

## List of Publications – E.J. Balder (as of Fall 2012)

### Excerpts from scientific reviews ...

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- *..uses new very sophisticated techniques.. ..very good results..* (E. Baiada, Zbl. 475.49006).
- *..subsumes several known lower semicontinuity theorems..* (L.D. Berkovitz, MR 82h: 49012).
- *..ingenious proofs..* (M. Valadier, MR 85c: 28004).
- *Such an existence result is very useful in various optimization problems, and the present theorem unifies and improves a variety of available particular results.* (Z. Artstein, MR 85f: 28003).
- *His results appear to generalize the theory of generalized curves and relaxed controls, and are inspired by the techniques of L.C. Young, R.T. Rockafellar and the reviewer..* (J. Warga, MR 85k: 49018).
- *The author extends to Banach spaces the concept of seminormality for finite-dimensional spaces which had been studied by Tonelli (1921), McShane (1934) and the reviewer (1966) .. This is particularly relevant because, by doing so, the author can present a version of the concept which concerns the integrand function .. and a version which concerns the integral ..* (L. Cesari, MR 87e:49032).
- *The proof of measurability of these related set-functions is usually quite involved. The present paper makes such proof unnecessary in many cases..* (E. Roxin, Zbl. 569.49028).
- *This approach is not only quick and elegant but covers also a quite general case..* (A. Kirsch, Zbl. 576.49005).
- *..interesting translation of the classical Tonelli's seminormality..* (C. Vinti, Zbl. 582.49013).
- *..elegant method of proof.., ..beautifully written..* (N.C. Yannelis, MR 90e: 28012).
- *A very ingenious argument..* (M. Valadier, MR 91g: 28008).
- *..considerably extend those of A. Mas-Colell.. a considerable relaxation in the assumptions of Khan-Rustichini..* (T.E. Armstrong, MR 92k: 90135).
- *The appeal of the new proof is .. saving more elaborate functional analysis considerations, employed in earlier proofs..* (Z. Artstein, Zbl. 768.49009).
- *Some interesting examples and counterexamples to earlier results are presented..* (Z. Wyderka, Zbl. 786.49002).
- *.. enlightening style ..* (Z. Artstein, MR 95h:28018)
- *The conditions .. are general enough to subsume practically all the results (that the reviewer is aware of) available in the literature ..* (Z. Artstein, MR 96a:28023)

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<sup>1</sup>MR = *Mathematical Reviews*,  
Zbl. = *Zentralblatt Mathematik*.

- .. *very general existence results for Bayesian Nash equilibrium of games with incomplete information.* (N.C. Yannelis, MR 98b:90176)
- .. *sharp results .. scholarly remarks ..* (M. Valadier, MR 98c:49034)
- .. *very general existence results ..* (N. Yannelis, MR 98b:90176)
- .. *A notable contribution of the paper is that the theorem derived allows general action spaces and avoids the presupposition of integrability of the action profiles ..* (D. Yeung, MR 2000k:91017)
- *These results unify the equilibrium existence proofs for a broad class of games, known from the literature ..* (D. Furth, MR 2002d:91012)

