Submitted to Econometrica

CORRIGENDUM TO: "INVESTIGATING GENERALIZATIONS OF EXPECTED UTILITY THEORY USING EXPERIMENTAL DATA"

Pavlo Blavatskyy and Xiaohui Zhang

Hey, J. D. and Orme, C. (1994) proposed a new utility functional for Gul, F. (1991) disappointment aversion theory. Hey, J. D. and Orme, C. (1994) proved that this utility functional is identical to that in Gul, F. (1991) for the case when lotteries have at most three outcomes. We show that there is an algebraic mistake in this proof and the utility functional proposed in Hey, J. D. and Orme, C. (1994) is not the same as in Gul, F. (1991) disappointment aversion theory.

Keywords: expected utility, non-expected utility, risk, preference functionals, pairwise choice, experiments.

Hey, J. D. and Orme, C. (1994) proposed a new utility functional for Gul, F. (1991) disappointment aversion theory. Hey, J. D. and Orme, C. (1994) proved that this utility functional is identical to that in Gul, F. (1991) for the case when lotteries have at most three outcomes.

We use the same notation as in Hey, J. D. and Orme, C. (1994). Let $u_i \in R$ denote the utility of outcome $i \in \{1, 2, 3\}$ ($u_3 > u_2 > u_1$) and let $p_i \in [0, 1]$ denote the probability of outcome $i \in \{1, 2, 3\}$ ($p_1 + p_2 + p_3 = 1$). Let $\beta > -1$ denote Guls disappointment aversion parameter. Finally, let V_1 denote the following fraction

$$V_1 = \frac{(1+\beta)p_1u_1 + (1+\beta)p_2u_2 + p_3u_3}{1 + \beta p_1 + \beta p_2}$$

and let V_2 denote the following fraction

$$V_2 = \frac{(1+\beta)p_1u_1 + p_2u_2 + p_3u_3}{1 + \beta p_1}$$

According to Hey, J. D. and Orme, C. (1994), elementary algebra shows that $V_1 \geq V_2$ if and only if

$$p_3 < (1+\beta)p_1 \frac{u_2 - u_1}{u_3 - u_2}$$

from which it follows that the utility functional for Gul, F. (1991) disappointment aversion theory can be written as $\min(V_1, V_2)$.

However $V_1 \geq V_2$ if and only if

$$\beta u_2(1 - p_2 + \beta p_1) < \beta(1+\beta)p_1u_1 + \beta p_3u_3.$$

School of Management and Governance, Murdoch University, 90 South Street, Murdoch, WA 6150, AUSTRALIA
pavlo.blavatskyy@muroch.edu.au; xiaohui.zhang@murdoch.edu.au

[1]We are thankful to David Butler for helpful comments. John Hey generously provided raw experimental data.

Using the fact that $1 - p_2 = p_1 + p_3$, the last inequality can be rewritten as

$$\beta p_3 \leq \beta(1+\beta)p_1 \frac{u_2 - u_1}{u_3 - u_2}$$

which is equivalent to

$$\begin{cases} p_3 \leq (1+\beta)p_1 \frac{u_2-u_1}{u_3-u_2} & \beta > 0 \\ p_3 \geq (1+\beta)p_1 \frac{u_2-u_1}{u_3-u_2} & \beta < 0 \end{cases}$$

From this it follows that the utility functional in Gul, F. (1991) disappointment aversion theory can be written as $\min(V_1, V_2)$ when $\beta \geq 0$ and $\max(V_1, V_2)$ when $\beta \leq 0$.

Generalizing this result to lotteries with four outcomes, we get that a new utility functional presented by Hey, J. D. and Orme, C. (1994) is identical to that of Gul, F. (1991) disappointment aversion theory only when a decision maker has disappointment averse preferences (i.e. $\beta \geq 0$). When a decision maker has elation loving preferences (i.e. $\beta \in (-1, 0]$), the correct utility functional, in the notation of Hey, J. D. and Orme, C. (1994), is $\max(W_1, W_2, W_3)$.

In the appendix we show how some of the results reported in Hey, J. D. and Orme, C. (1994) change when we use a correct utility functional for Gul, F. (1991) disappointment aversion theory.

REFERENCES

Gul, F. (1991). A theory of disappointment aversion. *Econometrica* 667–686.

Hey, J. D. and Orme, C. (1994). Investigating generalisations of expected utility theory using experimental data. *Econometrica* 1291-1326.

APPENDIX

This appendix shows how some of the results reported in Hey, J. D. and Orme, C. (1994) change when we use a correct utility functional for Gul, F. (1991) disappointment aversion theory. In the below tables and figure, results reported in Hey, J. D. and Orme, C. (1994) for DA theory are indicated as "Hey and Orme", whereas new results with a correct utility functional for Gul, F. (1991) disappointment aversion theory are indicated as "Gul".

