RE: Response to external examination reports for Tianyu Raymond Li's PhD

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Dear A/Prof Adam Rennie,

I would like to thank you once again for taking the time to handle the administrative processes involved with submitting my thesis for external examination and together with my supervisors (Dr Marianito Rodrigo and A/Prof Joanna Goard), sifting through the examination reports and constructing a report for me.

I have attached below a point-by-point response to each of the external examiner's comments and suggestions. The two examiners were Prof Matt Davison of Western University (Canada) and Dr Jeff Dewynne of University of Oxford (UK). I wish to highlight a two points from Matt Davison have not been directly addressed as they were simply statements rather than changes to be made. Those have been omitted.

Kindest regards,

Tianyu Raymond Li

Responses to Prof Matt Davison

1. **Page 1 first sentence of the last paragraph. I would say we are talking about the Black-Scholes equation here– it is fairly common usage to reserve the phrase "Black-Scholes formula" for expressions like $C(S,t) = SN(d_1) - Ke^{-rt}N(d_2)$.**

   The phrase "Black-Scholes formula" in this sentence has been changed to read "Black-Scholes equation".

2. **Page 3 2nd line "early early"' → "early".**

   The typo has been fixed.

3. **Page 12 2nd last line "directly evaluating of the Inverse Mellin..." → "directly evaluating the inverse Mellin...".**

   The typo has been fixed.

4. **Page 20 last line "Dupre" → "Dupire".**

   The typo has been fixed.

5. **Page 24 2nd last line after eq (2.8) – I would simplify the sentence "As aforementioned in the introduction" to simply read "As mentioned in the introduction".**

   The sentence now reads "As mentioned in the introduction".

6. **Page 24 bottom of the page. While I agree that the smooth pasting conditions can arise from a profit maximizing argument, and even how this makes the $V(S^*(t),t) = K - S^*(t)$ half of the smooth pasting condition essential, it is harder to understand why the derivative term of the smooth pasting condition corresponds to maximization. In fact, I prefer to think of**

the derivative term as arising from the need to have a Δ of -1 at put exercise to avoid any risk in the hedged porfolio.

Additional references have been provided here to reinforce the financial significance of the smooth pasting conditions. A proof has also been cited.

7. **Page 25 Line 2, superfluous space between "formulation" and the period.**

   The unwarranted space has been removed.

8. **Page 31 statement of Lemma 3 "it follows from that": follows from what?.**

   This is a typo. It has been changed to read "it follows that".

9. **Page 33 statement of Lemma 8 – don't italicize "and". Line following eq (2.43) – not sure why some words are italicized here and not others.**

   The inconsistent italics have been removed.

10. **Page 33/34 Lemma 8 "defined to be the discretized Black-Scholes kernel (pg 33)". I don't love this nomenclature as the kernel from Lemma 8 (2.44) seems perfectly continuous to me. Can a different name be found here?**

    The reason for the word "discretized" is to differentiate it from the expression for the Black-Scholes kernel that corresponds to an asset that pays a continuous dividend yield versus a discrete dividend payment. We believe the expression is suitable as it is and has not been altered.

11. **Page 51 -10 lines from the end – I think you mean "H functions" not "Hh functions"? Of course the link between H functions and G functions and the Mellin transforms is very fundamental.**

    This is no typo. We were indeed referring to Hh functions that Kou [1, 2] implemented to handle the jump-diffusion dynamics following a double exponential distribution.

12. **Page 55 first line of section 4.1.2 "are in terms of the strike price" → "are with respect to the strike price".**

    The phrase has been changed to the recommendation.

13. **Page 63 I feel there are way too many significant figures here.**

    The number of significant figures was a by-product of using *format long* in MATLAB (which is what we used to generate our data). Additionally, these results have already been accepted and published. Thus, we will be keeping the data as is.

14. **Page 73 last line – change to: "is because, upon inversion, this...".**

    The last line has been changed to what was recommended.

15. **Page 95, line 5 "was done in [26]" → "was investigated in [26]" or "was reported in [26]".**

    This has been changed to "was reported in".

16. **Page 77 5th last line "instigating" the properties of the Delta function? Perhaps you mean the properties of the Delta function?**

    This has been addressed and changed to "using the properties of the Delta function".

17. **Page 100 2nd last line before section 5.4.1 "renownedly" → "renowned".**

    This typo has been fixed.

References

[1] Kou, S. (2002): "A jump-diffusion model for option pricing", *Management Science*, Vol. 48, No. 8, pp. 1086–1101.

[2] Kou, S. and H. Wang (2004): "Option pricing under a double exponential jump-diffusion model", *Management Science*, Vol. 50, No. 9, pp. 1178–1192.