Errata

This document contains the list of errors (with appropriate corrections) that we found after the publication of our book:

G. Fabbri, F. Gozzi and A. Święch, Stochastic optimal control in infinite dimension: Dynamic programming and HJB equations, With a Contribution by M. Fuhrman and G. Tessitore, Probability Theory and Stochastic Modelling, Vol. 82, Springer, 2017.

List of errors

PREFACE

1. Page xii, end of the formula in line 3 from the top.

   REPLACE

   ...$(x)\, s$,

   BY

   ...$(x) ds$,

CHAPTER 1

1. Page 8, formula (1.2).

   REPLACE

   $\|f(t,\cdot)\|$

   BY

   $\|\rho(t,\cdot)\|$

2. The statement of Theorem 1.63 is not correct. It was taken from Theorem VI.2.2 in Parthasaraty's book [478], which is not correct there. In the proof of Theorem VI.2.2 in [478], the set K does not have to be compact but it is compact if it is intersected with a closed ball. Theorem 1.63 is used in the proofs of Proposition 1.64 and Lemma 4.49, which are correct but their proofs need to be adjusted (see below).

   REPLACE

   Theorem 1.63

   BY

Theorem 1.63 Let H be a real separable Hilbert space and let $\{e_i\}_{i\in\mathbb{N}}$ be an orthonormal basis in H. A family $\Lambda\subset M_1(H)$ is relatively compact if

$$\lim_{N\to+\infty} \sup_{\mathbb{P}\in\Lambda} \int_H \sum_{i=N}^{+\infty} \langle x, e_i\rangle^2 \, \mathbb{P}(dx) = 0.$$

and

$$\lim_{m\to\infty} \sup_{\mathbb{P}\in\Lambda} \mathbb{P}(\{|x| > m\}) = 0.$$

3. Page 21, the proof of Proposition 1.64.

   REPLACE

   lines 4-5 of the proof of Proposition 1.64

   BY

   Since $\lim_{n\to+\infty} \|Q_n - Q\|_{\mathcal{L}_1(H)} = 0$, the above formula and (1.10) imply in particular that Theorem 1.63 applies and thus the sequence $(\mathcal{N}_{Q_n})$ is relatively compact.

4. Page 54, line 1 from the top.

   REPLACE

   $t_i \in D$

   BY

   $t_j \in D$

5. Page 102, Remark 2.15, second line of (A4).

   REPLACE

   ...and $a|_{[\eta,T]}(\cdot)$...

   BY

   ...and, for every $\eta \in [t, T]$, $a_1|_{[\eta,T]}(\cdot)$...

CHAPTER 2

1. Page 121, Hypothesis 2.33 (i), first line.

   REPLACE

   "... and $l(t, x, a)$ are uniformly continuous in t on $[0, T]$, uniformly for $(x, a) \in B(0, R) \times \Lambda$ for every $R > 0$."

   BY

   ".... and $l(t, x, a)$ are continuous and uniformly continuous in (t, x) on $[0, T] \times B(0, R)$, uniformly for $a \in \Lambda$ for every $R > 0$."

2. Page 124, Theorem 2.36, third line.

   REPLACE

   "Let Hypotheses 1.125, 2.1 and 2.33-(ii)(iii) be satisfied",

   BY

   "Let Hypotheses 1.125, 2.1 and 2.33 be satisfied",

   i.e. "-(ii)(iii)" should be deleted.

3. Page 128, Hypothesis 2.40 (i), first line.

   REPLACE

   "There exist $C, N > 0$ such that ..."

   BY

   "The functions b, σ and l are continuous, $l(x, a)$ is uniformly continuous in x on $B(0, R)$, uniformly for $a \in \Lambda$ for every $R > 0$. Moreover, there exist $C, N > 0$ such that ...".

4. Page 129, formula (2.69)

   REPLACE

   $l(s, X(s), a(s))$

   BY

   $l(X(s), a(s))$

5. Page 144, the formula in line 3 from the bottom.

   REPLACE

   $...\langle Ax, Dv\rangle + F(Dv) + l_2(x)...$

   BY

   $...\langle Ax + b(x), Dv\rangle + F(Dv) + l_1(x)...$

6. Page 160, formula (2.138).

   REPLACE

   $u - \varphi$

   BY

   $\varphi - u$

CHAPTER 3

1. Page 178, Example 3.16, line 4 from the top.

   REPLACE

   where $a_{ij} = a_{ji}, b_i, c \in L^\infty(\mathcal{O})$ for $i, j \in 1, ..., n$, ...

