

CRAFTY EU28

C001-G9-C3-I1 B1

Sascha Holzhauer

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1 Configuration

- IPCC Scenario B1
- Reduced main production of C farmers by .4 (cereal) and .15 (meat)
- Competition: set parameter b for cereal and meat to 1.0
- Giving up probability: 0.2 (if agents are meant to give up they do so only with probability of 0.2).

1.1 Technical Innovation Adoption

- Trial threshold noise: $sd = 0.2$
- Initial awareness probability: 0.05 (initial trial not spatially restricted)
- Adoption only triggered when social network changes
- New agents get aware of adopted neighbours

1.2 CRAFTY Model Framework

- See <http://crafty-abm.sourceforge.net/> for information about the CRAFTY model framework.
- The most relevant paper about the model framework is <http://www.sciencedirect.com/science/article/pii/S1364815214001583>.
- An ODD (Overview, Design concepts, Details) protocol is also available at <https://www.wiki.ed.ac.uk/display/CRAFTY/Home>.

1.3 Relevant Information

- Coordinates have been converted for simulation purposes, which is also reflected by spatial output data: in terms of ETRS 1989 LAEA, the original coordinates are shifted by (2698874, 1855465), i.e. the new origin (0,0) was originally at (-2698874,-1855465), divided by 1000, and rounded.
- Capital data are not public domain and cannot be provided.

1.4 Run Information

	26
Project	
Purpose	Luc4C inter model comparision
Version	C001-G9-C3-I1
Date (start)	
1st Run ID	7
Last Run ID	7
World	EU28
Regionalisation	26
Scenario	B1
Functionality	
Model Version	0.1.1
CRAFTY Version	0.1.18
MoRe Version	0.9.4
Machine	TC
Runtime	
Data folder	./data/C001/C001-G9-C3-I1
Start Tick	2010
End Tick	2040
Random Seed	0
Results summary	
Place of output	K:
Description	seeReport
Stage of Analysis	Report
Original output?	cpl. removed
Logged?	
Raster: AFTs	
Raster: Capital	
Raster: Productivity	
Raster: Adoption	
Aggregate AFT Composition	
Aggregate Service Supply	
Aggregated Takeover data	
CellTable: AFT	
CellTable: Service Supply	
CellTable: Competitiveness	
CellTable: ServiceProductivity	

Table 1: Model run information

1.5 Run Parameters

INFO [2016-06-03 10:32:02] Print run parameter table for run ID 7

	8	
run	7	
Scenario	B1	
Version	C001-G9-C3-I1	
World	EU28	
Regionalisation	26	
aftParamId	1	
RegionCsvFile	worlds/EU28/regionalisations/26.csv	
Agent_xml	/_C001-G9-C3-I1/agents/Agents_hetero.xml	
Competition_xml	/_C001-G9-C3-I1/competition/Competition_linear.xml	
Allocation_percentageCell	30	
Allocation_percentageTakeovers	0.25	
CapitalLevelTechnicalInnovationCsvFile	worlds/EU28/B1/B1_CapitalFactorsBaseTechnical.csv	
capitalFactorsCSV	/worlds/EU28/B1/B1_CapitalFactorsBase-T.csv	
Institutions_xml	institutions/Institutions_CapitalDynamics.xml	/institu-
	tions/Institution_VariableCapital.xml	
SocialNetwork_xml	SocialNetwork_Restore.xml	
SocialNetworkInit_xml	SocialNetwork_HDFF.xml	