## Publications:

### *Games, Equilibrium Theory and Mathematical Economics*

- A unifying note on Fatou's lemma in several dimensions, MRC Report #2368, University of Wisconsin, Madison, Mathematics of Operations Research 9 (1984), 267-275.
- More on Fatou's lemma in several dimensions, Canadian Mathematical Bulletin 30 (1987), 334-339.
- Generalized equilibrium results for games with incomplete information, Mathematics of Operations Research 13 (1988), 265-276.
- Fatou's lemma in infinite dimensions, Journal of Mathematical Analysis and Applications 16 (1988), 450-465.
- (with N. C. Yannellis) Random equilibria in generalized continuum games, in: Equilibrium Theory with Infinitely Many Commodities (M.A. Khan, N.C. Yannellis, eds.), Springer-Verlag, Berlin, 1991, pp. 333-350.
- On Cournot-Nash equilibrium distributions for games with differential information and discontinuous payoffs, Economic Theory 1 (1991), 339-354.
- (with N.C. Yannellis) Necessary and sufficient conditions for weak continuity of expected utility functions, Economic Theory 3 (1993), 625-643.
- (with A. Rustichini) An equilibrium result for games with private information and uncountably many players, Journal of Economic Theory 62 (1994), 385-393.
- (with C. Hess) Fatou's lemma for multifunctions with unbounded values, Mathematics of Operations Research 20 (1995), 175-188.
- A unifying approach to existence of Nash equilibria, International Journal of Game Theory 24 (1995), 79-94.
- On the existence of optimal contract mechanisms for incomplete information principal-agent models, Journal of Economic Theory, 68 (1996), 133-148.
- Comments on the existence of equilibrium distributions, Journal of Mathematical Economics 25 (1996), 307-323.
- Remarks on Nash equilibria for games with additively coupled payoffs, Economic Theory 9 (1997), 161-167.
- Young measure techniques for existence of Cournot-Nash-Walras equilibria, in: *Topics in Mathematical Economics and Game Theory* (M. Wooders, ed.), Fields Institute Communications **23**, American Mathematical Society, Providence, 1999, pp. 31-39.
- On the existence of Cournot-Nash equilibria in continuum games, Journal of Mathematical Economics 32 (1999), 207-223.
- On Cournot-Nash equilibrium existence results for games with a measure space of players. Atti del Seminario Matematico e Fisico dell'Universita di Modena 49 (2001), 121-127.
- Incompatibility of the usual conditions for Nash equilibrium existence in continuum economies without ordered preferences, Journal of Economic Theory, 93 (2000), 110-117.
- (with M.R. Pistorius) On an optimal consumption problem for  $p$ -integrable consumption plans, Economic Theory, 17 (2001), 721-737.

- A unifying pair of Cournot-Nash equilibrium existence results, *Journal of Economic Theory*, 102 (2002), 437-470.
- A Fatou lemma for Gelfand integrals by means of Young measure theory, *Positivity* 6 (2002), 317-329.
- On the existence of maximum likelihood Nash equilibria. *Annals of Operations Research* 114 (2002), 57-70.
- On undominated Nash equilibria for games with a measure space of players, *Economics Letters* 80 (2003), 137-140.
- An equilibrium existence result for games with incomplete information and indeterminate outcomes, *Journal of Mathematical Economics* 40 (2004), 297-320.
- (with A.R. Sambucini) Fatou's lemma for multifunctions with unbounded values in a dual space, *Journal of Convex Analysis* 12 (2005), 383-395.
- (with N.C. Yannelis) On the continuity of expected utility. In: *Differential Information Economies* (D. Glycopantis et al., editors), *Studies in Economic Theory* 19, Springer-Verlag, Berlin, 2005, pp. 105-124.
- (with N.C. Yannelis) Continuity properties of the private core. *Economic Theory* 29 (2006), 453-464.
- More on equilibria in competitive markets with externalities and a continuum of agents, *Journal of Mathematical Economics* 44 (2008), 575-602.
- Comments on purification in continuum games, *International Journal of Game Theory* 37 (2008), 73-92.
- (with N.C. Yannelis) Bayesian-Walrasian equilibria: beyond the rational expectations equilibrium, *Journal of Mathematical Economics* 38 (2009), 385-397.
- An equilibrium closure result for discontinuous games, *Economic Theory* 48 (2011), 47-65.
- Exact and useful optimization methods for microeconomics, in: *New Insights into the Theory of Giffen Goods* (W. Heijman and P. von Mouche, eds.), *Lecture Notes in Economics and Mathematical Systems* 655, Springer-Verlag, 2012, pp. 21-38.

#### *Optimal Growth*

- An existence result for optimal economic growth problems, *Journal of Mathematical Analysis and Applications* 95 (1983), 195-213.
- Existence of optimal solutions for control and variational problems with recursive objectives, *Journal of Mathematical Analysis and Applications* 178 (1993), 418-437.

#### *Optimal Control*

- On a useful compactification for optimal control problems, *Journal of Mathematical Analysis and Applications* 72 (1979), 391-398.
- Relaxed inf-compactness for variational problems by Hilbert cube compactification, *Journal of Mathematical Analysis and Applications* 79 (1981), 1-12.
- Lower semicontinuity of integral functionals with nonconvex integrands by relaxation-compactification, *SIAM Journal on Control and Optimization* 19 (1981), 533-542.

