

Stock Direction — Phase 8 Report

This notebook compiles the key results from Phase 6 (diagnostics) and Phase 7 (backtest) into a concise report.

```
In [28]: # --- Imports & artifact paths ---
import json
from pathlib import Path
import pandas as pd
from IPython.display import Image, display, Markdown

DATA = Path("data")
ART = Path("artifacts")
FIG = Path("reports/figures")

assert (DATA/"multiticker_tau_sweep.csv").exists(), "Run Phase 7 to create data/mul
assert (ART/"backtest_summary.json").exists(), "Run Phase 7 to create artifacts/bac

sweep = pd.read_csv(DATA/"multiticker_tau_sweep.csv")
summary = json.load(open(ART/"backtest_summary.json", "r"))
tau = json.load(open(ART/"threshold.json", "r"))["LR"]["tau"] if (ART/"threshol

display(Markdown(f"""Loaded:** sweep={len(sweep)} rows · backtest_summary.json ✓ ·
                if tau is not None else
                f"""Loaded:** sweep={len(sweep)} rows · backtest_summary.json ✓ ·
```

Loaded: sweep=16 rows · backtest_summary.json ✓ · best τ = **0.54**

```
In [29]: # --- Best-row snapshot (per model) ---
best = (sweep.sort_values(["model", "Sharpe"], ascending=[True, False])
        .groupby("model").head(1).reset_index(drop=True))

fmt = {"tau": "{:.2f}", "Sharpe": "{:.2f}", "CAGR": "{:.2%}",
       "total_return": "{:.2%}", "max_drawdown": "{:.1%}",
       "hit_rate": "{:.2f}", "vol_annual": "{:.2f}"}

best_display = best[["model", "tau", "Sharpe", "CAGR", "total_return", "max_drawdown", "h
display(best_display.style.format(fmt))
```

	model	tau	Sharpe	CAGR	total_return	max_drawdown	hit_rate	vol_annual
0	LR	0.54	0.43	6.17%	11.04%	-16.1%	0.29	0.19

```
In [30]: # --- KPI cards (LR) ---
lr = summary["models"].get("LR", {})
cards = pd.DataFrame([{"Model": "LR",
                       "τ (threshold)": lr.get("tau", None),
                       "Sharpe": lr.get("Sharpe", None),
                       "CAGR": lr.get("CAGR", None),
                       "Total Return": lr.get("total_return", None),
```

```

    "Max Drawdown": lr.get("max_drawdown", None),
    "Hit Rate": lr.get("hit_rate", None),
    "Vol (Annual)": lr.get("vol_annual", None),
  })
display(cards.style.format({
    "τ (threshold)": "{:.2f}", "Sharpe": "{:.2f}",
    "CAGR": "{:.2%}", "Total Return": "{:.2%}",
    "Max Drawdown": "{:.1%}", "Hit Rate": "{:.2f}",
    "Vol (Annual)": "{:.2f}"
}))

