

QMC RQP Lab - Monte Carlo Review

Generated from the completed result snapshot posted by the QMC frontend. Every plot and table shown in the app is in this document, grouped into numbered sections that follow the reader's questions.

This is the full report. A two-page overview (verdict, estimate with its interval, benchmark table, two charts, run record) is available as the separate Overview export of the same run.

Scenario ID BASKET_CORR_256_RHO0	Scenario Two-share basket call, correlation 0, 256 joint states	Run mode run_convergence	Job ID qmc_job_20261030-081227_29393a29
Status ok	Qubits 9 (8 for the distribution + 1 objective)	Methods classical_mc, low_depth_ae	Runtime 6804

Contents

1 The answer	1
2 The inputs: distribution and payoff	3
3 How the estimators converged	5
4 Circuit and resources	8
5 Run record and method	9
Appendix A Memory diagnostics	11
Appendix B Resource metrics per budget point	11
Appendix C Full distribution and payoff data	11
Appendix D Diagnostics, warnings and artifacts	18

1 The answer

Every method in this report answers the same question: what is the expected discounted payoff $E[f(X)]$ under the scenario's terminal distribution? The engine discretizes the distribution into a probability grid, evaluates the payoff on that grid, and then lets classical and quantum estimators compete on how efficiently they recover the expectation. The exact grid expectation is known in the simulator, so every estimate has a certified error - no method is graded on self-reported accuracy.

VERDICT

METHOD STUDY

The certified grid reference is 14.0586; the closest estimate came from low_depth_ae with an RMSE of 0.0665002 at $k=0,1,2,4,8,16$, shots/power=512 / cost 34816.

Fitted convergence rates: classical Monte Carlo $\alpha = 0.44$ (reference 0.5); low_depth_ae $\alpha = 0.86$. low_depth_ae converges faster than Monte Carlo on this scenario - fewer oracle calls per unit of accuracy - which is the mechanism the Lab exists to show, observed here empirically on a simulator.

Classical baseline: best error 0.170947 at samples=32768 over 4 budget points; every quantum method is read against it on the oracle-call axis.

Resources: up to 9 qubits, circuit depth up to 13056, up to 13056 two-qubit gates per circuit, Grover power up to $k = 16$; runtime 6804 s.

Vocabulary: this Lab reports a Method study - an empirical convergence comparison on a simulator, not a quantum advantage claim. The fitted α is the observed error-versus-budget slope for this finite scenario; the reference expectations are 0.5 for classical Monte Carlo and up to 1 for ideal amplitude estimation.

1.1 Result summary

Metric	Value
Reference value	14.0586
Reference scaled value	0.0387289
Raw expected payoff	14.4867

Metric	Value
Continuous-model value	14.1009
Grid reference vs continuous model	-0.30%
Best method	low_depth_ae
Best estimate	14.0449
Best error (RMSE)	0.0665002
Best CI width	0.263537
Runtime	6804

Reading it: The reference value is the exact expectation on the discretized grid - the certified answer every estimator is measured against. "Best" is the single point with the lowest error over all methods and budgets; it says which method got closest, not which one got there cheapest - the convergence rate below answers that. The continuous-model value is what the model is worth without the grid (the same model on a fine grid: 256 points per factor over 6 standard deviations either side). The grid reference differs from it by -0.30% - the price of representing the distribution on this many qubits. That difference is a modelling error: no estimator, classical or quantum, removes it; only a finer grid does.

1.2 Scenario conclusion

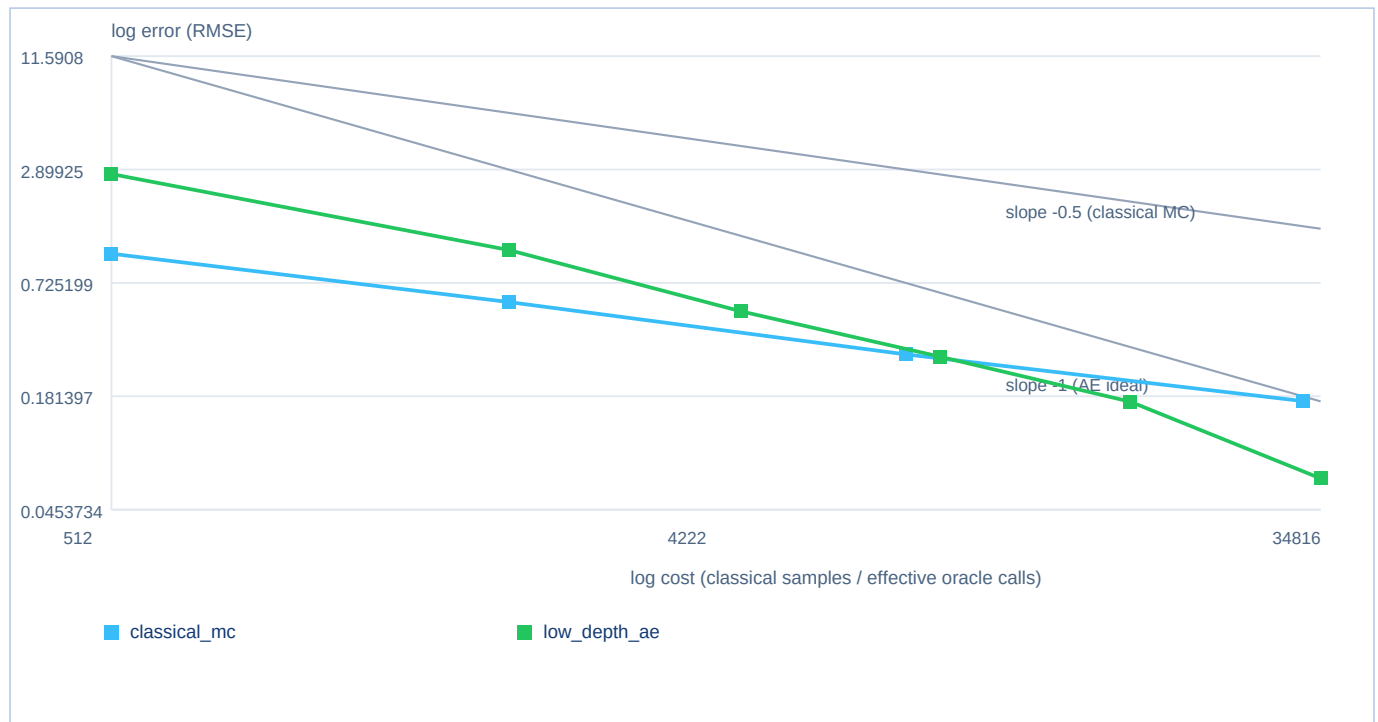
Method	Conclusion
Scaling frame	Classical Monte Carlo error usually decays like $1/\sqrt{N}$. Ideal amplitude estimation targets $1/N$ query scaling; the fitted alpha below is empirical for this finite scenario and is not a quantum advantage claim.
classical_mc	Best baseline error 0.170947 at samples=32768. Empirical alpha 0.44; the MC reference expectation is about 0.5 for $1/\sqrt{N}$ convergence.
low_depth_ae	Best error 0.0665002 at $k=0,1,2,4,8,16$, shots/power=512 / cost 34816. That is 2.57x lower error than the best classical_mc point. A $1/\sqrt{N}$ MC extrapolation from the latest classical point would need about 216535 samples to reach this error, about 6.22x of this method's reported budget. Empirical alpha 0.86, faster than classical_mc's fitted 0.44 in this run. For AE-style methods the ideal query-scaling target is alpha around 1, i.e. roughly $\sqrt{N}$ fewer queries than MC for the same error in the asymptotic model.

1.3 Empirical convergence rate

Method	Positive points	Fitted alpha	Reference expectation	Latest error
classical_mc	4	0.44	~0.5 MC reference	0.170947
low_depth_ae	6	0.86	AE ideal often ~1; empirical here	0.0665002

Reading it: The fitted alpha is the least-squares slope of $\log(\text{error})$ against $\log(\text{budget})$ - the empirical convergence rate of each method in this run. About 0.5 is Monte Carlo behaviour; values approaching 1 indicate the amplitude-estimation speedup is materializing. The steepest slope here is low_depth_ae at 0.86. Fits over few points or few repetitions are noisy; treat alpha as a trend indicator, not a measured constant.

1.4 Log error vs cost



Reading it: The one chart to judge the methods on: error against cost - simulated samples for classical Monte Carlo, effective oracle calls for the quantum methods, one evaluation of the model each - on log-log axes where a power law is a straight line. A method's slope matters more than its position - the dashed guides mark the classical Monte Carlo slope of -0.5 and the ideal amplitude-estimation slope of -1. In this run low_depth_ae overtakes classical Monte Carlo at a cost of about 9700 (interpolated); below that classical Monte Carlo has the lower error, because a classical sample returns the payoff itself while a quantum shot returns one bit.