Table 2: Model run parameters

2 Input Data

2.1 Overview

Type	Data
Services	Meat, Cereal, Conservation, Timber
Capitals	Cprod, Fprod, Infra, Grass, Nat, Econ
Capital Data	C001/_C001-G9-C3-I1/../../worlds/EU28/regionalisations/26/capitals/26_A1_AT_Capitals.csv
Capital Data	C001/_C001-G9-C3-I1/../../worlds/EU28/regionalisations/26/capitals/26_A1_BE_Capitals.csv
Capital Data	C001/_C001-G9-C3-I1/../../worlds/EU28/regionalisations/26/capitals/26_A1_BG_Capitals.csv
Capital Data	C001/_C001-G9-C3-I1/../../worlds/EU28/regionalisations/26/capitals/26_A1_CZ_Capitals.csv
Capital Data	C001/_C001-G9-C3-I1/../../worlds/EU28/regionalisations/26/capitals/26_A1_DE_Capitals.csv
Capital Data	C001/_C001-G9-C3-I1/../../worlds/EU28/regionalisations/26/capitals/26_A1_DK_Capitals.csv
Capital Data	C001/_C001-G9-C3-I1/../../worlds/EU28/regionalisations/26/capitals/26_A1_EE_Capitals.csv
Capital Data	C001/_C001-G9-C3-I1/../../worlds/EU28/regionalisations/26/capitals/26_A1_EL_Capitals.csv
Capital Data	C001/_C001-G9-C3-I1/../../worlds/EU28/regionalisations/26/capitals/26_A1_ES_Capitals.csv
Capital Data	C001/_C001-G9-C3-I1/../../worlds/EU28/regionalisations/26/capitals/26_A1_FI_Capitals.csv
Capital Data	C001/_C001-G9-C3-I1/../../worlds/EU28/regionalisations/26/capitals/26_A1_FR_Capitals.csv
Capital Data	C001/_C001-G9-C3-I1/../../worlds/EU28/regionalisations/26/capitals/26_A1_HU_Capitals.csv
Capital Data	C001/_C001-G9-C3-I1/../../worlds/EU28/regionalisations/26/capitals/26_A1_IE_Capitals.csv
Capital Data	C001/_C001-G9-C3-I1/../../worlds/EU28/regionalisations/26/capitals/26_A1_IT_Capitals.csv
Capital Data	C001/_C001-G9-C3-I1/../../worlds/EU28/regionalisations/26/capitals/26_A1_LT_Capitals.csv
Capital Data	C001/_C001-G9-C3-I1/../../worlds/EU28/regionalisations/26/capitals/26_A1_LU_Capitals.csv
Capital Data	C001/_C001-G9-C3-I1/../../worlds/EU28/regionalisations/26/capitals/26_A1_LV_Capitals.csv
Capital Data	C001/_C001-G9-C3-I1/../../worlds/EU28/regionalisations/26/capitals/26_A1_MT_Capitals.csv
Capital Data	C001/_C001-G9-C3-I1/../../worlds/EU28/regionalisations/26/capitals/26_A1_NL_Capitals.csv
Capital Data	C001/_C001-G9-C3-I1/../../worlds/EU28/regionalisations/26/capitals/26_A1_PL_Capitals.csv
Capital Data	C001/_C001-G9-C3-I1/../../worlds/EU28/regionalisations/26/capitals/26_A1_PT_Capitals.csv
Capital Data	C001/_C001-G9-C3-I1/../../worlds/EU28/regionalisations/26/capitals/26_A1_RO_Capitals.csv
Capital Data	C001/_C001-G9-C3-I1/../../worlds/EU28/regionalisations/26/capitals/26_A1_SE_Capitals.csv
Capital Data	C001/_C001-G9-C3-I1/../../worlds/EU28/regionalisations/26/capitals/26_A1_SI_Capitals.csv
Capital Data	C001/_C001-G9-C3-I1/../../worlds/EU28/regionalisations/26/capitals/26_A1_SK_Capitals.csv
Capital Data	C001/_C001-G9-C3-I1/../../worlds/EU28/regionalisations/26/capitals/26_A1_UK_Capitals.csv
Capital changes	see 'Capital Changes'
Demand	see 'Service demand'
Benefit functions	see 'Benefit Functions'
Allocation model	see 'Run parameters'
Institutions	see table 'Run parameters'
AFT production	see 'Agent Production Parameters'
Social Network	see 'Run parameters'

Table 3: Model input files

2.2 Capital Changes

Year	Cprod	Fprod	Infra	Grass	Nat	Econ	Production
2010	1.00	1	1	1.00	1	1.02	1
2011	1.00	1	1	1.01	1	1.04	1
2012	1.00	1	1	1.01	1	1.07	1
2013	1.01	1	1	1.01	1	1.09	1
2014	1.01	1	1	1.01	1	1.11	1
2015	1.01	1	1	1.02	1	1.14	1
2016	1.01	1	1	1.02	1	1.16	1
2017	1.01	1	1	1.02	1	1.19	1
2018	1.01	1	1	1.02	1	1.22	1
2019	1.01	1	1	1.03	1	1.24	1
2020	1.02	1	1	1.03	1	1.27	1
2021	1.02	1	1	1.03	1	1.29	1
2022	1.02	1	1	1.04	1	1.32	1
2023	1.02	1	1	1.04	1	1.34	1
2024	1.02	1	1	1.04	1	1.37	1
2025	1.02	1	1	1.04	1	1.40	1
2026	1.02	1	1	1.05	1	1.42	1
2027	1.02	1	1	1.05	1	1.45	1
2028	1.03	1	1	1.05	1	1.48	1
2029	1.03	1	1	1.05	1	1.50	1
2030	1.03	1	1	1.06	1	1.53	1
2031	1.03	1	1	1.06	1	1.56	1
2032	1.03	1	1	1.06	1	1.59	1
2033	1.03	1	1	1.07	1	1.62	1
2034	1.03	1	1	1.07	1	1.65	1
2035	1.04	1	1	1.07	1	1.68	1
2036	1.04	1	1	1.07	1	1.71	1
2037	1.04	1	1	1.08	1	1.74	1
2038	1.04	1	1	1.08	1	1.77	1
2039	1.04	1	1	1.08	1	1.80	1
2040	1.04	1	1	1.08	1	1.83	1

