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Neural Networks and the Financial Markets

Predicting, Combining and Portfolio Optimisation



Springer

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Preface

This is a book about the methods developed by our research team, over a period of 10 years, for predicting financial market returns.

The work began in late 1991, at a time when one of us (Jimmy Shadbolt) had just completed a rewrite of the software used at Econostat by the economics team for medium-term trend prediction of economic indicators. Looking for a new project, it was suggested that we look at non-linear modelling of financial markets, and that a good place to start might be with neural networks.

One small caveat should be added before we start: we use the terms “prediction” and “prediction model” throughout the book, although, with only such a small amount of information being extracted about future performance, can we really claim to be building predictors at all? Some might say that the future of markets, especially one month ahead, is too dim to perceive. We think we can claim to “predict” for two reasons. Firstly we do indeed predict a few per cent of future values of certain assets in terms of past values of certain indicators, as shown by our track record. Secondly, we use standard and in-house prediction methods that are purely quantitative. We allow no subjective view to alter what the models tell us. Thus we are doing prediction, even if the problem is very hard. So while we could throughout the book talk about “getting a better view of the future” or some such euphemism, we would not be correctly describing what it is we are actually doing. We are indeed getting a better view of the future, by using prediction methods.

The initial results looked very promising, and we soon had a small team working on one-month-ahead bond prediction. Late in 1992 we were given funds to manage on the basis of those predictions. Over the nine years since then we have continuously managed funds and consistently outperformed our benchmark (the Salomon Index). The team came to be known as the *NewQuant* Team, and the product the *NewQuant* Product. References are made throughout the book to both as *NewQuant*.

The contributors to this book have all contributed directly to our work, either as researchers in our team or as consultants on specific aspects.

We would like to thank them heartily for their efforts.

Others who have contributed to our work (but not the book) in more or less chronological order are Paul Refenes, Magali Azema-Barak and Ugur Bilge (who got us up to date with neural networks), John Coyne (who worked with genetic algorithms for input selection and developed our

first network integration models), Drago Indjic (who developed, amongst other things, a method that turned out to be the same as Leo Breiman's Bagging), Dario Romare (linear modelling and wavelets), Pano Vergis (PCA, mutual information) and David Chippington (our software backup and system admin). On the way, Brian Ripley kicked our butts and forced some very serious analysis of what we were doing.

Some research directions have been examined and abandoned; some of those will probably be revisited when we have solutions to the problems encountered. Some have taken up to a year to deliver the goods and are part of our toolkit today. In all over 50 person years have gone into our research.

The problems encountered along the way are those due to our living on the edge of randomness. Unlike in most other disciplines, the predictability of our data is marginal – the error bounds are almost as wide as the data variance. We cannot make claims of models fitting data with 90% confidence levels; in fact, we hope only to be consistently a few per cent better than random. The ultimate test of whether our models have value comes only from using them to allocate funds in a portfolio, and here we can make claims to success.

The *NewQuant* process must be considered as a whole, from the economics used for initial input selection, through the quantitative data selection, prediction modelling and model combining, to the portfolio optimisation. No individual model is of use on its own: it is only through the whole process that we can derive benefit.

We would like to close by thanking Charles Diamond, the MD of Econostat, for continued support, allowing the work reported here to be performed.

*Jimmy Shadbolt
John G. Taylor*

Contents

List of Contributors	xiii
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Part I Introduction to Prediction in the Financial Markets

1 Introduction to the Financial Markets	3
1.1 The Financial Markets	3
1.2 Economics and the Markets	5
1.3 Financial Markets and Economic Data	6
1.4 What Are We Predicting?	7
1.5 The Overall Process	8
2 Univariate and Multivariate Time Series Predictions	11
2.1 Philosophical Assumptions	11
2.2 Data Requirements	16
2.3 Summary	22
3 Evidence of Predictability in Financial Markets	23
3.1 Overview	23
3.2 Review of Theoretical Arguments	24
3.3 Review of Empirical Research	26
3.4 Predictability Tests	29
3.5 Beyond Tests for Market Efficiency	32
3.6 Summary	32
4 Bond Pricing and the Yield Curve	35
4.1 The Time Value of Money and Discount Factors	35
4.2 Pricing Bonds	36
4.3 Bond Yield and the Yield Curve	37
4.4 Duration and Convexity	38
4.5 Summary	39
5 Data Selection	41
5.1 Introduction	41
5.2 The General Economic Model	42
5.3 Proxies	42
5.4 Principal Components	43

5.5	Summary	45
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Part II Theory of Prediction Modelling

6	General Form of Models of Financial Markets	49
6.1	Introduction	49
6.2	Cost Functions	49
6.3	Parameterisation	51
6.4	Econometric Models	52
6.5	Summary	53
7	Overfitting, Generalisation and Regularisation	55
7.1	Overfitting and Generalisation	55
7.2	Early Stopping	56
7.3	Information Criteria	57
7.4	Regularisation	57
7.5	Weight Decay	58
7.6	Forgetting	58
7.7	Summary	59
8	The Bootstrap, Bagging and Ensembles	61
8.1	Introduction	61
8.2	The Bias–Variance Trade-Off	61
8.3	The Bootstrap	62
8.4	Bagging	63
8.5	Bootstrap with Noise	65
8.6	Decorrelated Models	66
8.7	Ensembles in Financial Market Prediction	67
9	Linear Models	69
9.1	Introduction	69
9.2	Review of Linear Forecasting Methods	70
9.3	Moving Average/Smoothing Methods	70
9.4	ARMA, ARIMA and Time Series Regression Models	72
9.5	Cointegration and Error Correction Models	73
9.6	Ridge Regression	74
9.7	State Space Models	75
9.8	Summary	76
10	Input Selection	77
10.1	Introduction	77
10.2	Input Selection	77
10.3	Mutual Information	81
10.4	Summary	83