2 The inputs: distribution and payoff

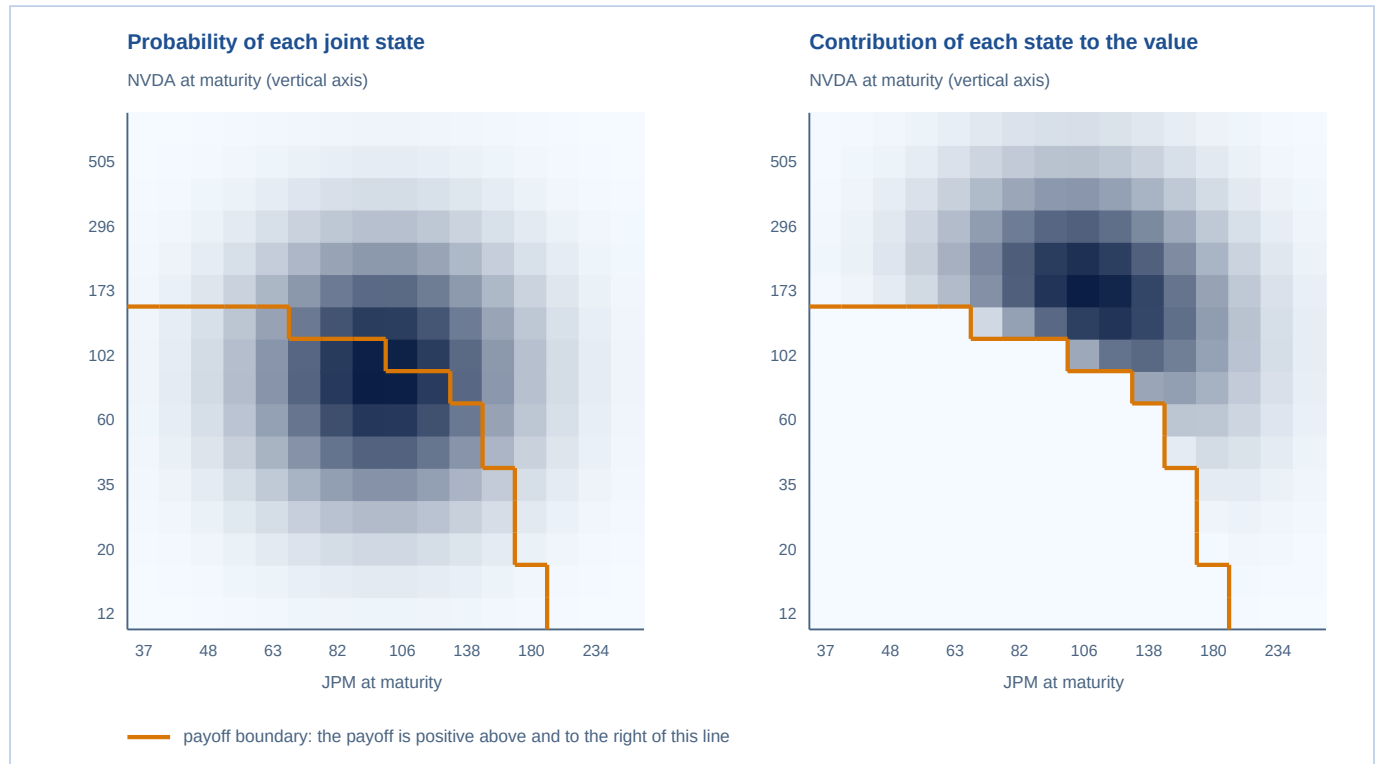
The model inputs before any estimation happens: the discretized terminal distribution (each cell is one basis state of the quantum register), the payoff evaluated on the same grid, and their product - the contribution of each state to the price. Where the contribution concentrates tells you which part of the distribution the estimators must resolve; deep out-of-the-money or rare-event payoffs concentrate mass in a thin tail, which is exactly the regime where amplitude estimation is most interesting.

2.1 Model and grid

Metric	Value
Payoff	basket_call, strike 100
Maturity	1 years
Factor JPM (JPMorgan Chase)	weight 50%, spot 100, volatility 28.3%, drift 3.0%, lognormal, grid from 37 to 267
Factor NVDA (NVIDIA)	weight 50%, spot 100, volatility 57.8%, drift 3.0%, lognormal, grid from 12 to 659
Correlation	0 between the two factors, applied to the joint grid
Grid	16 x 16 = 256 states, spaced evenly in the logarithm of the value (equal relative steps) (bounded_log_grid)
Qubits	8 for the distribution + 1 objective qubit = 9

Reading it: The model exactly as the grid applies it. The two factors share one joint grid; with zero correlation the joint probabilities are the product of the two marginals. A grid in equal relative steps follows a lognormal factor closely: in log-value the distribution is a symmetric bell.

2.2 Joint distribution and payoff contribution



Reading it: Each cell is one joint state of JPM (horizontal) and NVDA (vertical) - one basis state of the quantum register; the darker the cell, the larger the value. Left: where the probability sits. Right: probability times discounted payoff, i.e. where the value comes from. The orange line is the payoff boundary.

2.3 Largest contributions

State	x	Probability	Payoff	Contribution	Cum. probability	Cum. contribution
state 138: JPM=106.161, NVDA=173.374	139.768	0.0163814	39.7677	0.632199	0.672152	5.6708
state 154: JPM=121.112, NVDA=173.374	147.243	0.0131036	47.243	0.600757	0.819026	8.24049
state 139: JPM=106.161, NVDA=226.446	166.304	0.00849936	66.3036	0.546883	0.680651	6.21769
state 153: JPM=121.112, NVDA=132.741	126.926	0.0204007	26.9263	0.533081	0.805922	7.63973
state 122: JPM=93.0564, NVDA=173.374	133.215	0.0164884	33.2152	0.531481	0.491867	3.36316
state 123: JPM=93.0564, NVDA=226.446	159.751	0.00855488	59.7511	0.496056	0.500422	3.85922
state 155: JPM=121.112, NVDA=226.446	173.779	0.00679867	73.7789	0.486775	0.825825	8.72726
state 137: JPM=106.161, NVDA=132.741	119.451	0.0255039	19.451	0.481416	0.65577	5.03861
state 170: JPM=138.168, NVDA=173.374	155.771	0.00843905	55.7711	0.456745	0.915748	10.5999
state 169: JPM=138.168, NVDA=132.741	135.454	0.0131386	35.4544	0.452054	0.907309	10.1432
state 107: JPM=81.5691, NVDA=226.446	154.007	0.00693277	54.0074	0.363355	0.320036	2.06651
state 106: JPM=81.5691, NVDA=173.374	127.472	0.013362	27.4715	0.356227	0.313104	1.70315
state 171: JPM=138.168, NVDA=226.446	182.307	0.00437853	82.307	0.349732	0.920126	10.9496
state 140: JPM=106.161, NVDA=295.764	200.962	0.00356213	100.962	0.349013	0.684213	6.5667
state 124: JPM=93.0564, NVDA=295.764	194.41	0.0035854	94.4099	0.328493	0.504007	4.18771
state 121: JPM=93.0564, NVDA=132.741	112.898	0.0256705	12.8985	0.321325	0.475379	2.83168

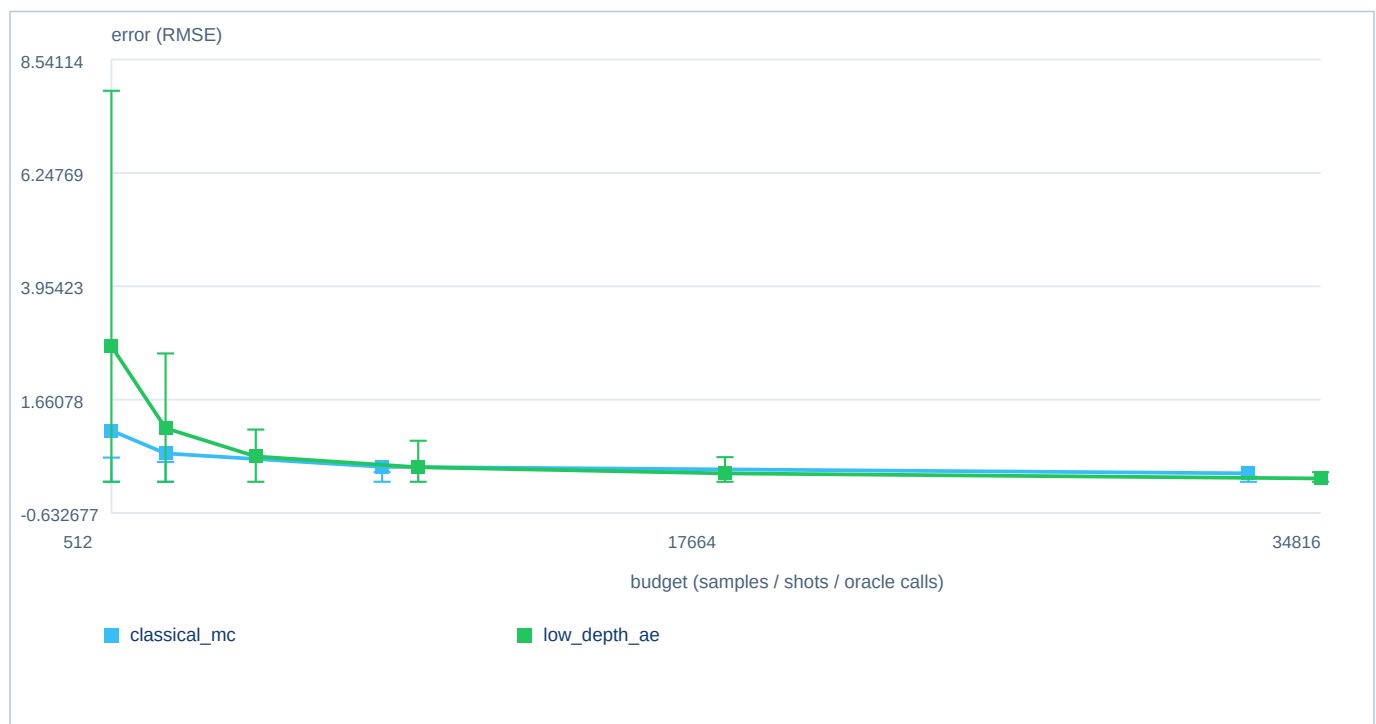
State	x	Probability	Payoff	Contribution	Cum. probability	Cum. contribution
state 168: JPM=138.168, NVDA=101.63	119.899	0.0165232	19.8993	0.319082	0.89417	9.69111
state 156: JPM=121.112, NVDA=295.764	208.438	0.00284937	108.438	0.299847	0.828674	9.02711
state 185: JPM=157.626, NVDA=132.741	145.183	0.00681268	45.1835	0.298723	0.962897	12.0649
state 152: JPM=121.112, NVDA=101.63	111.371	0.0256561	11.3712	0.283118	0.785522	7.10665
state 186: JPM=157.626, NVDA=173.374	165.5	0.00437585	65.5002	0.278148	0.967273	12.343
state 108: JPM=81.5691, NVDA=295.764	188.666	0.00290557	88.6663	0.250012	0.322942	2.31652
state 184: JPM=157.626, NVDA=101.63	129.628	0.00856768	29.6283	0.246344	0.956084	11.7662
state 91: JPM=71.4998, NVDA=226.446	148.973	0.00452341	48.9728	0.214977	0.17452	0.926332