Table 4: Factors of change for capitals

2.3 Agent Parameters

INFO [2016-06-03 10:32:03] Print agent parameter table for agent param ID 1

AFT	GI	GIDistMean	GIDistSD	GU	GUDistMean	GUDistSD	serviceLevelNoiseMax
C_Cereal	0.02	0.02	0.00	0.10	0.10	0.03	0.10
NC_Cereal	0.08	0.08	0.01	0.05	0.05	0.03	0.10
C_Livestock	0.02	0.02	0.00	0.10	0.10	0.03	0.10
NC_Livestock	0.08	0.08	0.01	0.00	0.00	0.03	0.10
Forester	1.00	1.00	0.20	0.05	0.05	0.03	0.10
Conservationist	10.00	10.00	0.00	0.05	0.05	0.03	0.10

Table 5: Agent Parameters

2.4 Agent Production Parameters

2.4.1 Productivities and Capital Sensitivities: C_Cereal

X	Cprod	Fprod	Infra	Grass	Nat	Econ	Production
Cereal	0.80	0.20	0.50	0.20	0.10	0.50	1.11
Meat	0.30	0.10	0.20	0.40	0.40	0.10	0.02
Timber	0.30	0.50	0.10	0.00	0.30	0.10	0.66
Recreation	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 6: Productivities and Capital Sensitivities for C_Cereal

2.4.2 Productivities and Capital Sensitivities: NC_Cereal

X	Cprod	Fprod	Infra	Grass	Nat	Econ	Production
Cereal	0.50	0.10	0.30	0.10	0.40	0.20	0.42
Meat	0.30	0.10	0.20	0.40	0.40	0.10	0.07
Timber	0.30	0.50	0.10	0.00	0.30	0.10	1.00
Recreation	0.00	0.00	0.00	0.00	1.00	0.00	0.29

Table 7: Productivities and Capital Sensitivities for NC_Cereal

2.4.3 Productivities and Capital Sensitivities: C_Livestock

X	Cprod	Fprod	Infra	Grass	Nat	Econ	Production
Cereal	0.50	0.10	0.30	0.10	0.40	0.20	0.12
Meat	0.60	0.20	0.40	0.50	0.10	0.40	0.48
Timber	0.30	0.50	0.10	0.00	0.30	0.10	0.66
Recreation	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 8: Productivities and Capital Sensitivities for C_Livestock

2.4.4 Productivities and Capital Sensitivities: NC_Livestock

X	Cprod	Fprod	Infra	Grass	Nat	Econ	Production
Cereal	0.50	0.10	0.30	0.10	0.40	0.20	0.19
Meat	0.30	0.10	0.20	0.40	0.40	0.10	0.18
Timber	0.30	0.50	0.10	0.00	0.30	0.10	1.00
Recreation	0.00	0.00	0.00	0.00	1.00	0.00	0.29

Table 9: Productivities and Capital Sensitivities for NC_Livestock

2.4.5 Productivities and Capital Sensitivities: Forester

X	Cprod	Fprod	Infra	Grass	Nat	Econ	Production
Cereal	0.50	0.10	0.30	0.10	0.40	0.20	0.00
Meat	0.30	0.10	0.20	0.40	0.40	0.10	0.00
Timber	0.30	0.50	0.10	0.00	0.30	0.10	4.66
Recreation	0.00	0.00	0.00	0.00	1.00	0.00	0.29

Table 10: Productivities and Capital Sensitivities for Forester

2.4.6 Productivities and Capital Sensitivities: Conservationist

X	Cprod	Fprod	Infra	Grass	Nat	Econ	Production
Cereal	0.00	0.00	0.00	0	0.00	0.00	0.00
Meat	0.00	0.00	0.00	0	0.00	0.00	0.00
Timber	0.30	0.50	0.10	0	0.30	0.10	1.33
Recreation	0.00	0.00	0.00	0	1.00	0.00	2.30

