

# Contents

<b>1</b>	<b>Introduction</b>	<b>1</b>
<b>2</b>	<b>The Model</b>	<b>6</b>
2.1	The stylized New Keynesian DSGE model	6
2.2	The Performance-based Boltzmann-Gibbs machine : Adaptive belief system	9
2.3	The social network structure	13
2.3.1	Generating algorithms of different social network structures	13
2.3.2	The statistics of social network structure	21
2.4	The Ising model	23
2.5	The network-based ant model	24
<b>3</b>	<b>Experimental Designs</b>	<b>27</b>
<b>4</b>	<b>The Underlying Social Network Structure of the Performance-based Boltzmann-Gibbs model</b>	<b>31</b>
4.1	Motivation	33
4.2	Experimental results of the Ising model	37
4.3	Experimental results of the network-based ant model	44
4.4	Summary	48
<b>5</b>	<b>Aggregation Problem in the New Keynesian DSGE Model</b>	<b>50</b>
5.1	Motivation	51
5.2	The Estimation bias of the New Keynesian DSGE model	56
5.2.1	Correlation coefficient analysis	62
5.2.2	Threshold regression analysis	64
5.3	Summary	67
<b>6</b>	<b>Conclusion and Future Research</b>	<b>69</b>
	<b>Reference</b>	<b>73</b>
	<b>Appendixes</b>	<b>79</b>

# List of Tables

2.1 Basic statistics of different social networks	22
3.1 Parameters setting of the stylized New Keynesian DSGE model	27
3.2 Parameter setting of the performance-based Boltzmann-Gibbs model and Ising model	28
3.3 Parameters setting of network-based ant model	29
3.4 Parameters setting of different network structure	29
3.5 Other parameters	30
4.1 The p-value of Kolmogorov-Smirnov statistic	39
4.2 The results of relative entropy	41
4.3 The shape of the optimistic ratios' probability density function with different values of the intensity of choice	42
4.4 Number the of best candidate for the underlying network structure of the performance-based Boltzmann-Gibbs machine	44
4.5 Kolmogorov-Smirnov test results (N=100)	46
4.6 Kolmogorov-Smirnov test results (N=1000)	46
4.7 Relative entropy	47
5.1 Estimation bias of the New Keynesian DSGE model	59
5.2 Correlation coefficient	64
5.3 Results of threshold regression	66

# List of Figures

2.1 Fully-connected network	14
2.2 Circle network	15
2.3 Regular network	15
2.4 Small world network with rewiring rate 0.1	17
2.5 Small world network with rewiring rate 0.3	17
2.6 Small world network with rewiring rate 0.5	18
2.7 Small world network with rewiring rate 0.7	18
2.8 Small world network with rewiring rate 0.9	19
2.9 Random network	19
2.10 Scale free network	20



# List of Appendixes

A.1 Probability density function of optimistic ratios with intensity of choice ( $\lambda$ ) = 100	79
A.2 Probability density function of optimistic ratios with intensity of choice ( $\lambda$ ) = 500	83
A.3 Probability density function of optimistic ratios with intensity of choice ( $\lambda$ ) = 1000	87
A.4 Probability density function of optimistic ratios with intensity of choice ( $\lambda$ ) = 5000	91
A.5 Probability density function of optimistic ratios with intensity of choice ( $\lambda$ ) = 10000	95
A.6 Probability density function of optimistic ratios with intensity of choice ( $\lambda$ ) = 50000	99
A.7 Probability density function of optimistic ratio of network based ant model (N=100)	103
A.8 Probability density function of optimistic ratio of network based ant model (N=1000)	106