Reading it: The 24 states with the largest contribution, of 256; the full table is in the appendix. 256 grid states; the 51 states with the largest contribution (20% of the grid) carry 91% of the price, and 149 states contribute at all. The more concentrated the contribution, the thinner the tail the estimators must resolve - the regime where amplitude estimation earns its keep.

3 How the estimators converged

Each point is one budget level for one method: how far the estimate sits from the certified grid reference (RMSE over repetitions where the run was repeated across seeds). The first two charts show raw and log error; the log-log chart is the one to judge scaling on. For amplitude-estimation methods the budget grows by adding deeper Grover powers at fixed shots per power - depth, not shot count, is what buys the steeper slope. Budgets are expressed in samples for classical Monte Carlo, shots for direct quantum sampling, and effective oracle calls (shots $\times$ $\sum(2k+1)$) for amplitude estimation.

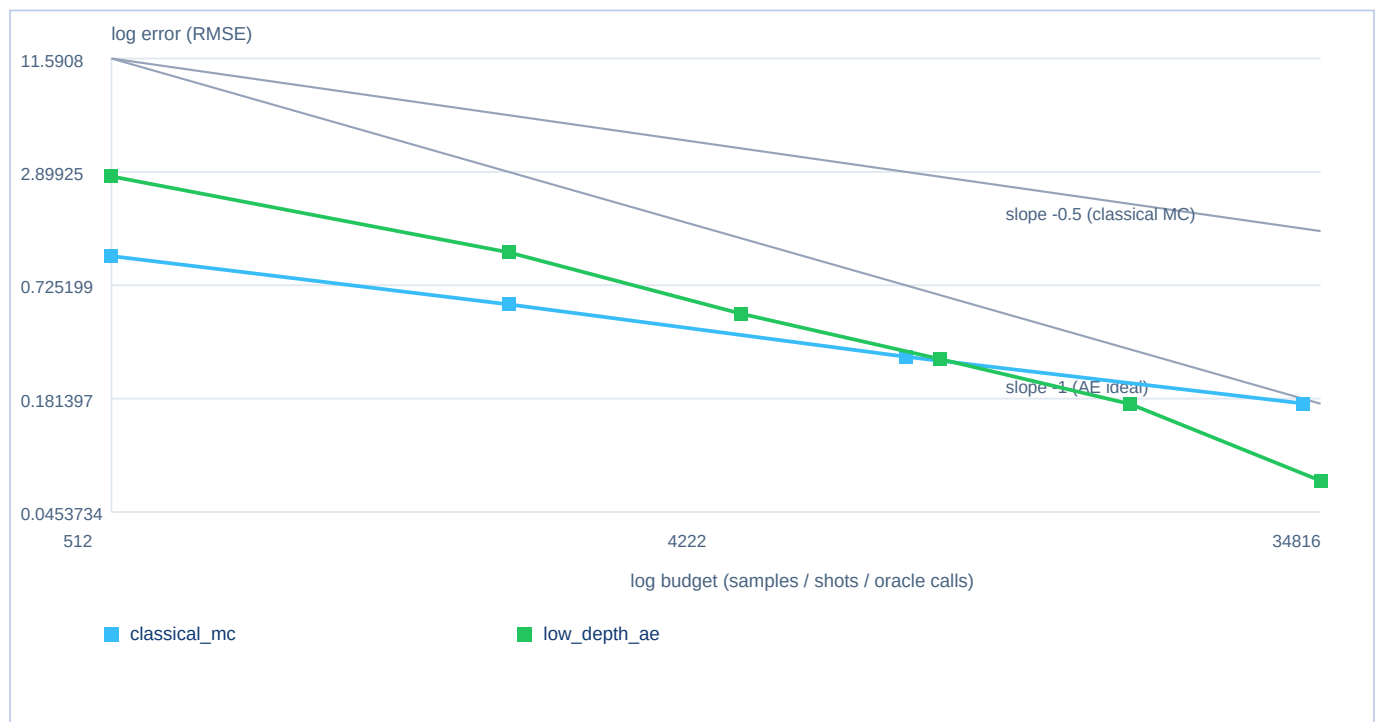
3.1 Error vs budget



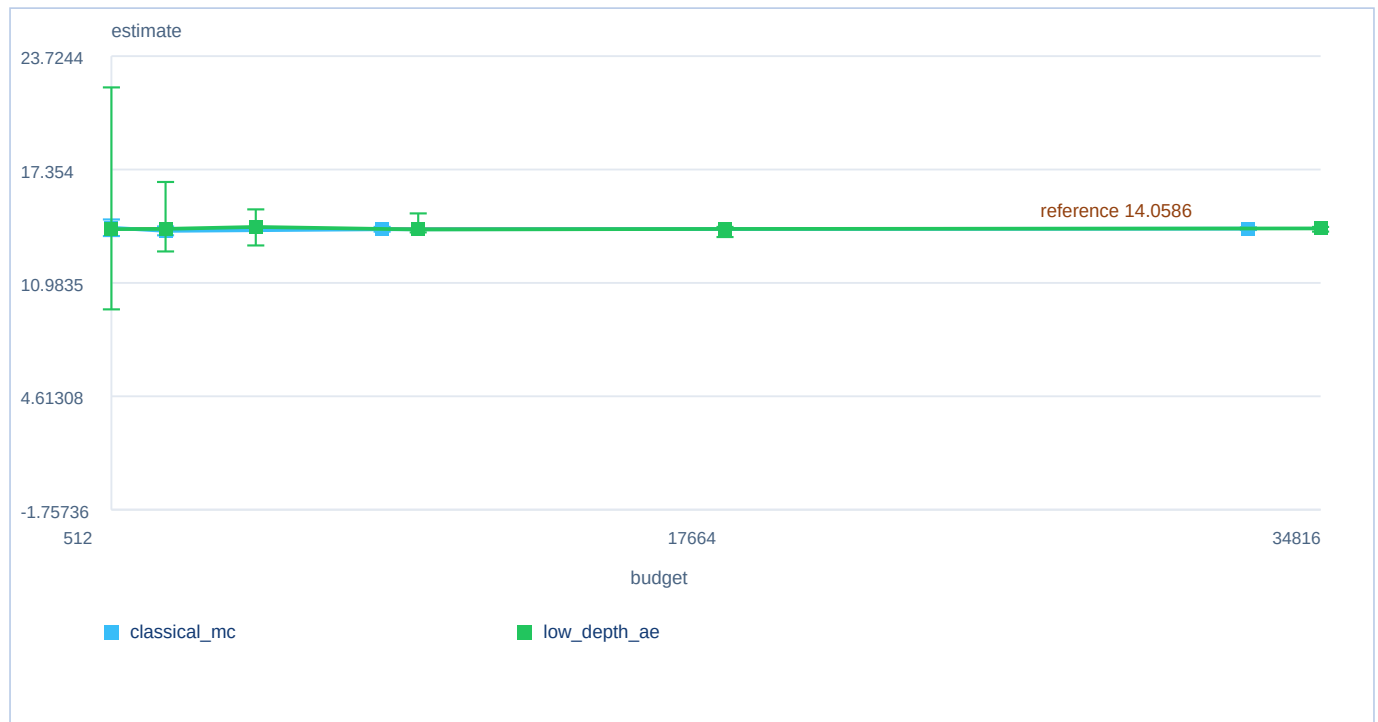
3.2 Log error vs budget



3.3 Log error vs log budget



3.4 Estimate vs reference



3.5 Confidence interval width vs budget



3.6 Convergence comparison

Method	Budget	Cost	Reps	Estimate	Error (RMSE)	CI Width	Oracle Calls	Max Grover
classical_mc	samples=512	512 samples	20	14.0819	1.03608	0.931506	n/a	n/a

