011-12, IIA Three Lines Model

Comprehensive model risk management requires governance across the entire lifecycle.

Bias Sources in ML Models



Bias can enter at multiple stages from data collection to deployment.

Market Prediction Limitations: Key Takeaways

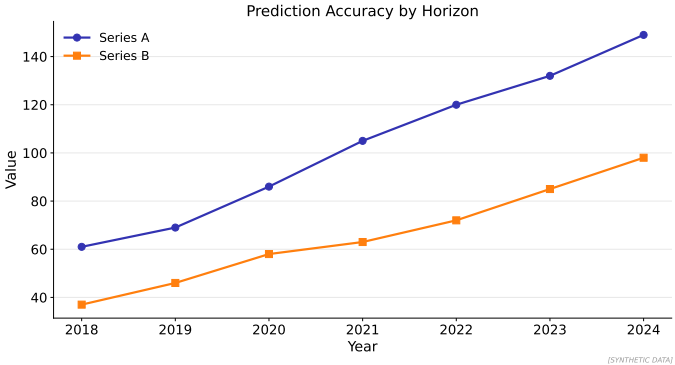
Key Takeaways:

- Markets are hard to predict (EMH partially true)
- Regime changes invalidate historical patterns
- Model decay inevitable: continuous monitoring required
- Governance critical for production ML systems
- Realistic expectations: Sharpe 1.5-2.0 is excellent
- Alpha is scarce, crowded, and decays rapidly

Next Lesson: Explainability and Bias

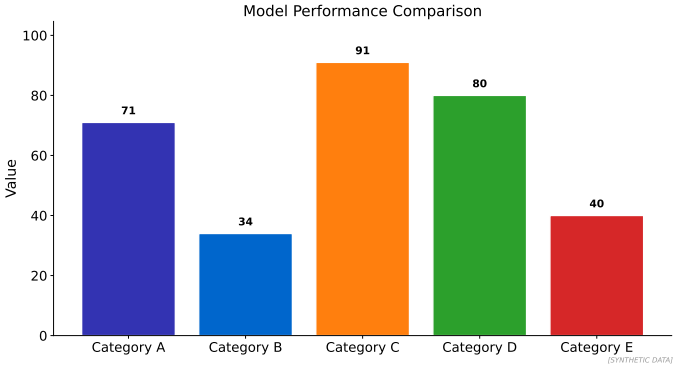
Regime changes invalidate models trained on different market conditions.

Prediction Accuracy Decay



Accuracy degrades with longer prediction horizons.

Model Performance Comparison



No single model dominates across all metrics.