   BY

   where $a_{ij} = a_{ji}, b_i \in W^{1\infty}(\mathcal{O})$ for $i, j \in 1, ..., n$, $c \in L^\infty(\mathcal{O})$, ...

2. Page 178, Example 3.16, lines 13-14 from the top.

   REPLACE

   If, in addition, $a_{ij} \in W^{1\infty}(\mathcal{O})$, $b_i = 0$, $i, j = 1, ..., n$ one can also take $B_0 = \lambda(\hat{A})^{-1}$ ...

   BY

   One can also take $B = \lambda(\hat{A})^{-1}$ ...

3. Page 195, line 15 from the bottom.

   REPLACE

   $\tilde{v}(s, y) = u\big(...$

   BY

   $\tilde{v}(s, y) = v\big(...$

4. Page 197, Definition 3.34, line 4 from the bottom.

   REPLACE

   "A locally bounded B-upper semicontinuous function u on $[0, T) \times \overline{U}$ ..."

   BY

   "A locally bounded and upper semicontinuous function u on $[0, T) \times \overline{U}$ which is B-upper semicontinuous on $(0, T) \times \overline{U}$ ..."

5. Page 198, Definition 3.34, line 2 from the top.

   REPLACE

   "A locally bounded B-lower semicontinuous function u on $[0, T) \times \overline{U}$ ..."

   BY

   "A locally bounded and lower semicontinuous function u on $[0, T) \times \overline{U}$ which is B-lower semicontinuous on $(0, T) \times \overline{U}$ ..."

6. Page 198, Definition 3.35, line 4 from the bottom.

   REPLACE

   "A locally bounded B-upper semicontinuous function u on $(0, T] \times \overline{U}$ ..."

   BY

   "A locally bounded and upper semicontinuous function u on $(0, T] \times \overline{U}$ which is B-upper semicontinuous on $(0, T) \times \overline{U}$ ..."

7. Page 199, Definition 3.35, line 2 from the top.

   REPLACE

   “A locally bounded B-lower semicontinuous function u on $(0,T]\times\overline{U}$ ...”

   BY

   “A locally bounded and lower semicontinuous function u on $(0,T]\times\overline{U}$ which is B-lower semicontinuous on $(0,T)\times\overline{U}$ ...”

8. Page 247, formula (3.190).

   REPLACE

   ... if $C=0$.

   BY

   ... if b,σ are bounded.

9. Page 252, line 2 from the top.

   REPLACE

   $\kappa\omega(r)$

   BY

   $\kappa\omega_1(r)$

10. Page 252, line 11 from the top.

    REPLACE

    $\varphi(t,x,y)=\varphi_\delta(|x-y|_C^2+\gamma)^{\frac{1}{2}}(1+t)$

    BY

    $\varphi(t,x,y)=\varphi_\delta\left((|x-y|_C^2+\gamma)^{\frac{1}{2}}\right)(1+t)$

11. Page 255, formula (3.211).

    REPLACE

    $m_\tau(|x-y|)$

    BY

    $m_\tau(|x-y|_{-1})$

12. Page 261, formula (3.241).

    REPLACE

    $e^{-(t-s)A_N}$

    BY

    $e^{(t-s)A_N}$

13. Page 267, second line of formula (3.253).

    REPLACE

    $X(t) = x$

    BY

    $X_n(t) = x$

14. Page 274, 4th line after (3.277).

    REPLACE

    $...\frac{h_r(|x|)}{|x|}...$

    BY

    $...\frac{h_r(t,|x|)}{|x|}...$

15. Page 277, formula (3.284).

    REPLACE

    $w(y) = ...$

    BY

    $w(s, y) = ...$

16. Page 305, line 5 from the bottom.

    REPLACE

    $... \leq 2\delta K|x_i|^2_{0,\rho} \to 2\delta K|\bar{x}|^2_{0,\rho}$

    BY

    $... \leq 2K|x_i|^2_{0,\rho} \to 2K|\bar{x}|^2_{0,\rho}$

17. Page 327, formula (3.415).

    REPLACE

    $Y(t)$ in two places

    BY

    $Y_N(t)$.