Method	Budget	Cost	Reps	Estimate	Error (RMSE)	CI Width	Oracle Calls	Max Grover
classical_mc	samples=2048	2048 samples	20	13.9057	0.574042	0.497597	n/a	n/a
classical_mc	samples=8192	8192 samples	20	13.9961	0.302655	0.266313	n/a	n/a
classical_mc	samples=32768	32768 samples	20	14.032	0.170947	0.151858	n/a	n/a
low_depth_ae	k=0, shots/power=512	512 oracle calls	20	14.0035	2.74383	12.4711	512	n/a
low_depth_ae	k=0,1, shots/power=512	2048 oracle calls	20	14.0186	1.08452	3.9041	2048	1
low_depth_ae	k=0,1,2, shots/power=512	4608 oracle calls	20	14.1263	0.512261	2.02647	4608	2
low_depth_ae	k=0,1,2,4, shots/power=512	9216 oracle calls	20	13.9847	0.294556	1.06683	9216	4
low_depth_ae	k=0,1,2,4,8, shots/power=512	17920 oracle calls	20	14.0145	0.169755	0.567985	17920	8
low_depth_ae	k=0,1,2,4,8,16, shots/power=512	34816 oracle calls	20	14.0449	0.0665002	0.263537	34816	16

Reading it: Budget is the human-readable schedule label; Cost is the same budget expressed in its comparable unit (samples, shots, or effective oracle calls). Reps is the number of independent seeded repetitions behind the RMSE; confidence intervals for repeated points come from the first repetition. 10 budget points across 2 methods. Points were repeated 20 to 20 times across seeds.

4 Circuit and resources

On the quantum side, loading the distribution and adding the payoff become a circuit: state preparation loads the amplitudes $\sqrt{p_x}$, and one controlled rotation per grid state writes the scaled payoff onto an extra objective qubit, so that $P(\text{objective} = 1)$ equals the scaled expectation exactly. The resource table translates the run into hardware-relevant quantities. Depth per circuit grows linearly with the Grover power k (each amplification repeats the state preparation and payoff oracle), which is the practical constraint on near-term devices: the statistical efficiency of amplitude estimation is bought with longer coherent circuits, not more of them.

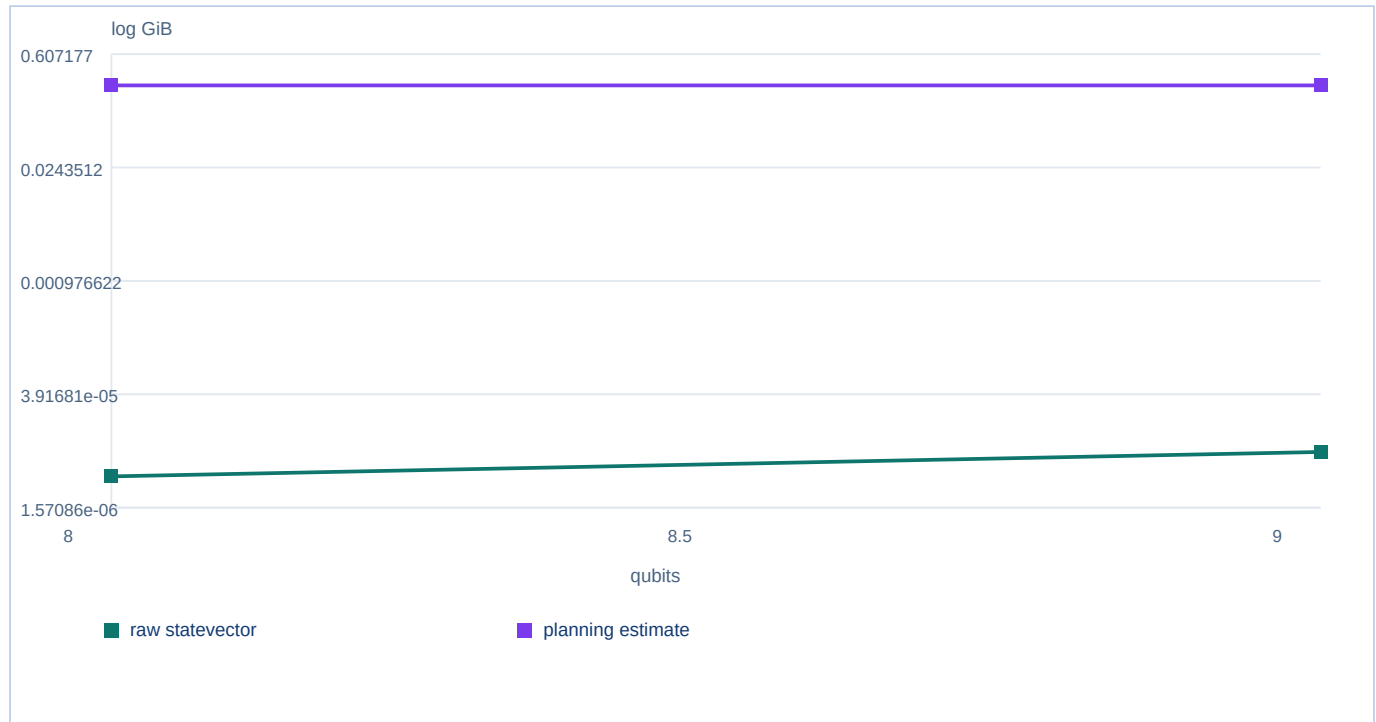
distribution_loading (correlated_lognormal_placeholder): 8 qubits, depth 256, 255 two-qubit gates per circuit;
 payoff_objective_loading (bounded_log_grid): 9 qubits, depth 256, 256 two-qubit gates per circuit;
 objective_shot_readout (objective_shots): 9 qubits, depth 512, 512 two-qubit gates per circuit; grover_iterate (objective_reflection_and_diffusion): 9 qubits, depth 784, 784 two-qubit gates per circuit. 1 further components are listed in the table.

4.1 Circuit resource estimate

Component	Method	Qubits	Gates/Circuit	Depth/Circuit	2Q/Circuit	Ctrl Rot./Circuit	Circuit Calls	Oracle Calls	Max k	Suitability
distribution_loading	correlated_lognormal_placeholder	8	510	256	255	0	1	n/a	n/a	simulator_or_stateprep_research
payoff_objective_loading	bounded_log_grid	9	512	256	256	256	1	n/a	n/a	controlled_rotation_bottleneck
objective_shot_readout	objective_shots	9	1024	512	512	256	n/a	n/a	n/a	small_simulator_or_toy_hardware_candidate
grover_iterate	objective_reflection_and_diffusion	9	1568	784	784	256	n/a	n/a	16	reflection_size_bottleneck
ae_schedule	low_depth_ae	9	26112	13056	13056	4352	n/a	n/a	16	simulator_benchmark_first

Reading it: One row per estimator component. Depth per circuit and two-qubit gates per circuit are the hardware-relevant numbers; circuit calls times depth is the coherent work a device would have to sustain. The suitability column is a coarse placement of each component on today's simulator-vs-hardware spectrum.

4.2 Statevector memory estimate



4.3 Statevector memory table

Component	Method	Qubits	Raw statevector	Planning estimate	Worker hint
distribution_loading	correlated_lognormal_placeholder	8	4 KiB	0.25 GiB	small candidate
payoff_objective_loading	bounded_log_grid	9	8 KiB	0.25 GiB	small candidate
objective_shot_readout	objective_shots	9	8 KiB	0.25 GiB	small candidate
grover_iterate	objective_reflection_and_diffusion	9	8 KiB	0.25 GiB	small candidate
ae_schedule	low_depth_ae	9	8 KiB	0.25 GiB	small candidate

Reading it: These runs execute on a statevector simulator, which stores all 2^n complex amplitudes explicitly - memory doubles with every added qubit. This is a simulator constraint, not a property of the algorithm: on hardware the same circuit needs n physical qubits, not 2^n memory. The planning estimate adds the working-set overhead the worker actually needs on top of the raw statevector.

5 Run record and method

What was run and how the problem was set up - the facts needed to reproduce the result - followed by the three-step estimation pipeline and a glossary of the methods that took part. Worker telemetry, the per-point resource metrics, warnings and the backend log are in the appendices.

5.1 Run metadata

Metric	Value
Original workbook	n/a
Selected scenario	n/a
Run mode	n/a
Job ID	qmc_job_20261030-081227_29393a29

Metric	Value
Job status	ok
Downloaded at	2026-10-31T07:51:37.073003+00:00
API URL	n/a

5.2 Selected scenario

Metric	Value
Scenario name	Two-share basket call, correlation 0, 256 joint states
Problem type	basket_call
Payoff type	basket_call
Distribution model	correlated_lognormal_terminal
Underlyings	JPM, NVDA
Qubits	9 (8 for the distribution + 1 objective)
Max total qubits	16
Notes	Same basket, grid, budgets, seeds and amplification schedule as BASKET_CORR_256; only the JPM/NVDA correlation cell moved from 0.5 to 0.

