



**UvA-DARE (Digital Academic Repository)**

**Bounded rationality and heterogeneous expectations in macroeconomics**

Massaro, D.

[Link to publication](#)

*Citation for published version (APA):*

Massaro, D. (2012). *Bounded rationality and heterogeneous expectations in macroeconomics*. Amsterdam: Thela Thesis.

**General rights**

It is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), other than for strictly personal, individual use, unless the work is under an open content license (like Creative Commons).

**Disclaimer/Complaints regulations**

If you believe that digital publication of certain material infringes any of your rights or (privacy) interests, please let the Library know, stating your reasons. In case of a legitimate complaint, the Library will make the material inaccessible and/or remove it from the website. Please Ask the Library: <https://uba.uva.nl/en/contact>, or a letter to: Library of the University of Amsterdam, Secretariat, Singel 425, 1012 WP Amsterdam, The Netherlands. You will be contacted as soon as possible.

# Contents

<b>1</b>	<b>Introduction</b>	<b>1</b>
<b>2</b>	<b>A Simple Model of Inflation Dynamics under Heterogeneous Expectations</b>	<b>9</b>
2.1	Introduction . . . . .	9
2.2	Interest Rate Rules and Cumulative Process . . . . .	13
2.3	Interest Rate Feedback Rules with Fundamentalists and Biased Beliefs . . . . .	16
2.3.1	Evolutionary Dynamics with Few Constant Belief Types . . . . .	18
2.3.2	Many Belief Types . . . . .	26
2.4	Stochastic Simulations . . . . .	30
2.5	Concluding Remarks . . . . .	33
	Appendix 2.A Model with a finite number of types . . . . .	36
	Appendix 2.B Dynamics of the model with 3 types . . . . .	38
<b>3</b>	<b>A Micro-Foundation of Heterogenous Expectations in New Keynesian Models</b>	<b>49</b>
3.1	Introduction . . . . .	49
3.2	The model with a representative (rational) agent . . . . .	52
3.2.1	Households . . . . .	52
3.2.2	Firms . . . . .	54
3.2.3	Government . . . . .	55
3.2.4	Aggregate equations . . . . .	55
3.3	The model with heterogeneous expectations . . . . .	56

3.3.1	Households . . . . .	56
3.3.2	Firms . . . . .	58
3.3.3	Aggregation of individual decision rules . . . . .	60
3.4	Monetary policy with heterogeneous expectations . . . . .	64
3.4.1	Specification of expectations and evolutionary dynamics . . . . .	65
3.4.2	Numerical analysis of determinacy . . . . .	73
3.5	Conclusions . . . . .	78
Appendix 3.A	Steady state representative rational agent model . . . . .	80
Appendix 3.B	Derivation of consumption rule (3.17) . . . . .	81
Appendix 3.C	Derivation of pricing rule (3.22) . . . . .	83
Appendix 3.D	Derivation of systems (3.43) and (3.46) . . . . .	85
Appendix 3.E	Computation of bifurcation surfaces . . . . .	87
<b>4</b>	<b>Behavioral Heterogeneity in U.S. Inflation Data</b>	<b>89</b>
4.1	Introduction . . . . .	89
4.2	The model . . . . .	95
4.2.1	The NKPC with heterogeneous expectations . . . . .	95
4.2.2	Evolutionary selection of expectations . . . . .	97
4.2.3	A simple two-type example . . . . .	98
4.3	Estimation results . . . . .	101
4.3.1	Data description . . . . .	101
4.3.2	The fit of the model . . . . .	101
4.3.3	Specification tests and out-of-sample forecasting . . . . .	106
4.4	Robustness analysis . . . . .	108
4.4.1	Robustness to the specification of the VAR model . . . . .	109
4.4.2	Robustness to alternative measures of marginal costs . . . . .	110
4.5	Conclusions . . . . .	111
Appendix 4.A	NKPC with heterogeneous expectations . . . . .	114

Appendix 4.B	Data sources . . . . .	115
Appendix 4.C	Econometric procedure . . . . .	116
<b>5</b>	<b>Experiments on Individual Expectations and Aggregate Macro Behavior</b>	<b>119</b>
5.1	Introduction . . . . .	119
5.2	The learning to forecast experiment . . . . .	121
5.2.1	The New Keynesian model . . . . .	122
5.2.2	Experimental design . . . . .	126
5.2.3	Experimental results . . . . .	128
5.3	Individual forecasting rules . . . . .	134
5.4	A heterogeneous expectations model . . . . .	141
5.4.1	50-periods ahead simulations . . . . .	142
5.4.2	One-period ahead simulations . . . . .	145
5.5	Conclusions . . . . .	154
Appendix 5.A	(Translation of Dutch) Instructions for participants . . . . .	157
Appendix 5.B	List of tables . . . . .	169
<b>6</b>	<b>Summary</b>	<b>183</b>
	<b>Bibliography</b>	<b>199</b>
	<b>Samenvatting (Summary in Dutch)</b>	<b>201</b>