Genetic Algorithms In Economics and Finance: Forecasting Stock Market Prices And Foreign Exchange — A Review

Chapter

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Genetic Algorithms and Genetic Programming in Computational Finance

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Abstract

After a brief overview of the history of the development and application of genetic algorithms and related simulation techniques, this chapter describes alternative implementations of the genetic algorithm, their strengths and weaknesses. Then follows an overview of published applications in finance, with particular focus on the papers of Bauer, Pereira, and Colin in foreign exchange trading. Many other rumored applications remain unpublished.

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References

Bäck, T. (1996). *Evolutionary Algorithms in Theory and Practice, Evolutionary Strategies, Evolutionary Progarmming, Genetic Algorithms*. New York and Oxford: Oxford University Press.

Barnett, W. A., C. Chiarella, S. Keen, R. E. Marks, and H. Schnabl (eds.), (2000). *Commerce, Complexity, and Evolution: Topics in Economics, Finance, Marketing, and Management: Proceedings of the Twelfth In-ternational Symposium in Economic Theory and Econometrics*. Cambridge: Cambridge University Press.

Bauer, R. J. Jr. (1994). *Genetic Algorithms and Investment Strategies*. New York: Wiley.

Bauer, R. J. Jr. (1995). “Genetic Algorithms and the Management of Exchange Rate Risk,” in J. Biethahn and V. Nissen (eds.), *Evolutionary Algorithms in Management Applications*, 253–263.

Bauer, R. J. Jr. and G. E. Liepins (1992). “Genetic Algorithms and Computerized Trading Strategies,” in O’Leary and Watkins (eds.), *Expert Systems in Finance*, 89–100.

Belew, R. K. and L. B. Booker (eds.), (1991). *Proceedings of the Fourth International Conference on Genetic Algorithms*. San Mateo: Morgan Kaufmann.

Biethahn, J. and V. Nissen (eds.), (1995). *Evolutionary Algorithms in Management Applications*. Berlin, Heidelberg, New York: Springer-Verlag.

Bodnovich, T. (1995). “Genetic Algorithms in Business and their Supportive Role in Decision Making,” <http://business.kent.edu/~tbodnovi/ga.html>, November.

Caldwell, C. and V. S. Johnston (1991). “Tracking Criminal Suspect Through ‘Face-space’ with a Genetic Algorithm,” in Belew and Booker (eds.), *Proceedings of the Fourth International Conference on Genetic Algorithms*, 416–421.

Colin, A. M. (1994). “Genetic Algorithms for Financial Modeling,” in Deboeck (ed.), *Trading on the Edge: Neural, Genetic, and Fuzzy Systems for Chaotic Financial Markets*, 148–173.

Colin, A. M. (2000). “A Genetic-programming-based Approach to the Generation of Foreign-exchange Trading Models,” in Barnett, Chiarella, Keen, Marks, and Schnabl (eds.), *Commerce, Complexity, and Evolution: Topics in Economics, Finance, Marketing, and Management: Proceedings of the Twelfth International Symposium in Economic Theory and Econometrics*, 173–189.

Davis, L. (ed., 1991). *Handbook of Genetic Algorithms*. New York: Van Nostrand Reinhold.

Davis, L. (1994). “Genetic Algorithms and Financial Applications,” in Deboeck (ed.), *Trading on the Edge: Neural, Genetic, and Fuzzy Systems for Chaotic Financial Markets*, 133–147.

Davis, L. and S. Coombs (1987). “Genetic Algorithms and Communication Link Speed Design: Theoretical Considerations,” in Grefenstette (ed.), *Genetic Algorithms and their Applications: Proceedings of the Second International Conference on Genetic Algorithms*, 252–256.

Deboeck, G. J. (ed.), (1994). *Trading on the Edge: Neural, Genetic, and Fuzzy Systems for Chaotic Financial Markets*. New York: Wiley.

Eddelbüttel, D. (1996a). “A Genetic Algorithm for Passive Management: Creating Index Funds with Fewer Stocks,”

<http://rosebud.sps.queensu.ca/~edd/papers.html> 26 December.

Eddelbüttel, D. (1996b). “A Hybrid Genetic Algorithm for Passive Management,” <http://rosebud.sps.queensu.ca/~edd/papers.html> 26 December.