```

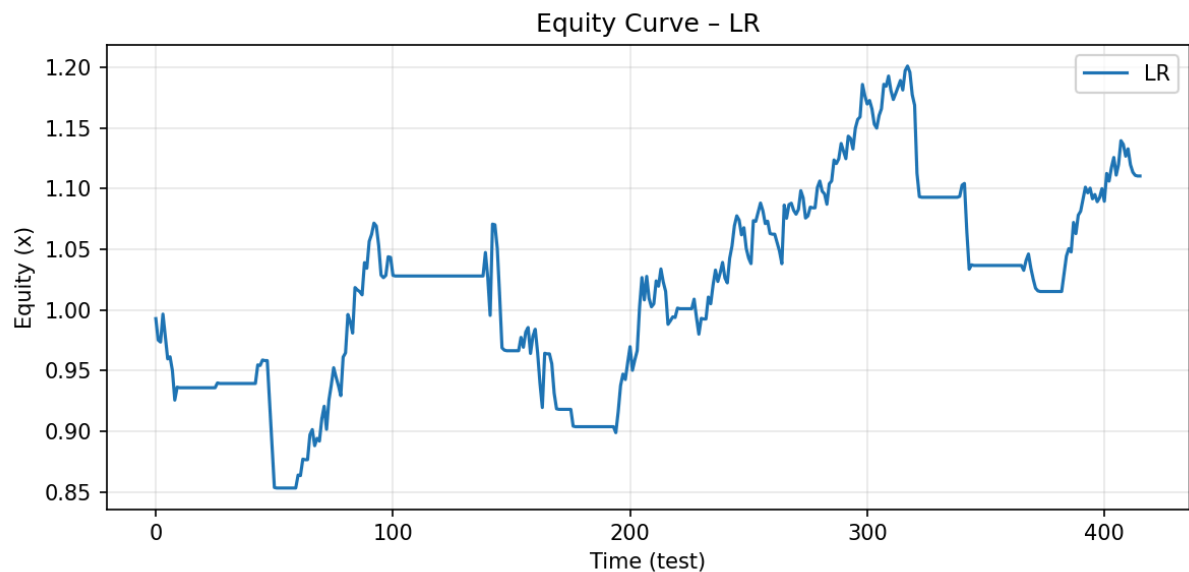
	Model	τ (threshold)	Sharpe	CAGR	Total Return	Max Drawdown	Hit Rate	Vol (Annual)
0	LR	0.54	0.43	6.17%	11.04%	-16.1%	0.29	0.19

```

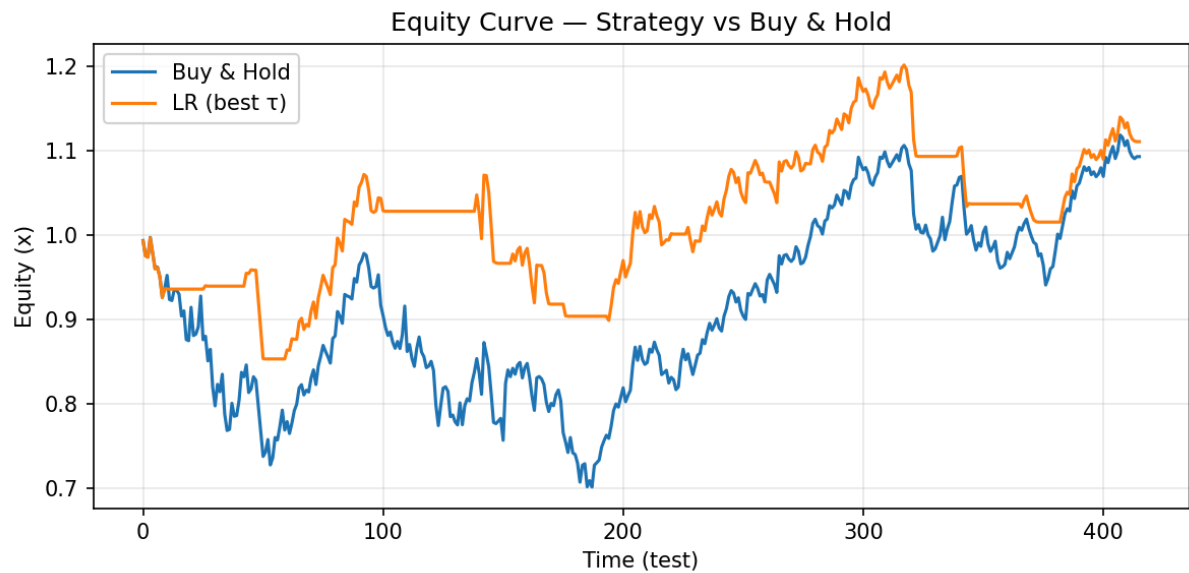
In [31]: # --- Equity curves (from Phase 7) ---
for fn in ["equity_curve_lr.png", "equity_curve_vs_buyhold.png"]:
    p = (FIG / fn)
    if p.exists():
        display(Markdown(f"### {fn}"))
        display(Image(filename=str(p)))
    else:
        display(Markdown(f"**Missing:** {p}"))

