List of Changes and Responses

The page numbers are from the revised draft, and the page numbers in brackets are from the original draft.

1. Numerical Experiments Details

- **Added in Chapter 2, Page 47(46):** Added a paragraph to explain the numerical experiments in Chapter 2.
- **Added in Chapter 2, Page 48(47):** Added a paragraph to explain maturity date of the options in the numerical experiments in Chapter 2.
- **Added in Chapter 2, Page 48(47):** Computing platform details for the numerical experiments in Chapter 2.
- **Added in Chapter 2, Page 59(58):** Added a paragraph to explain the Heston model parameters.
- The numerical experiments in Chapter 3 and Chapter 4 now have sufficient details.

2. Appendix Addition

- **New Addition (After Page xiv):** Added an appendix for all acronyms.
- After careful consideration, only one acronym table is added. The reason is that the number of acronyms used in this thesis is relatively small, making a single consolidated table more appropriate and efficient.

3. Clarification of Expected Values

- **Chapter 3, Pages 75-77(72):**
  - Clarified definition for GMMB liability, showing how the conditional expectation works.
  - Added explanation for pathwise delta calculations.
- **Chapter 3, Page 78(74):**
  - Corrected the mistake in the definition H_t^{bf}.
  - Showed the derivation of the formula for loss random variable L.

4. Neural Network Approximation Clarification

- **Chapter 3, Page 82(76):**
  - Added explanation that neural networks approximate L in Equation (3.4).
  - Added explanation that L depends on all hedging weights ($\Delta_0,\ldots,\Delta T_{-1}$) and each Δt depends on St.
  - Explained that $L(\mathbf{S}_T)$ is both a random variable and a function of the underlying path.

5. Regression References

- **Chapter 2, Page 55(54):**
  - Added one line to explain the high empirical convergence rate reported in the graph legends.
  - I think in the thesis, the high empirical convergence rate is well-explained using a separate set of experiments.

6. Multi-level Monte Carlo Sections

- **Chapter 2, Page 21(21):** Rewrote sections on multi-level Monte Carlo with clearer descriptions.
- **Chapter 2, Page 60(59):** Added more implementation details for replication purposes.

7. Cauchy-Schwarz Inequality

- **Chapter 2, Page 32:**

- Added explanation between the inequality:

$$\mathbb{E}[(\hat{\rho}_{M,N} - \rho)^2] \leq 2\mathbb{E}[(\hat{\rho}_{M,N} - \rho_M)^2] + 2\mathbb{E}[(\rho_M - \rho)^2]$$

- Included proper explanation for Cauchy-Schwarz inequality.

8. Taylor Expansion Clarification

- **Chapter 2, Page 34(33):**
  - Clearly defined variable z when applying Taylor expansion.
- **Global check (Pages 37(36), 42(41)):** Verified all other Taylor expansions are clearly explained.

9. Section 2.3.1 Rewrite

- **Chapter 2, Pages 29-30(28-30):** Rewrote section 2.3.1 to clarify Definitions 4.
- I was not able to find existing statistical results that can be applied to the proof of Theorem 1. Theorem 1 showed the connections between the convergence rates that are in different forms and it fundamentally different from the classic L2 theory that convergence in L2 implies convergence in probability.

10. Minor Items

- **Page i:** Moved copyright statement to first page.
- **Page ii:** Added paragraph under the "sole-author" declaration noting that part of this thesis has been published in a WSC proceeding.