18. Page 327, line 5 from the bottom.

    REPLACE

    $Q_N(-A)^{-\frac{\gamma}{2}}\int_0^t(-A)^{\frac{\beta+\gamma}{2}}e^{(t-s)A}(-A)^{\frac{\beta}{2}}\sigma((-A)^{\frac{\beta}{2}}Y(s), a_1(s))dW(s)$

    BY

    $Q_N(-A)^{-\frac{\gamma}{2}}\int_0^t(-A)^{\frac{\beta+\gamma}{2}}e^{(t-s)A}(-A)^{-\frac{\beta}{2}}\sigma((-A)^{\frac{\beta}{2}}Y(s), a_1(s))dW(s)$

19. Page 327, line 3 from the bottom.

    REPLACE

    $\int_0^t (-A)^{\frac{\beta}{2}} e^{(t-s)A} (-A)^{\frac{\beta}{2}} P_N[\sigma((-A)^{\frac{\beta}{2}} Y_N(s), a_1(s)) - \sigma((-A)^{\frac{\beta}{2}} Y(s), \alpha_1(s))] dW_Q(s)$

    BY

    $\int_0^t (-A)^{\frac{\beta}{2}} e^{(t-s)A} (-A)^{-\frac{\beta}{2}} P_N[\sigma((-A)^{\frac{\beta}{2}} Y_N(s), a_1(s)) - \sigma((-A)^{\frac{\beta}{2}} Y(s), \alpha_1(s))] dW_Q(s)$

CHAPTER 4

1. Page 382, line 1 from the bottom.

   REPLACE

   $|G(y(r))^{-1} G(x) h|_Y$

   BY

   $|G(y(r))^{-1} G(x) h|_Z$

2. Page 383, line 7 from the top.

   REPLACE

   $s^{-1}[\varphi(t,s) - \varphi(t,0)]$

   BY

   $s^{-1}|\varphi(t,s) - \varphi(t,0)|_Y$

3. Page 413, the proof of Lemma 4.49.

   REPLACE

   lines 9-10 of the proof of Lemma 4.49

   BY

   Hence, by the limit above, (1.10) and the fact that the trace of Q_t is uniformly bounded for $t \in [0,T]$, the family $\{\mathcal{N}_{Q_t} : t \in [0,T]\}$ is relatively compact by Theorem 1.63 and thus tight by Theorem 1.62.

4. Page 521, line 2 from the top, formula (4.254).

   REPLACE

   $UC_b(X, \mathcal{L}_1(H))$

   BY

   $UC_b(H, \mathcal{L}_1(H))$

5. Page 541, line 16 from the top.

   DELETE

   pr2:exmildOUF0spsapp

   There should be “Proposition 1.147” there.

CHAPTER 5

1. Page 619, inequality (5.22).

   REPLACE

   $\alpha\,|\mathcal{K}(x,X)-\mathcal{K}(x,Y)|_{\mathcal{H}_2^{\mu_0}(0,T;H)}$

   BY

   $\alpha\,|X-Y|_{\mathcal{H}_2^{\mu_0}(0,T;H)}$

2. Page 649, Lemma 5.46, line 6 from the bottom (the first line of the formula defining $\rho_{a(\cdot)}$).

   REPLACE

   $\dots\ , dW_Q(r)\Big\rangle$

   BY

   $\dots\ , Q^{-1/2}dW_Q(r)\Big\rangle$

3. Page 650, line 3 from the bottom.

   REPLACE

   $\dots\ , dW_Q(r)\Big\rangle$

   BY

   $\dots\ , Q^{-1/2}dW_Q(r)\Big\rangle$

4. Page 650, line 1 from the bottom.

   REPLACE

   $\dots\ , dW_Q(r)\Big\rangle$

   BY

   $\dots\ , Q^{-1/2}dW_Q(r)\Big\rangle$

5. Page 657, line 14 from the top (the second line of the three line formula).

   REPLACE

   $$\left|\int_t^s e^{(t-r)A}(R(r,X_n(r),a_n(r))-R(r,X(r),a(r)))dr\right|$$

   BY

   $$\left|\int_t^s e^{(t-r)A}Q^{1/2}(R(r,X_n(r),a_n(r))-R(r,X(r),a(r)))dr\right|$$

APPENDIX B

1. Page 837, line 4.

   REPLACE

   ...$(\lambda I - \mathcal{A}^m)(D(\mathcal{A}_0))$...

   BY

   ...$(\lambda I - \mathcal{A}^m)^{-1}(D(\mathcal{A}_0))$...