```

equity_curve_lr.png



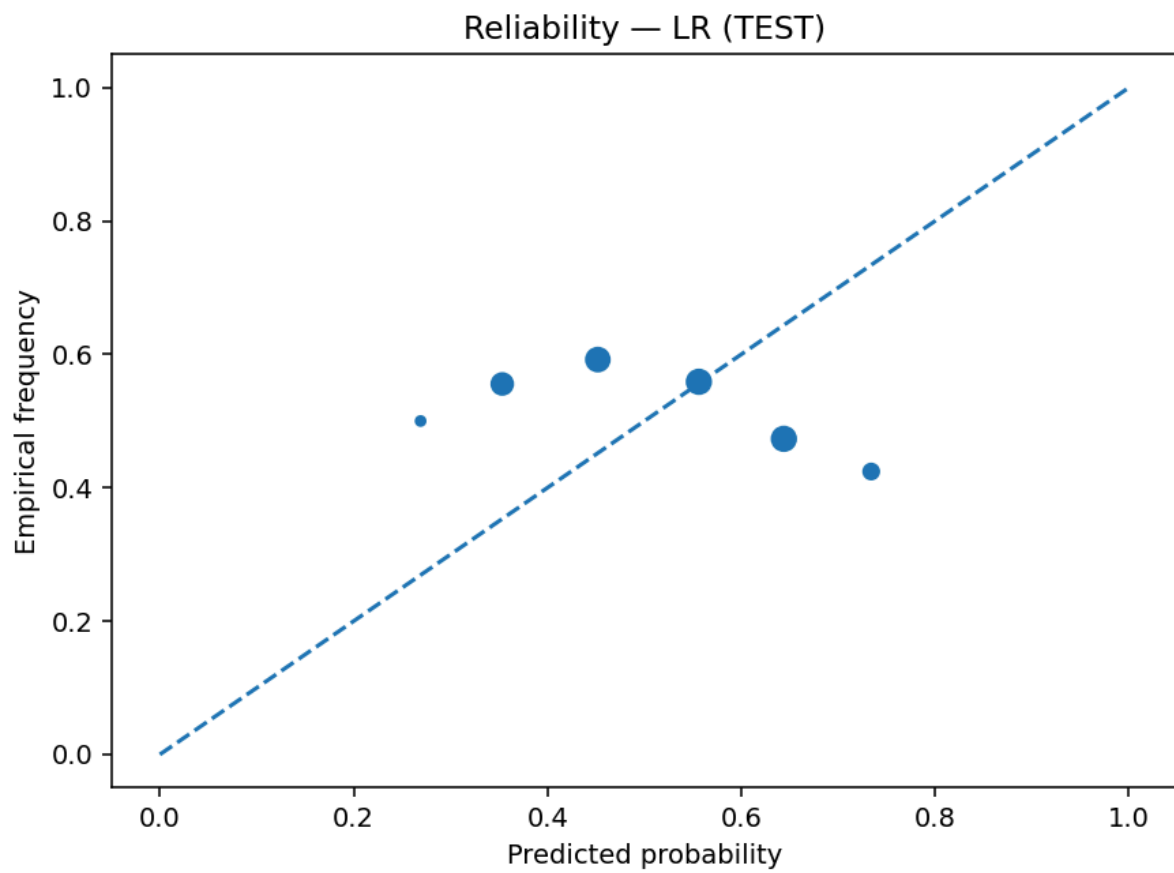
equity_curve_vs_buyhold.png



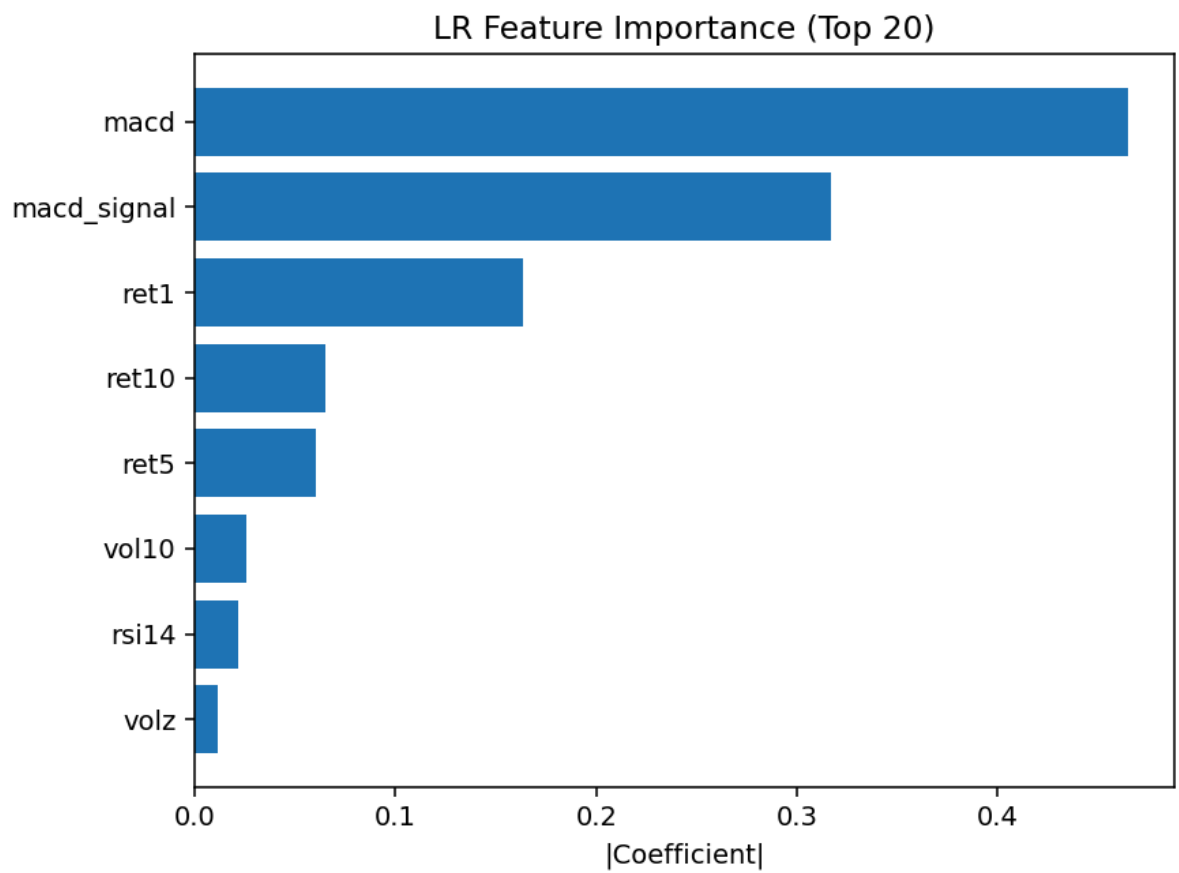
```
In [32]: # --- Phase-6 diagnostics (auto-discover) ---
candidates = [
    "calibration_logreg.png", "reliability_lr_nb05.png",
    "logreg_coef_importance.png", "lr_feature_importance_top*.png",
    "shap_importance.png", "roc_LR_test.png", "pr_LR_test.png"
]
found = []
for pat in candidates:
    for p in FIG.glob(pat):
        if p not in found:
            display(Markdown(f"### {p.name}"))
            display(Image(filename=str(p)))
            found.append(p)

if not found:
    display(Markdown("_No Phase-6 figures found in reports/figures_."))
```

