On approximate Cobb-Douglas production functions

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ABSTRACT.

We introduce a new type of production function, called approximate Cobb-Douglas function, by a perturbation of Euler's partial differential equation characterizing homogeneous function. We show that for every approximate Cobb-Douglas function, there exist an exact Cobb-Douglas function near it.

References

- [1] Carter, S., On the Cobb-Douglas and all that': The Solow-Simon correspondence over the neoclassical aggregate production function, Journal of Post Keynesian Economics (to appear)
- [2] Charnes, A., Cooper, W. W. and Schinnar, A. P., A theorem on homogeneous functions and extended Cobb-Douglas forms, Proc. Natl. Acad. Sci. USA, 73 (1976), 3747–3748
- [3] Cîmpean, D. S. and Popa, D., Hyers-Ulam stability of Euler's equation, Appl. Math. Lett., 24 (2011), 1539–1543
- [4] Cobb, C. and Douglas, P., A theory of production, American Economic Review, 18 (1928), 139-165
- [5] Cronin, B. and Gudin, M., Information and productivity: A review of research, International Journal of Management, 6 (1986), 85–101
- [6] Felipe, J., Aggregate production function and the measurement of infrastructure productivity; A reassessment, Eastern Economic Journal, 31 (2005), 427–446
- [7] Felipe, J. and Holz, C. A., Why do aggregate production function work? Fisher's simulations, Shaikh's identity and some new results, International Review of Applied Economics, 15 (2001), 261–285
- [8] Hyers, D. H., Isac, G. and Rassias, Th. M., Stability of Functional Equations in Several Variables, Birkhäuser, Basel, 1998
- [9] Labini, P. S., Why the interpretation of Cobb-Douglas production function must be radically changed, Structural Change and Economics Dynamics, 6 (1995), 485–504
- [10] Menderhausen, H., On the significance of Professor Douglas' Production function, Econometrica, 6 (1938), 143–153
- [11] Pressman, S., What is wrong with the aggregate production functions, Eastern Economic Journal, **31** (2005), 421–426
- [12] Shaikh, A., Nonlinear dynamics and Pseudo production functions, Eastern Economic Journal, 31 (2005), 447-466
- [13] Shephard, R., Theory of Cost and Production Functions, Princeton University Press, 1970
- [14] Simon, H. and Levy, F. A note on Cobb-Douglas function, Review of Economic Studies, 30 (1963), 93–94
- [15] Teo, T. S. H., Wong, P. K. and Chia, E. H., *Information technology (IT) investment and the role of a firm; an exploratory study*, International Journal of Management, **20** (2000), 269–286
- [16] Thompson, A., Economics of the Firm, Theory and Practice, Prentice Hall, 1981
- [17] Vîlcu, G. E., A geometric perspective of the generalized LD-Cobb-Douglas production function, Appl. Math. Lett., 24 (2011), 777–783

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