5.3 QMC estimation pipeline

Step	Name	What is reported
1	Load distribution	Terminal-state probability mass over the discretized grid.
2	Add payoff	Payoff or event indicator evaluated for each grid state.
3	Derive expectation value	Classical MC, objective shots, and AE-style methods estimate the expected value.

State preparation loads the amplitudes $\sqrt{p_x}$ so that measuring the register samples the distribution, and one controlled rotation per grid state writes the scaled payoff $g(x)$ onto an extra objective qubit, with rotation angle $\theta_x = 2 \arcsin(\sqrt{g(x)})$. After that, $P(\text{objective} = 1)$ equals the scaled expectation $E[g(X)]$ exactly. Step 3 is where the methods differ: they are simply different read-out strategies for that one probability, from naive repeated measurement to Grover-amplified interval estimation.

5.4 Methods in this run

Method	What it does	Cost unit / expected scaling
classical_mc	Crude Monte Carlo: draw terminal states from the same discrete grid, average the discounted payoff.	samples; error $\sim 1/\sqrt{N}$
low_depth_ae	Maximum-likelihood amplitude estimation over a bounded Grover-power schedule (NISQ-style depth budget). Combines counts from all powers into one likelihood fit for theta.	oracle calls; error up to $\sim 1/N$ as depth grows

Why report it this way: on a log-log plot a power law error $\sim \text{budget}^{-\alpha}$ is a straight line with slope $-\alpha$. Classical Monte Carlo is pinned at $\alpha = 0.5$; amplitude estimation can approach $\alpha = 1$, i.e. quadratically fewer oracle calls for the same accuracy. The fitted alpha table quantifies where this finite-size run actually lands, which is an empirical observation about this scenario on a simulator, not a quantum advantage claim.

Appendix A Memory diagnostics

The telemetry below documents what the worker actually used while executing the run.

A.1 Worker memory telemetry

No plottable points available for this chart.

Appendix B Resource metrics per budget point

Every convergence point with its shots, samples, oracle calls, Grover power, runtime and confidence-interval width.

Resource metrics

Method	Budget	Cost	Shots	Samples	Oracle Calls	Max Grover	Runtime	CI Width
classical_mc	samples=512	512 samples	n/a	512	n/a	n/a	0.0417711	0.931506
classical_mc	samples=2048	2048 samples	n/a	2048	n/a	n/a	0.0045822	0.497597
classical_mc	samples=8192	8192 samples	n/a	8192	n/a	n/a	0.0132379	0.266313
classical_mc	samples=32768	32768 samples	n/a	32768	n/a	n/a	0.050082	0.151858
low_depth_ae	k=0, shots/power=512	512 oracle calls	512	n/a	512	n/a	56.5055	12.4711
low_depth_ae	k=0,1, shots/power=512	2048 oracle calls	512	n/a	2048	1	198.196	3.9041
low_depth_ae	k=0,1,2, shots/power=512	4608 oracle calls	512	n/a	4608	2	449.353	2.02647
low_depth_ae	k=0,1,2,4, shots/power=512	9216 oracle calls	512	n/a	9216	4	892.885	1.06683
low_depth_ae	k=0,1,2,4,8, shots/power=512	17920 oracle calls	512	n/a	17920	8	1736	0.567985
low_depth_ae	k=0,1,2,4,8,16, shots/power=512	34816 oracle calls	512	n/a	34816	16	3471	0.263537

Appendix C Full distribution and payoff data

Every grid state in register order, with its probability, payoff and contribution to the value.

Distribution and payoff data

State	x	Probability	Payoff	Contribution	Cum. probability	Cum. contribution
state 0: JPM=37, NVDA=12	24.5	2.248e-07	0	n/a	2.248e-07	0
state 1: JPM=37, NVDA=15.6733	26.3367	9.86129e-07	0	n/a	1.21093e-06	0
state 2: JPM=37, NVDA=20.4711	28.7356	3.49431e-06	0	n/a	4.70524e-06	0
state 3: JPM=37, NVDA=26.7376	31.8688	1.00018e-05	0	n/a	1.47071e-05	0
state 4: JPM=37, NVDA=34.9223	35.9611	2.31252e-05	0	n/a	3.78323e-05	0
state 5: JPM=37, NVDA=45.6124	41.3062	4.31899e-05	0	n/a	8.10222e-05	0
state 6: JPM=37, NVDA=59.5748	48.2874	6.51582e-05	0	n/a	0.00014618	0
state 7: JPM=37, NVDA=77.8114	57.4057	7.94044e-05	0	n/a	0.000225585	0
state 8: JPM=37, NVDA=101.63	69.3152	7.81646e-05	0	n/a	0.000303749	0
state 9: JPM=37, NVDA=132.741	84.8703	6.21535e-05	0	n/a	0.000365903	0
state 10: JPM=37, NVDA=173.374	105.187	3.99218e-05	5.18701	0.000200955	0.000405825	0.000200955
state 11: JPM=37, NVDA=226.446	131.723	2.07131e-05	31.7229	0.000637659	0.000426538	0.000838614

State	x	Probability	Payoff	Contribution	Cum. probability	Cum. contribution
state 12: JPM=37, NVDA=295.764	166.382	8.68098e-06	66.3818	0.000559227	0.000435219	0.00139784
state 13: JPM=37, NVDA=386.3	211.65	2.93888e-06	111.65	0.000318429	0.000438158	0.00171627
state 14: JPM=37, NVDA=504.551	270.776	8.03684e-07	170.776	0.000133193	0.000438961	0.00184946
state 15: JPM=37, NVDA=659	348	1.77533e-07	248	4.27269e-05	0.000439139	0.00189219
state 16: JPM=42.2107, NVDA=12	27.1053	1.01838e-06	0	n/a	0.000440157	0.00189219
state 17: JPM=42.2107, NVDA=15.6733	28.942	4.46732e-06	0	n/a	0.000444625	0.00189219
state 18: JPM=42.2107, NVDA=20.4711	31.3409	1.58298e-05	0	n/a	0.000460454	0.00189219
state 19: JPM=42.2107, NVDA=26.7376	34.4741	4.53098e-05	0	n/a	0.000505764	0.00189219
state 20: JPM=42.2107, NVDA=34.9223	38.5665	0.000104761	0	n/a	0.000610525	0.00189219
state 21: JPM=42.2107, NVDA=45.6124	43.9115	0.000195657	0	n/a	0.000806182	0.00189219
state 22: JPM=42.2107, NVDA=59.5748	50.8928	0.000295177	0	n/a	0.00110136	0.00189219
state 23: JPM=42.2107, NVDA=77.8114	60.011	0.000359714	0	n/a	0.00146107	0.00189219
state 24: JPM=42.2107, NVDA=101.63	71.9205	0.000354098	0	n/a	0.00181517	0.00189219
state 25: JPM=42.2107, NVDA=132.741	87.4756	0.000281565	0	n/a	0.00209674	0.00189219
state 26: JPM=42.2107, NVDA=173.374	107.792	0.000180852	7.79235	0.00136761	0.00227759	0.0032598
state 27: JPM=42.2107, NVDA=226.446	134.328	9.38334e-05	34.3282	0.00312594	0.00237142	0.00638574
state 28: JPM=42.2107, NVDA=295.764	168.987	3.93262e-05	68.9871	0.00263282	0.00241075	0.00901856
state 29: JPM=42.2107, NVDA=386.3	214.255	1.33136e-05	114.255	0.00147619	0.00242406	0.0104947
state 30: JPM=42.2107, NVDA=504.551	273.381	3.64081e-06	173.381	0.000612591	0.0024277	0.0111073
state 31: JPM=42.2107, NVDA=659	350.605	8.04251e-07	250.605	0.000195593	0.00242851	0.0113029
state 32: JPM=48.1552, NVDA=12	30.0776	3.71439e-06	0	n/a	0.00243222	0.0113029
state 33: JPM=48.1552, NVDA=15.6733	31.9143	1.62939e-05	0	n/a	0.00244851	0.0113029
state 34: JPM=48.1552, NVDA=20.4711	34.3132	5.77369e-05	0	n/a	0.00250625	0.0113029
state 35: JPM=48.1552, NVDA=26.7376	37.4464	0.000165261	0	n/a	0.00267151	0.0113029
state 36: JPM=48.1552, NVDA=34.9223	41.5387	0.0003821	0	n/a	0.00305361	0.0113029
state 37: JPM=48.1552, NVDA=45.6124	46.8838	0.000713632	0	n/a	0.00376724	0.0113029
state 38: JPM=48.1552, NVDA=59.5748	53.865	0.00107661	0	n/a	0.00484386	0.0113029
state 39: JPM=48.1552, NVDA=77.8114	62.9833	0.00131201	0	n/a	0.00615587	0.0113029
state 40: JPM=48.1552, NVDA=101.63	74.8928	0.00129152	0	n/a	0.00744739	0.0113029
state 41: JPM=48.1552, NVDA=132.741	90.4479	0.00102697	0	n/a	0.00847436	0.0113029
state 42: JPM=48.1552, NVDA=173.374	110.765	0.000659632	10.7646	0.00689082	0.00913399	0.0181938
state 43: JPM=48.1552, NVDA=226.446	137.3	0.000342244	37.3005	0.0123886	0.00947623	0.0305823
state 44: JPM=48.1552, NVDA=295.764	171.959	0.000143437	71.9593	0.0100166	0.00961967	0.0405989
state 45: JPM=48.1552, NVDA=386.3	217.228	4.85595e-05	117.228	0.00552427	0.00966823	0.0461232
state 46: JPM=48.1552, NVDA=504.551	276.353	1.32794e-05	176.353	0.00227264	0.00968151	0.0483958
state 47: JPM=48.1552, NVDA=659	353.578	2.93339e-06	253.578	0.000721859	0.00968444	0.0491177
state 48: JPM=54.9368, NVDA=12	33.4684	1.09077e-05	0	n/a	0.00969535	0.0491177