Part III Theory of Specific Prediction Models

11	Neural Networks	87
11.1	What Are Neural Networks?	87
11.2	The Living Neuron	89
11.3	The Artificial or Formal Neuron	89
11.4	Neural Network Architectures	90
11.5	Neural Network Training Rules	92
11.6	Further Comments on Neural Networks	93
12	Learning Trading Strategies for Imperfect Markets	95
12.1	Introduction	95
12.2	Trading Predictability	96
12.3	Modelling Trading Strategies	98
12.4	Experimental Design and Simulation Experiments	101
12.5	Summary	108
13	Dynamical Systems Perspective and Embedding	109
13.1	Introduction	109
13.2	Practical Problems	112
13.3	Characterising and Measuring Complexity	113
13.4	SVD Smoothing	114
13.5	Summary	115
14	Vector Machines	117
14.1	Introduction	117
14.2	Support Vector Machines	117
14.3	Relevance Vector Machines	118
14.4	Optimising the Hyperparameters for Regression	120
14.5	Optimising the Hyperparameters for Classification	120
14.6	Summary	121
15	Bayesian Methods and Evidence	123
15.1	Bayesian Methods	123
15.2	A Bayesian View of Probability	123
15.3	Hypothesis Testing	125
15.4	The Bayesian Evidence Ratio	127
15.5	Conclusions	130

Part IV Prediction Model Applications

16	Yield Curve Modelling	133
16.1	Yield Curve Modelling	133
16.2	Yield Curve Data	133
16.3	Yield Curve Parameterisation	135
16.4	Predicting the Yield Curve	140
16.5	Conclusion	142

17	Predicting Bonds Using the Linear Relevance Vector Machine	145
17.1	Introduction	145
17.2	The RVM as a Predictor	146
17.3	Input Variable Selection	148
17.4	Summary and Conclusions	154
18	Artificial Neural Networks	157
18.1	Introduction	157
18.2	Artificial Neural Networks	157
18.3	Models	163
18.4	Summary	165
19	Adaptive Lag Networks	167
19.1	The Problem	167
19.2	Adaptive Lag Networks	167
19.3	Training the Adaptive Lag Network	169
19.4	Test Results	170
19.5	Modelling	171
19.6	Summary and Conclusions	174
20	Network Integration	175
20.1	Making Predictions with Network Ensembles	175
20.2	The Network Integrator	177
20.3	The Random Vector Functional Link (RVFL)	178
20.4	Summary	179
21	Cointegration	181
21.1	Introduction	181
21.2	Construction of Statistical Mispricings	183
21.3	Conditional Statistical Arbitrage Strategies	184
21.4	Application of Cointegration-Based Methodology to FTSE 100 Stocks	185
21.5	Empirical Results of Conditional Statistical Arbitrage Models	185
21.6	Summary	191
22	Joint Optimisation in Statistical Arbitrage Trading	193
22.1	Introduction	193
22.2	Statistical Mispricing	194
22.3	Controlling the Properties of the Forecasting Model	195
22.4	Modelling the Trading Strategy	196
22.5	Joint Optimisation	197
22.6	Empirical Experiments	197
22.7	Summary	201

23	Univariate Modelling	203
23.1	Introduction	203
23.2	Nearest Neighbours	203
23.3	The Group Method of Data Handling (GMDH)	205
23.4	The Support Vector Machine (SVM) Predictor Model	207
23.5	The Relevance Vector Machine (RVM)	209
24	Combining Models	211
24.1	Introduction	211
24.2	Linear Combiners	212
24.3	A Temperature-Dependent SOFTMAX Combiner	212
24.4	The Combiner Algorithm	213
24.5	Results	216
24.6	Conclusions	217

Part V Optimising and Beyond

25	Portfolio Optimisation	221
25.1	Portfolio Optimisation	221
25.2	Notation and Terminology	222
25.3	Scope of Portfolio Optimisation Methods	224
25.4	Efficient Set Mathematics and the Efficient Frontier	225
25.5	Construction of Optimised Portfolios Using Quadratic Programming	229
25.6	Issues in Practical Portfolio Construction	230
25.7	What Portfolio Selection Requires	233
25.8	The Process of Building an Optimised Portfolio	234
25.9	Example of an Asset Allocation Portfolio	236
25.10	Alternative Measures of Risk and Methods of Optimisation	241
25.11	Questions about Portfolio Optimisation and Discussion	245
26	Multi-Agent Modelling	247
26.1	Introduction	247
26.2	The Minority Game	248
26.3	A General Multi-agent Approach to the Financial Markets	249
26.4	Conclusions	251
27	Financial Prediction Modelling: Summary and Future Avenues	253
27.1	Summary of the Results	253
27.2	Underlying Aspects of the Approach	255
27.3	Future Avenues	257

Further Reading 259

References 261

Index 269

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