TABLE I

SUMMARY OF CORRECT SIGNS ON COEFFICIENTS

		b		
Model	a	Data1	Data2	Data3
Hey and Orme	320	320	320	320
Gul	320	318	320	320

[a] This table is corresponding to Table II in Hey, J. D. and Orme, C. (1994).
[b] a: total number of estimated coefficients; b: total number of coefficients with the correct sign

TABLE II

SUMMARY OF SATISFACTION OF MONOTONICITY CONDITIONS ON COEFFICIENTS

Model	Data1	Data2	Data3
Hey and Orme	77	70	77
Gul	72	71	76

[a] This table is corresponding to Table III in Hey, J. D. and Orme, C. (1994).

TABLE III

SUMMARY OF CONVEXITY/CONCAVITY PROPERTIES

	Data 1				Data 2				Data 3			
Model	a	b	c	d	a	b	c	d	a	b	c	d
Hey and Orme	35	2	39	3	49	1	29	1	45	2	32	1
Gul	34	3	41	2	41	5	34	0	44	3	33	0

[a] This table is corresponding to Table IV in Hey, J. D. and Orme, C. (1994).
[b] a: strictly concave; b: strictly convex; c: s-shapefirst concave then convex; d: s-shapefirst convex then concave

TABLE IV

RESULTS OF TESTS OF STABILITY OF COEFFICIENTS ACROSS THE TWO DATA SETS

	Number of subjects for whom test significant at	
Preference Functional	5%	1%
Hey and Orem	47	35
Gul	45	35

[a] This table is corresponding to Table V in Hey, J. D. and Orme, C. (1994).

TABLE V

LIKELIHOOD RATIO TESTS OF THE SUPERIORITY OF THE HIGHER LEVEL MODELS

The Top Level Functional versus Expected Utility						
	Number of subjects for whom test significant at					
	5%			1%		
Preference Functional	Data1	Data2	Data3	Data1	Data2	Data3
Hey and Orme	18	26	27	11	13	22
Gul	31	35	34	20	18	28

[a] This table is corresponding to Table VI Panel (1) in Hey, J. D. and Orme, C. (1994).

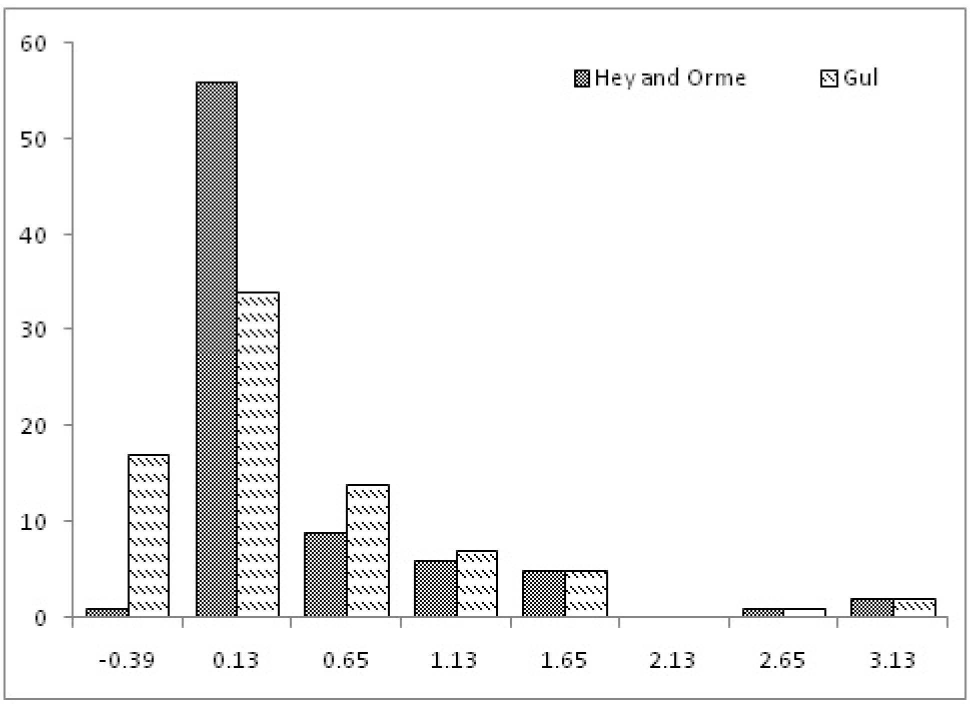

FIGURE 1.— Histogram for the beta variable