State	x	Probability	Payoff	Contribution	Cum. probability	Cum. contribution
state 49: JPM=54.9368, NVDA=15.6733	35.3051	4.78487e-05	0	n/a	0.0097432	0.0491177
state 50: JPM=54.9368, NVDA=20.4711	37.704	0.00016955	0	n/a	0.00991275	0.0491177
state 51: JPM=54.9368, NVDA=26.7376	40.8372	0.000485305	0	n/a	0.0103981	0.0491177
state 52: JPM=54.9368, NVDA=34.9223	44.9295	0.00112207	0	n/a	0.0115201	0.0491177
state 53: JPM=54.9368, NVDA=45.6124	50.2746	0.00209565	0	n/a	0.0136158	0.0491177
state 54: JPM=54.9368, NVDA=59.5748	57.2558	0.00316158	0	n/a	0.0167774	0.0491177
state 55: JPM=54.9368, NVDA=77.8114	66.3741	0.00385284	0	n/a	0.0206302	0.0491177
state 56: JPM=54.9368, NVDA=101.63	78.2836	0.00379268	0	n/a	0.0244229	0.0491177
state 57: JPM=54.9368, NVDA=132.741	93.8387	0.00301579	0	n/a	0.0274387	0.0491177
state 58: JPM=54.9368, NVDA=173.374	114.155	0.00193707	14.1554	0.0266097	0.0293757	0.0757274
state 59: JPM=54.9368, NVDA=226.446	140.691	0.00100503	40.6913	0.0396875	0.0303808	0.115415
state 60: JPM=54.9368, NVDA=295.764	175.35	0.000421216	75.3502	0.0308006	0.030802	0.146215
state 61: JPM=54.9368, NVDA=386.3	220.618	0.0001426	120.618	0.0166918	0.0309446	0.162907
state 62: JPM=54.9368, NVDA=504.551	279.744	3.89961e-05	179.744	0.00680216	0.0309836	0.169709
state 63: JPM=54.9368, NVDA=659	356.968	8.61419e-06	256.968	0.00214815	0.0309922	0.171858
state 64: JPM=62.6735, NVDA=12	37.3368	2.57894e-05	0	n/a	0.031018	0.171858
state 65: JPM=62.6735, NVDA=15.6733	39.1734	0.00011313	0	n/a	0.0311311	0.171858
state 66: JPM=62.6735, NVDA=20.4711	41.5723	0.000400873	0	n/a	0.031532	0.171858
state 67: JPM=62.6735, NVDA=26.7376	44.7056	0.00114743	0	n/a	0.0326794	0.171858
state 68: JPM=62.6735, NVDA=34.9223	48.7979	0.00265297	0	n/a	0.0353324	0.171858
state 69: JPM=62.6735, NVDA=45.6124	54.143	0.00495482	0	n/a	0.0402872	0.171858
state 70: JPM=62.6735, NVDA=59.5748	61.1242	0.00747506	0	n/a	0.0477623	0.171858
state 71: JPM=62.6735, NVDA=77.8114	70.2425	0.00910941	0	n/a	0.0568717	0.171858
state 72: JPM=62.6735, NVDA=101.63	82.152	0.00896718	0	n/a	0.0658389	0.171858
state 73: JPM=62.6735, NVDA=132.741	97.7071	0.00713035	0	n/a	0.0729692	0.171858
state 74: JPM=62.6735, NVDA=173.374	118.024	0.0045799	18.0238	0.0801075	0.0775491	0.251965
state 75: JPM=62.6735, NVDA=226.446	144.56	0.00237624	44.5597	0.102755	0.0799253	0.35472
state 76: JPM=62.6735, NVDA=295.764	179.219	0.000995897	79.2185	0.0765618	0.0809212	0.431282
state 77: JPM=62.6735, NVDA=386.3	224.487	0.000337154	124.487	0.0407308	0.0812584	0.472013
state 78: JPM=62.6735, NVDA=504.551	283.612	9.22001e-05	183.612	0.0164287	0.0813506	0.488442
state 79: JPM=62.6735, NVDA=659	360.837	2.03669e-05	260.837	0.00515542	0.081371	0.493597
state 80: JPM=71.4998, NVDA=12	41.7499	4.90927e-05	0	n/a	0.0814201	0.493597
state 81: JPM=71.4998, NVDA=15.6733	43.5866	0.000215355	0	n/a	0.0816354	0.493597
state 82: JPM=71.4998, NVDA=20.4711	45.9855	0.000763102	0	n/a	0.0823985	0.493597
state 83: JPM=71.4998, NVDA=26.7376	49.1187	0.00218424	0	n/a	0.0845828	0.493597
state 84: JPM=71.4998, NVDA=34.9223	53.211	0.00505018	0	n/a	0.0896329	0.493597
state 85: JPM=71.4998, NVDA=45.6124	58.5561	0.009432	0	n/a	0.0990649	0.493597

State	x	Probability	Payoff	Contribution	Cum. probability	Cum. contribution
state 86: JPM=71.4998, NVDA=59.5748	65.5373	0.0142295	0	n/a	0.113294	0.493597
state 87: JPM=71.4998, NVDA=77.8114	74.6556	0.0173407	0	n/a	0.130635	0.493597
state 88: JPM=71.4998, NVDA=101.63	86.5651	0.0170699	0	n/a	0.147705	0.493597
state 89: JPM=71.4998, NVDA=132.741	102.12	0.0135733	2.1202	0.0279277	0.161278	0.521525
state 90: JPM=71.4998, NVDA=173.374	122.437	0.00871829	22.4369	0.18983	0.169997	0.711355
state 91: JPM=71.4998, NVDA=226.446	148.973	0.00452341	48.9728	0.214977	0.17452	0.926332
state 92: JPM=71.4998, NVDA=295.764	183.632	0.00189579	83.6317	0.153862	0.176416	1.08019
state 93: JPM=71.4998, NVDA=386.3	228.9	0.000641806	128.9	0.0802837	0.177058	1.16048
state 94: JPM=71.4998, NVDA=504.551	288.025	0.000175512	188.025	0.0320254	0.177233	1.1925
state 95: JPM=71.4998, NVDA=659	365.25	3.87704e-05	265.25	0.0099799	0.177272	1.20248
state 96: JPM=81.5691, NVDA=12	46.7845	7.52416e-05	0	n/a	0.177347	1.20248
state 97: JPM=81.5691, NVDA=15.6733	48.6212	0.000330063	0	n/a	0.177677	1.20248
state 98: JPM=81.5691, NVDA=20.4711	51.0201	0.00116956	0	n/a	0.178847	1.20248
state 99: JPM=81.5691, NVDA=26.7376	54.1533	0.00334766	0	n/a	0.182194	1.20248
state 100: JPM=81.5691, NVDA=34.9223	58.2457	0.00774013	0	n/a	0.189935	1.20248
state 101: JPM=81.5691, NVDA=45.6124	63.5907	0.0144559	0	n/a	0.204391	1.20248
state 102: JPM=81.5691, NVDA=59.5748	70.572	0.0218088	0	n/a	0.226199	1.20248
state 103: JPM=81.5691, NVDA=77.8114	79.6902	0.0265771	0	n/a	0.252776	1.20248
state 104: JPM=81.5691, NVDA=101.63	91.5997	0.0261621	0	n/a	0.278938	1.20248
state 105: JPM=81.5691, NVDA=132.741	107.155	0.0208031	7.15483	0.144444	0.299742	1.34693
state 106: JPM=81.5691, NVDA=173.374	127.472	0.013362	27.4715	0.356227	0.313104	1.70315
state 107: JPM=81.5691, NVDA=226.446	154.007	0.00693277	54.0074	0.363355	0.320036	2.06651
state 108: JPM=81.5691, NVDA=295.764	188.666	0.00290557	88.6663	0.250012	0.322942	2.31652
state 109: JPM=81.5691, NVDA=386.3	233.935	0.000983659	133.935	0.127852	0.323926	2.44437
state 110: JPM=81.5691, NVDA=504.551	293.06	0.000268997	193.06	0.0503978	0.324195	2.49477
state 111: JPM=81.5691, NVDA=659	370.285	5.94211e-05	270.285	0.0155859	0.324254	2.51036
state 112: JPM=93.0564, NVDA=12	52.5282	9.28464e-05	0	n/a	0.324347	2.51036
state 113: JPM=93.0564, NVDA=15.6733	54.3649	0.000407289	0	n/a	0.324754	2.51036
state 114: JPM=93.0564, NVDA=20.4711	56.7638	0.00144321	0	n/a	0.326197	2.51036
state 115: JPM=93.0564, NVDA=26.7376	59.897	0.00413093	0	n/a	0.330328	2.51036
state 116: JPM=93.0564, NVDA=34.9223	63.9893	0.00955114	0	n/a	0.339879	2.51036
state 117: JPM=93.0564, NVDA=45.6124	69.3344	0.0178382	0	n/a	0.357718	2.51036
state 118: JPM=93.0564, NVDA=59.5748	76.3156	0.0269115	0	n/a	0.384629	2.51036
state 119: JPM=93.0564, NVDA=77.8114	85.4339	0.0327955	0	n/a	0.417425	2.51036
state 120: JPM=93.0564, NVDA=101.63	97.3434	0.0322834	0	n/a	0.449708	2.51036
state 121: JPM=93.0564, NVDA=132.741	112.898	0.0256705	12.8985	0.321325	0.475379	2.83168
state 122: JPM=93.0564, NVDA=173.374	133.215	0.0164884	33.2152	0.531481	0.491867	3.36316