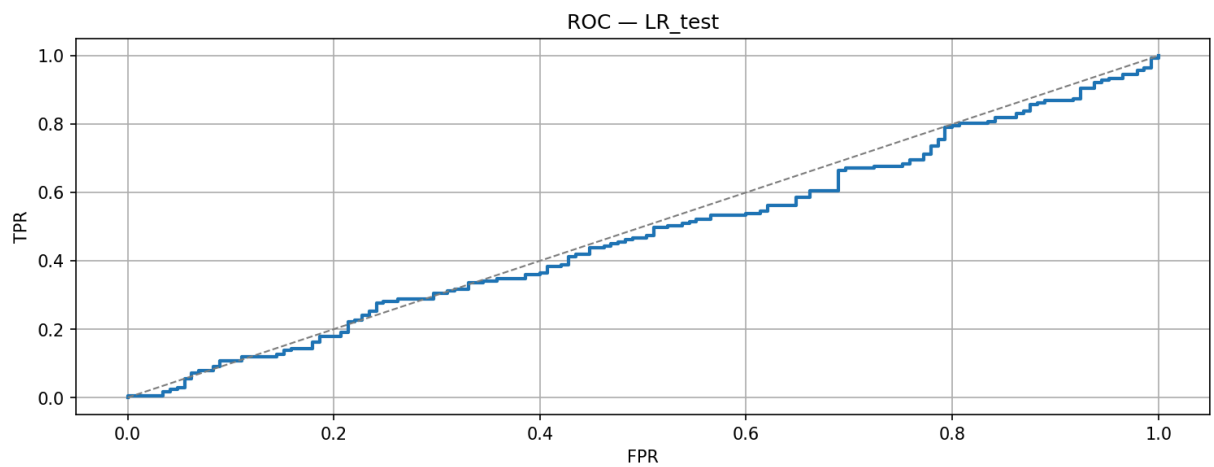
reliability_lr_nb05.png



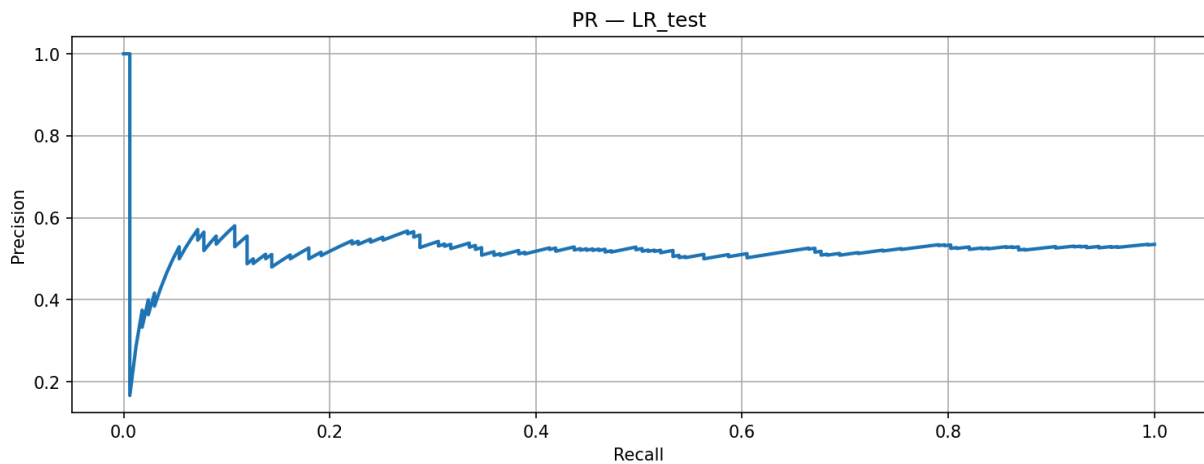
lr_feature_importance_topk.png



roc_LR_test.png



pr_LR_test.png



Assumptions & Caveats

- **Target:** Next-day direction (binary), ticker = AAPL (confirm).
- **Costs:** FEE_BPS = 5, SLIPPAGE_BPS = 0.
- **Strategy:** Long/flat using probability threshold τ (selected via Sharpe).
- **Selected:** LR with $\tau \approx$ best from the sweep.
- **Risks:** Regime shifts; turnover/capacity; slippage model realism; data revisions; look-ahead leakage mitigated by time splits.
- **Next steps:** Walk-forward re-fit, $\tau \times$ fee robustness, confidence sizing, multi-ticker ensemble.

```
In [33]: # --- Manifest of key files used/shown ---
manifest = {
    "sweep_csv": str(DATA/"multiticker_tau_sweep.csv"),
    "summary_json": str(ART/"backtest_summary.json"),
    "threshold_json": str(ART/"threshold.json") if (ART/"threshold.json").exists()
    "figures_present": sorted([p.name for p in FIG.glob("*.png")]),
}
manifest
```

```
Out[33]: {'sweep_csv': 'data\\multiticker_tau_sweep.csv',
'summary_json': 'artifacts\\backtest_summary.json',
'threshold_json': 'artifacts\\threshold.json',
'figures_present': ['equity_curve_lr.png',
'equity_curve_vs_buyhold.png',
'lr_feature_importance_topk.png',
'pr_LR_test.png',
'pr_XGB_test.png',
'pr_nb02.png',
'pr_nb05.png',
'reliability_lr_nb05.png',
'roc_LR_test.png',
'roc_XGB_test.png',
'roc_nb02.png',
'roc_nb05.png']}
```

```
In [34]: !jupyter nbconvert --to html "08_report.ipynb" --output "StockDirectionReport.html"
```

```
[NbConvertApp] Converting notebook 08_report.ipynb to html  
[NbConvertApp] WARNING | Alternative text is missing on 6 image(s).  
[NbConvertApp] Writing 664168 bytes to ..\reports\StockDirectionReport.html
```

In [35]: `!jupyter nbconvert --to webpdf "08_report.ipynb" --output "StockDirectionReport.pdf"`

```
[NbConvertApp] Converting notebook 08_report.ipynb to webpdf  
[NbConvertApp] WARNING | Alternative text is missing on 6 image(s).  
[NbConvertApp] Building PDF  
[NbConvertApp] PDF successfully created  
[NbConvertApp] Writing 439700 bytes to ..\reports\StockDirectionReport.pdf.pdf
```