

POTSDAM INSTITUTE FOR CLIMATE IMPACT RESEARCH
UNIVERSITY OF POTSDAM

Introductory phase report

Optimal adjustment of the global trade system
to local network disruption

Name:	Sebastian Klipp
Matriculation number:	779142
Period:	1.5.15 - 31.9.15
E-Mail:	sklipp@uni-potsdam.de
Supervisor:	Leonie Wenz
Examiner	Prof. Dr. Anders Levermann

Contents

Chapter 1	Introduction	3
1.1	Introduction	3
1.2	Motivation, connection to real world, extreme events, climate change, examples	3
Chapter 2	Theory	4
2.1	MRIOTs	5
2.1.1	Economic background	5
2.1.2	MRIOT in general	5
2.1.3	EORA MRIOT	5
2.2	Economic background	5
2.2.1	Begriffe	5
2.2.2	Supply Chains	5
2.3	Linear Optimisation - Simplex method	5
2.3.1	Mathematical derivation	5
2.3.2	Simplex application scheme	5
2.3.3	absolute value target function	5
2.4	Graph theory	5
2.4.1	disruption propagation	5
2.4.2	First, Second, Third order effects / direct indirect	5
2.4.3	Forward, backward effect	5
2.5	complex systems, linear responses, phase transition	5
2.6	climate change and extreme events	5
Chapter 3	Model setup	6
3.1	problem specific linear optimisation problem	6
3.1.1	Target function	6
3.1.2	Final demand constraint	6
3.1.3	Supply scaling constraint	6

3.1.4	Production output balance constraint	6
3.1.5	Linear problem 1 (LP1): Maximal adaptation	6
3.1.6	Linear problem 2 (LP2): Reduced adaptation	6
3.1.7	Treatment of EORA to fit my model	6
3.1.8	Application on testworlds - behaviour knowledge	6
3.2	Analysis of the EORA network	6
3.3	Aggregated network	6
Chapter 4	Results	7
4.1	statistics	7
4.1.1	F(ir)	7
4.1.2	comp_ir(ir)	7
4.2	comparison LPS/LPG	7
4.3	absorption potential	7
4.4	linear response	7
4.5	phase transition	7
4.6	case studies incl. forward/backward effects	7
4.6.1	Japan machinery drops out	7
4.6.2	other forward effect example	7
4.6.3	identify supply chains	7
4.7	??? time evolution ???	7
Chapter 5	Final	8
5.1	discussion	8
5.2	Ausblick	8
5.3	Appendix	8

Chapter 1

Introduction

1.1 Introduction

1.2 Motivation, connection to real world, extreme events, climate change, examples

adsffdadf

Chapter 2

Theory

adfdasfa

2.1 MRIOTs

2.1.1 Economic background

2.1.2 MRIOT in general

2.1.3 EORA MRIOT

2.2 Economic background

2.2.1 Begriffe

2.2.2 Supply Chains

2.3 Linear Optimisation - Simplex method

2.3.1 Mathematical derivation

2.3.2 Simplex application scheme

2.3.3 absolute value target function

2.4 Graph theory

2.4.1 disruption propagation

2.4.2 First, Second, Third order effects / direct indirect

2.4.3 Forward, backward effect

2.5 complex systems, linear responses, phase transition

2.6 climate change and extreme events

Chapter 3

Model setup

3.1 problem specific linear optimisation problem

3.1.1 Target function

3.1.2 Final demand constraint

3.1.3 Supply scaling constraint

3.1.4 Production output balance constraint

3.1.5 Linear problem 1 (LP1): Maximal adaptation

3.1.6 Linear problem 2 (LP2): Reduced adaptation

3.1.7 Treatment of EORA to fit my model

3.1.8 Application on testworlds - behaviour knowledge

3.2 Analysis of the EORA network

3.3 Aggregated network

Chapter 4

Results

4.1 statistics

4.1.1 $F(ir)$

4.1.2 $comp_ir(ir)$

4.2 comparison LPS/LPG

4.3 absorption potential

4.4 linear response

4.5 phase transition

4.6 case studies incl. forward/backward effects

4.6.1 Japan machinery drops out

4.6.2 other forward effect example

4.6.3 identify supply chains

4.7 ??? time evolution ???

Chapter 5

Final

5.1 discussion

5.2 Ausblick

5.3 Appendix

Bibliography