- Lower closure problems with weak convergence conditions in a new perspective, *SIAM Journal on Control and Optimization* 20 (1982), 198-210.
- On lower closure and lower semicontinuity in the existence theory for optimal control, in : *System Modelling and Optimization* (R.F. Drenick and F. Kozin, eds.), *Lecture Notes in Control and Information Sciences* No. 38, Springer-Verlag, Berlin, 1982, pp. 158-164.
- Prohorov's theorem for transition probabilities and its application to optimal control, in : *Proceedings of the 22nd Conference on Decision and Control*, IEEE, 1983, pp. 166-170.
- On existence problems for the optimal control of certain nonlinear integral equations of Urysohn type, *Journal of Optimization Theory and Applications* 42 (1984), 447-465.
- A general approach to lower semicontinuity and lower closure in optimal control theory, *SIAM Journal on Control and Optimization* 22 (1984), 570-598.
- Existence results without convexity conditions for general problems of optimal control with singular components, *Journal of Mathematical Analysis and Applications* 101 (1984), 527-539.
- A general denseness result for relaxed control theory, *Bulletin of the Australian Mathematical Society* 30 (1984), 463-475.
- On the existence of optimal solutions in a stochastic control model, *Journal of Optimization Theory and Applications* 45 (1985), 21-31.
- Lower closure for orientor fields by lower semicontinuity of outer integral functionals, *Annali di Matematica Pura ed Applicata (IV)* 139 (1985), 349-360.
- An extension of Prohorov's theorem for transition probabilities with applications to infinite-dimensional lower closure problems, *Rendiconti del Circolo Matematico di Palermo (II)* 34 (1985), 427-447.
- On seminormality of integral functionals and their integrands, *SIAM Journal on Control and Optimization* 24 (1986), 95-121.
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- On infinite-horizon lower closure results for optimal control, *Annali di Matematica Pura ed Applicata (IV)* 151 (1988), 239-246.
- Exact bang-bang optimal control for problems with nonlinear costs, in: *Advances in Optimization* (W. Oettli and D. Pallaschke, eds.), *Springer Lecture Notes in Economics and Mathematical Systems* 382, Springer, Berlin, 1992, pp. 371-383.
- On a new approach to existence without convexity in optimal control, in: *Variational Methods, Nonlinear Analysis and Differential Equations* (M. Chicco et al., eds.), *Proceedings of the international workshop on the occasion of the 75-th birthday of J.P. Cecconi*, Dipartimento di Matematica, Università di Genova, 1994, pp. 44-49.
- New existence results for optimal controls in the absence of convexity: the importance of extremality, *SIAM Journal on Control and Optimization* 32 (1994), 890-916.
- Existence without convexity in optimal control: an extreme point approach, in: *Proceedings Conference on Nonlinear Analysis and Calculus of Variations*, Perugia 1993, *Atti del Seminario Matematico e Fisico dell'Università di Modena* 42 (1994), 205-217.
- New fundamentals of Young measure theory, in: *Calculus of Variations and Differential Equations* (A. Ioffe, S. Reich and I. Shafrir, eds.), *Chapman and Hall/CRC Research Notes in Mathematics* 410, CRC Press, Boca Raton, 2000, 24-48.

- Comment on an existence result for a nonconvex noncoercive variational problem. *SIAM Journal on Control and Optimization* 40 (2001), 328-332.

*Convex Analysis and Measure Theory*

- An extension of the essential supremum concept with applications to normal integrands and multifunctions, *Bulletin of the Australian Mathematical Society* 27 (1983), 407-418.
- On weak convergence implying strong convergence in  $L_1$ -spaces, *Bulletin of the Australian Mathematical Society* 33 (1986), 363-368.
- Necessary and sufficient conditions for  $L_1$ -strong-weak lower semicontinuity of integral functionals, *Nonlinear Analysis TMA* 11 (1987), 1399-1404.
- Short proof of an existence result of V.L. Levin, *Bulletin of the Polish Academy of Sciences* 37 (1989), 655-658.
- Infinite-dimensional extension of a theorem of Komlos, *Probability Theory and Related Fields* 81 (1989), 185-188.
- Unusual applications of a.e. convergence, in: *Almost Everywhere Convergence* (G.A. Edgar, L. Sucheston, eds.), Academic Press, New York, 1989, pp. 31-53.
- On Prohorov's theorem for transition probabilities, *Travaux du Séminaire d'Analyse Convexe* 19 (1989), 9.1-9.11
- New sequential compactness results for spaces of scalarly integrable functions, *Journal of Mathematical Analysis and Applications* 151 (1990), 1-16.
- On uniformly bounded sequences in Orlicz spaces, *Bulletin of the Australian Mathematical Society* 41 (1990), 495-502.
- On equivalence of strong and weak convergence in  $L_1$ -spaces under extreme point conditions, *Israel Journal of Mathematics* 75 (1991), 21-48.
- On weak convergence implying strong convergence under extremal conditions, *Journal of Mathematical Analysis and Applications* 163 (1992), 147-156.
- From weak to strong convergence in  $L_1$ -spaces via  $K$ -convergence, *Annali di Matematica Pura ed Applicata (IV)* 165 (1993), 337-349.
- A unified approach to several results involving integrals of multifunctions, *Set-Valued Analysis* 2 (1994), 63-75.
- (with M. Girardi and V. Jalby) From weak to strong types of  $\mathcal{L}_E^1$ -convergence by the Bocce-criterion, *Studia Mathematica* 111 (1994), 241-262.
- Connections between recent Olech-type lemmas and Visintin's theorem, in: *Geometry and Nonlinear Control and Differential Inclusions*, Banach Center Publications, Vol. 32 (1995), 47-52.
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- Consequences of denseness of Dirac Young measures, *Journal of Mathematical Analysis and Applications* 207 (1997), 536-540.