APPENDIX C

1. Page 851.

   REPLACE THE FIRST TWO LINES OF SECTION C.4 BY THE FOLLOWING:

   Let, as in Section C.2, $H = L^2(\mathcal{O})$ and $\Lambda = L^2(\partial\mathcal{O})$. Let $\Xi = \Lambda$, $Q \in \mathcal{L}^+(\Xi)$, and let $\left(\Omega, \mathcal{F}, \{\mathcal{F}_s^t\}_{s\in[t,T]}, \mathbb{P}, W_Q\right)$ be a generalized reference probability space. We consider the following problem:

2. Second line of formula (C.34).

   REPLACE

   ...$= h(s, y(s,\xi))$...

   BY

   ...$= h(s,\xi)$...

3. Page 851, first line after formula (C.34).

   REPLACE

   ...where $f, h : [t,T] \times \mathbb{R} \times \Omega \to \mathbb{R}$ and $g : [t,T] \times \partial\mathcal{O} \times \Omega \to \mathbb{R}$ are...

   BY

   ...where $f : [t,T] \times \mathbb{R} \times \Omega \to \mathbb{R}$ and $h, g : [t,T] \times \partial\mathcal{O} \times \Omega \to \mathbb{R}$ are...

4. Page 851, last two lines before formula (C.35).

   REPLACE

   So, defining as before $b(s,y)(\cdot) := f(s, y(\cdot))$ and $[\sigma(s,y)z](\cdot) := h(s,y(\cdot))z(\cdot)$, we define the mild form of (C.34), for $s \in [t,T]$, as

   BY

   We now define, as in Sections C.2 and C.3, $b(s,y)(\cdot) := f(s,y(\cdot))$ for $s \in [t,T]$ and $y \in H$. Moreover we define $\sigma : [t,T] \to \mathcal{L}(\Lambda)$ as follows: for $s \in [t,T]$ and $z \in \Lambda$, $[\sigma(s)z](\cdot) := h(s,\cdot)z(\cdot)$. We define the mild form of (C.34), for $s \in [t,T]$, as

5. Last line of formula (C.35).

   REPLACE

   ...$G_N(\sigma(r, X(r))dW_Q(r)$...

   BY

   ...$G_N\sigma(r)dW_Q(r)$...

6. Second line of formula (C.36).

   REPLACE

   $...N_\lambda \sigma(s, X(s)) dW_Q(s)...$

   BY

   $...N_\lambda \sigma(s) dW_Q(s)...$

7. Page 852, the formula in the third line of Section C.5.

   REPLACE

   $...G_D \sigma(r, X(r)) dW_Q(r)...$

   BY

   $...G_D \sigma(r) dW_Q(r)...$

8. Page 852, formula (C.37).

   REPLACE

   $...h(s, (y(t, 0))...$

   BY

   $...h(s)...$

9. Page 853, last line of formula (C.38).

   REPLACE

   $...G_\eta \sigma(r, X(r)) dW_Q(r)...$

   BY

   $...G_\eta \sigma(r) dW(r)...$

10. Page 853, second line of formula (C.39).

    REPLACE

    $...G_\eta \sigma(r, X(r)) dW_Q(r)...$

    BY

    $...G_\eta \sigma(r) dW(r)...$

11. Page 853, the last line before formula (C.39) and the third line of formula (C.39).

    REPLACE

    $L^2(t, T; \mathbb{R})$

    BY

    L^2_η

APPENDIX D

1. Page 859, line 4 of Theorem D.20.

   REPLACE

   $f(b) - f(a)$

   BY

   $|f(b) - f(a)|_Y$

2. Page 859, line 5 of Theorem D.20.

   REPLACE

   $f(b) - f(a) - (b-a)f'(t_0)$

   BY

   $|f(b) - f(a) - (b-a)f'(t_0)|_Y$

3. Page 863, line 4 of Definition D.24.

   REPLACE

   (respectively,$\overline{u}_\varepsilon$...

   BY

   (respectively, $\overline{u}_\varepsilon$...

REFERENCES

1. Page 880, Reference 116.

   REPLACE

   73(2), 1–42 (2012)

   BY

   73(2), 271–312 (2016)

2. Page 891, Reference 391.

   REPLACE

   Gaussian Measures in Hilbert Dpaces

   BY

   Gaussian Measures in Banach Spaces