Feldman, K. and P. Treleaven (1994). “Intelligent Systems in Finance,” *Applied Mathematical Finance*, 1(2), December, 195–207.

Fogel, D. B. (1995). *Evolutionary Computation: Toward a New Philosophy of Machine Intelligence*. New York: IEEE Press.

Goldberg, D. E. (1989). *Genetic Algorithms in Search, Optimization, and Machine Learning*, Reading. Massachusetts: Addison-Wesley.

Goldberg, D. E. (1994). “Genetic and Evolutionary Algorithms Come of Age,” *Communications of the ACM*, 37(3), March, 113–119.

Goldberg, D. E. and K. Deb (1991). “A Comparative Analysis of Selection Schemes Used in Genetic Algorithms,” in Rawlins (ed.), *Foundations of Genetic Algorithms*, 69–93.

Goldberg, D. E. and R. Lingle Jr. (1985). “Alleles, Loci, and the Traveling Salesman Problem,” in Grefenstette (ed.), *Proceedings of an International Conference on Genetic Algorithms and their Applications*, 154–159.

Grefenstette, J. J. (ed.), (1985). *Proceedings of an International Conference on Genetic Algorithms and their Applications*. Hillsdale: Erlbaum.

Grefenstette, J. J. (ed.), (1987). *Genetic Algorithms and their Applications: Proceedings of the Second International Conference on Genetic Algorithms*.

Hillsdale: Lawrence Erlbaum.

Grefenstette, J. J., R. Gopal, B. Rosmaita, and D. V. Gucht (1985). “Genetic Algorithms for the Traveling Salesman Problem,” in Grefenstette (ed.), *Proceedings of an International Conference on Genetic Algorithms and their Applications*, 160–168.

Hetketter, J. and D. Beasley (1996). “Q1: What Are Evolutionary Algorithms (EAs)?” <http://www.cis.ohio-state.edu/hypertext/faq/usenet/ai-faq/genetic/part2/faq-doc-l.html>

Holland, J. H. (1992a). “Genetic Algorithms,” *Scientific American*, July, 44–50.

Holland, J. H. (1992b). *Adaptation in Natural and Artificial Systems*, 2nd ed. Cambridge: MIT Press.

Hughes, M. (1990). “Improving Products and Processes—Nature’s Way,” *Industrial Management & Data Systems*, 6, 22–25.

Kennedy, S. (1996). “Introduction to Genetic Algorithms,” <http://www.axcelis.com:80/articles.html>

Kingdon, J. and K. Feldman (1995). “Genetic Algorithms and Applications to Finance,” *Applied Mathematical Finance*, 2(2), 89–116.

Koza, J. R. (1992). “The Genetic Programming Paradigm: Genetically Breeding Populations of Computer Programs to Solve Problems,” in Soucek and IRIS Group, *Dynamic, Genetic, and Chaotic Programming: The Sixth Generation*, 203–321.

Koza, J. R. (1993). *Genetic Programming*. Cambridge: MIT Press.

Leinweber, D. J. and R. D. Arnott (1995). “Quantitative and Computational Innovation in Investment Management,” *The Journal of Portfolio Management*, 21(2), Winter, 8–15.

Michalewicz, Z. (1994). *Genetic Algorithms + Data Structures = Evolution Programs*, 2nd ed. Berlin, Heidelberg, New York: Springer-Verlag.

Mitchell, M. (1996). *An Introduction to Genetic Algorithms*. Cambridge: MIT Press.

O’Leary, D. E. and P. R. Watkins (eds.), (1992). *Expert Systems in Finance*. Amsterdam and New York: North-Holland.

Pereira, R. (1996). “Selecting Parameters for Technical Trading Rules Using Genetic Algorithms,” *Journal of Applied Finance and Investment*, 1(3), July/August, 27–34.

Rawlins, G. J. E. (ed.), (1991). *Foundations of Genetic Algorithms*. San Mateo: Morgan Kaufmann.

Soucek, B. and IRIS Group (1992). *Dynamic, Genetic, and Chaotic Programming: The Sixth Generation*. New York: John Wiley.

Syswerda, G. (1991). “Schedule Optimization Using Genetic Algorithms,” in Davis (ed.), *Handbook of Genetic Algorithms*, 332–349.

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