- On compactness results for multi-scale convergence, Proceedings Royal Society Edinburgh 129A (1999), 467-476.
- (with N. Dinh) Some extensions of Berliocchi-Lasry theorem and extremum principles for classes of mathematical programming problems, Vietnam Journal of Mathematics 27 (1999), 23-31.
- Lectures on Young measure theory and its applications in economics, Proceedings Grado School on Measure Theory and Real Analysis, Rendiconti dell'Istituto di Matematico dell'Università di Trieste 31 Suppl. 1 (2000), 1-69
- On *ws*-convergence of product measures, Mathematics of Operations Research 26 (2001), 494-518.
- (with A.R. Sambucini) A note on strong convergence for Pettis integrable functions, Vietnam Journal of Mathematics 31 (2003), 341-347.
- (with A.R. Sambucini) On weak compactness and lower closure results for Pettis integrable (multi)functions, Bulletin of the Polish Academy of Sciences 52 (2004), 53-61.

#### *Optimization*

- Comment on a note on duality gaps in linear programming over convex sets, Journal of Optimization Theory and Applications 17 (1975), 343-346.
- *An extension of duality-stability relations to nonconvex optimization problems*, Doctoral Thesis, University of California, Berkeley, 1976.
- An extension of duality-stability relations to nonconvex optimization problems, SIAM Journal on Control and Optimization 15 (1977), 329-343.
- Penalty functions and nonconvex duality theory, an approach via conjugate functions, Methods of Operations Research 28 (1978), 321-331.
- Nonconvex duality-stability relations pertaining to the interior penalty function method, Mathematische Operationsforschung und Statistik (Ser. Optimization) 11 (1980), 367-373.
- On a general duality result for moment problems, Mathematische Operationsforschung und Statistik (Ser. Optimization) 18 (1987), 17-21.
- Seminormal functions in optimization theory, in : Nondifferentiable Optimization : Motivations and Applications (V.F. Demyanov and D. Pallaschke, eds.) Lecture Notes in Economics and Mathematical Systems No. 255, Springer-Verlag, Berlin, 1985, pp. 165-169.
- A useful approximation scheme for Lagrangians, Journal of Optimization Theory and Applications 61 (1989), 203-219.

#### *Statistical Decision Theory*

- An extension of the usual model in statistical decision theory with applications to stochastic optimization problems, Journal of Multivariate Analysis 10 (1980), 383-397.
- Mathematical foundations of statistical decision theory: a modern viewpoint I, Preprint 199, Department of Mathematics, University of Utrecht.
- (with D.C. Gilliland and J.C. van Houwelingen) On the essential completeness of Bayes empirical Bayes decision rules, Statistics and Decisions 1 (1983), 503-509.
- Elimination of randomization in statistical decision theory reconsidered, Journal of Multivariate Analysis 16 (1985), 260-264.

*Stochastic Decision Processes*

- A new look at the existence of p-optimal policies in dynamic programming, *Mathematics of Operations Research* 6 (1981), 513-517.
- On compactness of the space of policies in stochastic dynamic programming, *Stochastic Processes and Applications* 32 (1989), 141-150.
- Existence without explicit compactness in stochastic dynamic programming, *Mathematics of Operations Research* 17 (1992), 572-580.

*Approximation Theory*

- (with S. le Cessie) A note on monotone interpolation and smoothing splines, *Numerical Functional Analysis and Optimization* 15 (1994), 47-54.