State	x	Probability	Payoff	Contribution	Cum. probability	Cum. contribution
state 123: JPM=93.0564, NVDA=226.446	159.751	0.00855488	59.7511	0.496056	0.500422	3.85922
state 124: JPM=93.0564, NVDA=295.764	194.41	0.0035854	94.4099	0.328493	0.504007	4.18771
state 125: JPM=93.0564, NVDA=386.3	239.678	0.00121381	139.678	0.164532	0.505221	4.35224
state 126: JPM=93.0564, NVDA=504.551	298.804	0.000331936	198.804	0.0640399	0.505553	4.41628
state 127: JPM=93.0564, NVDA=659	376.028	7.33243e-05	276.028	0.0196414	0.505626	4.43593
state 128: JPM=106.161, NVDA=12	59.0807	9.22439e-05	0	n/a	0.505719	4.43593
state 129: JPM=106.161, NVDA=15.6733	60.9174	0.000404646	0	n/a	0.506123	4.43593
state 130: JPM=106.161, NVDA=20.4711	63.3163	0.00143385	0	n/a	0.507557	4.43593
state 131: JPM=106.161, NVDA=26.7376	66.4495	0.00410413	0	n/a	0.511661	4.43593
state 132: JPM=106.161, NVDA=34.9223	70.5419	0.00948916	0	n/a	0.52115	4.43593
state 133: JPM=106.161, NVDA=45.6124	75.8869	0.0177225	0	n/a	0.538873	4.43593
state 134: JPM=106.161, NVDA=59.5748	82.8681	0.0267369	0	n/a	0.56561	4.43593
state 135: JPM=106.161, NVDA=77.8114	91.9864	0.0325826	0	n/a	0.598192	4.43593
state 136: JPM=106.161, NVDA=101.63	103.896	0.0320739	3.8959	0.121264	0.630266	4.55719
state 137: JPM=106.161, NVDA=132.741	119.451	0.0255039	19.451	0.481416	0.65577	5.03861
state 138: JPM=106.161, NVDA=173.374	139.768	0.0163814	39.7677	0.632199	0.672152	5.6708
state 139: JPM=106.161, NVDA=226.446	166.304	0.00849936	66.3036	0.546883	0.680651	6.21769
state 140: JPM=106.161, NVDA=295.764	200.962	0.00356213	100.962	0.349013	0.684213	6.5667
state 141: JPM=106.161, NVDA=386.3	246.231	0.00120593	146.231	0.171133	0.685419	6.73783
state 142: JPM=106.161, NVDA=504.551	305.356	0.000329782	205.356	0.0657213	0.685749	6.80356
state 143: JPM=106.161, NVDA=659	382.581	7.28484e-05	282.581	0.0199772	0.685822	6.82353
state 144: JPM=121.112, NVDA=12	66.556	7.37863e-05	0	n/a	0.685895	6.82353
state 145: JPM=121.112, NVDA=15.6733	68.3927	0.000323678	0	n/a	0.686219	6.82353
state 146: JPM=121.112, NVDA=20.4711	70.7916	0.00114694	0	n/a	0.687366	6.82353
state 147: JPM=121.112, NVDA=26.7376	73.9248	0.00328291	0	n/a	0.690649	6.82353
state 148: JPM=121.112, NVDA=34.9223	78.0172	0.00759042	0	n/a	0.698239	6.82353
state 149: JPM=121.112, NVDA=45.6124	83.3622	0.0141763	0	n/a	0.712416	6.82353
state 150: JPM=121.112, NVDA=59.5748	90.3435	0.0213869	0	n/a	0.733803	6.82353
state 151: JPM=121.112, NVDA=77.8114	99.4617	0.026063	0	n/a	0.759866	6.82353
state 152: JPM=121.112, NVDA=101.63	111.371	0.0256561	11.3712	0.283118	0.785522	7.10665
state 153: JPM=121.112, NVDA=132.741	126.926	0.0204007	26.9263	0.533081	0.805922	7.63973
state 154: JPM=121.112, NVDA=173.374	147.243	0.0131036	47.243	0.600757	0.819026	8.24049
state 155: JPM=121.112, NVDA=226.446	173.779	0.00679867	73.7789	0.486775	0.825825	8.72726
state 156: JPM=121.112, NVDA=295.764	208.438	0.00284937	108.438	0.299847	0.828674	9.02711
state 157: JPM=121.112, NVDA=386.3	253.706	0.000964633	153.706	0.143888	0.829639	9.171
state 158: JPM=121.112, NVDA=504.551	312.832	0.000263794	212.832	0.0544844	0.829902	9.22548
state 159: JPM=121.112, NVDA=659	390.056	5.82718e-05	290.056	0.0164025	0.829961	9.24189

State	x	Probability	Payoff	Contribution	Cum. probability	Cum. contribution
state 160: JPM=138.168, NVDA=12	75.0841	4.75203e-05	0	n/a	0.830008	9.24189
state 161: JPM=138.168, NVDA=15.6733	76.9208	0.000208457	0	n/a	0.830217	9.24189
state 162: JPM=138.168, NVDA=20.4711	79.3197	0.000738661	0	n/a	0.830955	9.24189
state 163: JPM=138.168, NVDA=26.7376	82.4529	0.00211428	0	n/a	0.83307	9.24189
state 164: JPM=138.168, NVDA=34.9223	86.5452	0.00488843	0	n/a	0.837958	9.24189
state 165: JPM=138.168, NVDA=45.6124	91.8903	0.0091299	0	n/a	0.847088	9.24189
state 166: JPM=138.168, NVDA=59.5748	98.8715	0.0137738	0	n/a	0.860862	9.24189
state 167: JPM=138.168, NVDA=77.8114	107.99	0.0167853	7.98979	0.130147	0.877647	9.37203
state 168: JPM=138.168, NVDA=101.63	119.899	0.0165232	19.8993	0.319082	0.89417	9.69111
state 169: JPM=138.168, NVDA=132.741	135.454	0.0131386	35.4544	0.452054	0.907309	10.1432
state 170: JPM=138.168, NVDA=173.374	155.771	0.00843905	55.7711	0.456745	0.915748	10.5999
state 171: JPM=138.168, NVDA=226.446	182.307	0.00437853	82.307	0.349732	0.920126	10.9496
state 172: JPM=138.168, NVDA=295.764	216.966	0.00183507	116.966	0.208297	0.921961	11.1579
state 173: JPM=138.168, NVDA=386.3	262.234	0.000621249	162.234	0.0978091	0.922583	11.2558
state 174: JPM=138.168, NVDA=504.551	321.36	0.00016989	221.36	0.0364954	0.922752	11.2922
state 175: JPM=138.168, NVDA=659	398.584	3.75286e-05	298.584	0.0108743	0.92279	11.3031
state 176: JPM=157.626, NVDA=12	84.8132	2.46404e-05	0	n/a	0.922815	11.3031
state 177: JPM=157.626, NVDA=15.6733	86.6498	0.00010809	0	n/a	0.922923	11.3031
state 178: JPM=157.626, NVDA=20.4711	89.0487	0.000383014	0	n/a	0.923306	11.3031
state 179: JPM=157.626, NVDA=26.7376	92.1819	0.00109631	0	n/a	0.924402	11.3031
state 180: JPM=157.626, NVDA=34.9223	96.2743	0.00253477	0	n/a	0.926937	11.3031
state 181: JPM=157.626, NVDA=45.6124	101.619	0.00473408	1.61934	0.00743952	0.931671	11.3106
state 182: JPM=157.626, NVDA=59.5748	108.601	0.00714203	8.60058	0.0596102	0.938813	11.3702
state 183: JPM=157.626, NVDA=77.8114	117.719	0.00870357	17.7189	0.149659	0.947516	11.5198
state 184: JPM=157.626, NVDA=101.63	129.628	0.00856768	29.6283	0.246344	0.956084	11.7662
state 185: JPM=157.626, NVDA=132.741	145.183	0.00681268	45.1835	0.298723	0.962897	12.0649
state 186: JPM=157.626, NVDA=173.374	165.5	0.00437585	65.5002	0.278148	0.967273	12.343
state 187: JPM=157.626, NVDA=226.446	192.036	0.00227037	92.0361	0.202781	0.969543	12.5458
state 188: JPM=157.626, NVDA=295.764	226.695	0.000951528	126.695	0.116991	0.970495	12.6628
state 189: JPM=157.626, NVDA=386.3	271.963	0.000322133	171.963	0.0537578	0.970817	12.7166
state 190: JPM=157.626, NVDA=504.551	331.089	8.80924e-05	231.089	0.0197555	0.970905	12.7363
state 191: JPM=157.626, NVDA=659	408.313	1.94595e-05	308.313	0.0058223	0.970924	12.7422
state 192: JPM=179.825, NVDA=12	95.9124	1.02869e-05	0	n/a	0.970935	12.7422
state 193: JPM=179.825, NVDA=15.6733	97.749	4.51255e-05	0	n/a	0.97098	12.7422
state 194: JPM=179.825, NVDA=20.4711	100.148	0.0001599	0.147917	2.29529e-05	0.97114	12.7422
state 195: JPM=179.825, NVDA=26.7376	103.281	0.000457685	3.28114	0.00145735	0.971597	12.7436
state 196: JPM=179.825, NVDA=34.9223	107.373	0.00105821	7.37348	0.00757212	0.972655	12.7512

State	x	Probability	Payoff	Contribution	Cum. probability	Cum. contribution
state 197: JPM=179.825, NVDA=45.6124	112.719	0.00197638	12.7185	0.0243938	0.974632	12.7756
state 198: JPM=179.825, NVDA=59.5748	119.7	0.00298165	19.6998	0.0570019	0.977614	12.8326
state 199: JPM=179.825, NVDA=77.8114	128.818	0.00363356	28.818	0.101617	0.981247	12.9342
state 200: JPM=179.825, NVDA=101.63	140.728	0.00357683	40.7275	0.14137	0.984824	13.0756
state 201: JPM=179.825, NVDA=132.741	156.283	0.00284415	56.2826	0.155346	0.987668	13.2309
state 202: JPM=179.825, NVDA=173.374	176.599	0.00182683	76.5994	0.135798	0.989495	13.3667
state 203: JPM=179.825, NVDA=226.446	203.135	0.000947834	103.135	0.094866	0.990443	13.4616
state 204: JPM=179.825, NVDA=295.764	237.794	0.000397243	137.794	0.05312	0.99084	13.5147
state 205: JPM=179.825, NVDA=386.3	283.062	0.000134484	183.062	0.0238913	0.990974	13.5386
state 206: JPM=179.825, NVDA=504.551	342.188	3.67768e-05	242.188	0.00864365	0.991011	13.5473
state 207: JPM=179.825, NVDA=659	419.412	8.12393e-06	319.412	0.00251819	0.991019	13.5498
state 208: JPM=205.149, NVDA=12	108.575	3.45768e-06	8.57464	2.87721e-05	0.991023	13.5498
state 209: JPM=205.149, NVDA=15.6733	110.411	1.51678e-05	10.4113	0.000153249	0.991038	13.55
state 210: JPM=205.149, NVDA=20.4711	112.81	5.37465e-05	12.8102	0.000668155	0.991092	13.5506
state 211: JPM=205.149, NVDA=26.7376	115.943	0.000153839	15.9434	0.00238024	0.991246	13.553
state 212: JPM=205.149, NVDA=34.9223	120.036	0.000355692	20.0358	0.00691595	0.991601	13.5599
state 213: JPM=205.149, NVDA=45.6124	125.381	0.00066431	25.3808	0.0163624	0.992266	13.5763
state 214: JPM=205.149, NVDA=59.5748	132.362	0.00100221	32.3621	0.0314749	0.993268	13.6078
state 215: JPM=205.149, NVDA=77.8114	141.48	0.00122133	41.4803	0.0491639	0.994489	13.6569
state 216: JPM=205.149, NVDA=101.63	153.39	0.00120226	53.3898	0.0622914	0.995691	13.7192
state 217: JPM=205.149, NVDA=132.741	168.945	0.000955991	68.9449	0.0639628	0.996647	13.7832
state 218: JPM=205.149, NVDA=173.374	189.262	0.000614043	89.2616	0.0531906	0.997261	13.8364
state 219: JPM=205.149, NVDA=226.446	215.798	0.000318591	115.798	0.0358017	0.99758	13.8722
state 220: JPM=205.149, NVDA=295.764	250.456	0.000133523	150.456	0.0194957	0.997714	13.8917
state 221: JPM=205.149, NVDA=386.3	295.725	4.52034e-05	195.725	0.00858593	0.997759	13.9002
state 222: JPM=205.149, NVDA=504.551	354.85	1.23616e-05	254.85	0.00305724	0.997771	13.9033
state 223: JPM=205.149, NVDA=659	432.075	2.73066e-06	332.075	0.000879982	0.997774	13.9042
state 224: JPM=234.04, NVDA=12	123.02	9.3573e-07	23.0201	2.0904e-05	0.997775	13.9042
state 225: JPM=234.04, NVDA=15.6733	124.857	4.10477e-06	24.8568	9.9016e-05	0.997779	13.9043
state 226: JPM=234.04, NVDA=20.4711	127.256	1.45451e-05	27.2557	0.00038472	0.997793	13.9047
state 227: JPM=234.04, NVDA=26.7376	130.389	4.16326e-05	30.3889	0.00122778	0.997835	13.9059
state 228: JPM=234.04, NVDA=34.9223	134.481	9.62588e-05	34.4813	0.00322103	0.997931	13.9091
state 229: JPM=234.04, NVDA=45.6124	139.826	0.000179778	39.8263	0.0069483	0.998111	13.9161
state 230: JPM=234.04, NVDA=59.5748	146.808	0.000271221	46.8076	0.01232	0.998382	13.9284
state 231: JPM=234.04, NVDA=77.8114	155.926	0.000330521	55.9258	0.0179384	0.998713	13.9463
state 232: JPM=234.04, NVDA=101.63	167.835	0.000325361	67.8353	0.0214186	0.999038	13.9678
state 233: JPM=234.04, NVDA=132.741	183.39	0.000258714	83.3904	0.0209367	0.999297	13.9887

State	x	Probability	Payoff	Contribution	Cum. probability	Cum. contribution
state 234: JPM=234.04, NVDA=173.374	203.707	0.000166175	103.707	0.0167242	0.999463	14.0054
state 235: JPM=234.04, NVDA=226.446	230.243	8.62183e-05	130.243	0.0108975	0.999549	14.0163
state 236: JPM=234.04, NVDA=295.764	264.902	3.61346e-05	164.902	0.00578256	0.999585	14.0221
state 237: JPM=234.04, NVDA=386.3	310.17	1.22331e-05	210.17	0.00249505	0.999598	14.0246
state 238: JPM=234.04, NVDA=504.551	369.296	3.34534e-06	269.296	0.00087426	0.999601	14.0255
state 239: JPM=234.04, NVDA=659	446.52	7.38981e-07	346.52	0.000248504	0.999602	14.0257
state 240: JPM=267, NVDA=12	139.5	2.03884e-07	39.5	7.81539e-06	0.999602	14.0257
state 241: JPM=267, NVDA=15.6733	141.337	8.94377e-07	41.3367	3.58779e-05	0.999603	14.0258
state 242: JPM=267, NVDA=20.4711	143.736	3.16919e-06	43.7356	0.00013451	0.999606	14.0259
state 243: JPM=267, NVDA=26.7376	146.869	9.07122e-06	46.8688	0.000412592	0.999615	14.0263
state 244: JPM=267, NVDA=34.9223	150.961	2.09736e-05	50.9611	0.00103725	0.999636	14.0273
state 245: JPM=267, NVDA=45.6124	156.306	3.91714e-05	56.3062	0.00214041	0.999675	14.0295
state 246: JPM=267, NVDA=59.5748	163.287	5.90956e-05	63.2874	0.00362948	0.999734	14.0331
state 247: JPM=267, NVDA=77.8114	172.406	7.20164e-05	72.4057	0.00506029	0.999806	14.0382
state 248: JPM=267, NVDA=101.63	184.315	7.08919e-05	84.3152	0.00580061	0.999877	14.044
state 249: JPM=267, NVDA=132.741	199.87	5.63705e-05	99.8703	0.00546336	0.999934	14.0494
state 250: JPM=267, NVDA=173.374	220.187	3.62074e-05	120.187	0.00422304	0.99997	14.0537
state 251: JPM=267, NVDA=226.446	246.723	1.87859e-05	146.723	0.00267486	0.999989	14.0563
state 252: JPM=267, NVDA=295.764	281.382	7.87327e-06	181.382	0.00138586	0.999996	14.0577
state 253: JPM=267, NVDA=386.3	326.65	2.66544e-06	226.65	0.000586268	0.999999	14.0583
state 254: JPM=267, NVDA=504.551	385.776	7.28907e-07	285.776	0.000202148	1	14.0585
state 255: JPM=267, NVDA=659	463	1.61015e-07	363	5.67209e-05	1	14.0586

Appendix D Diagnostics, warnings and artifacts

Diagnostics and warnings

Type	Message
Info	No warnings or errors were included in the result payload.

Artifacts

Artifact	Status
JSON result	ready
CSV convergence export	ready
PDF report	ready
Qiskit notebook	ready
PennyLane notebook	ready
Workbook/result bundle	future