Table 11: Productivities and Capital Sensitivities for Conservationist

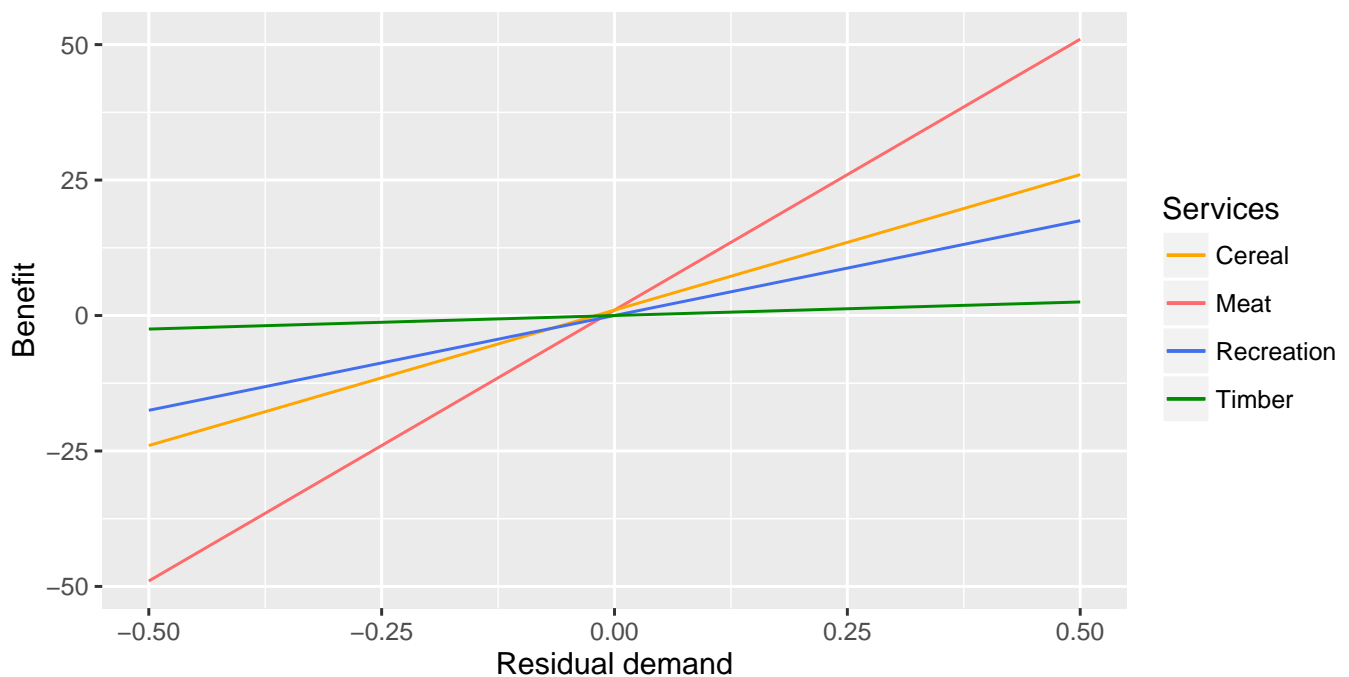
2.5 Service Demand

Tick	Demand.Meat	Demand.Cereal	Demand.Recreation	Demand.Timber
2010	90951.94	373143.33	11855.17	2416645.88
2011	90651.11	368547.33	11610.34	2432234.21
2012	90350.28	363951.33	11365.50	2447822.56
2013	90049.44	359355.32	11120.66	2463410.89
2014	89748.60	354759.32	10875.82	2478999.24
2015	89447.78	350163.32	10630.98	2494587.58
2016	89146.94	345567.32	10386.14	2510175.92
2017	88846.10	340971.32	10141.30	2525764.26
2018	88545.27	336375.32	9896.46	2541352.60
2019	88244.44	331779.31	9651.62	2556940.94
2020	87943.60	327183.31	9406.77	2572529.28
2021	85711.89	326147.34	9524.15	2576411.26
2022	83480.19	325111.37	9641.52	2580293.23
2023	81248.48	324075.40	9758.90	2584175.21
2024	79016.77	323039.43	9876.27	2588057.19
2025	76785.06	322003.45	9993.65	2591939.16
2026	74553.35	320967.48	10111.02	2595821.13
2027	72321.64	319931.51	10228.40	2599703.11
2028	70089.93	318895.54	10345.77	2603585.09
2029	67858.23	317859.57	10463.15	2607467.07
2030	65626.52	316823.59	10580.52	2611349.04
2031	64918.38	316487.61	10511.10	2611456.97
2032	64210.25	316151.62	10441.68	2611564.91
2033	63502.11	315815.64	10372.26	2611672.85
2034	62793.97	315479.65	10302.84	2611780.78
2035	62085.83	315143.66	10233.41	2611888.72
2036	61377.70	314807.67	10164.00	2611996.66
2037	60669.56	314471.69	10094.57	2612104.59
2038	59961.42	314135.70	10025.15	2612212.53
2039	59253.29	313799.71	9955.73	2612320.47
2040	58545.15	313463.72	9886.31	2612428.40

Table 12: Service demand

2.6 Benefit Functions

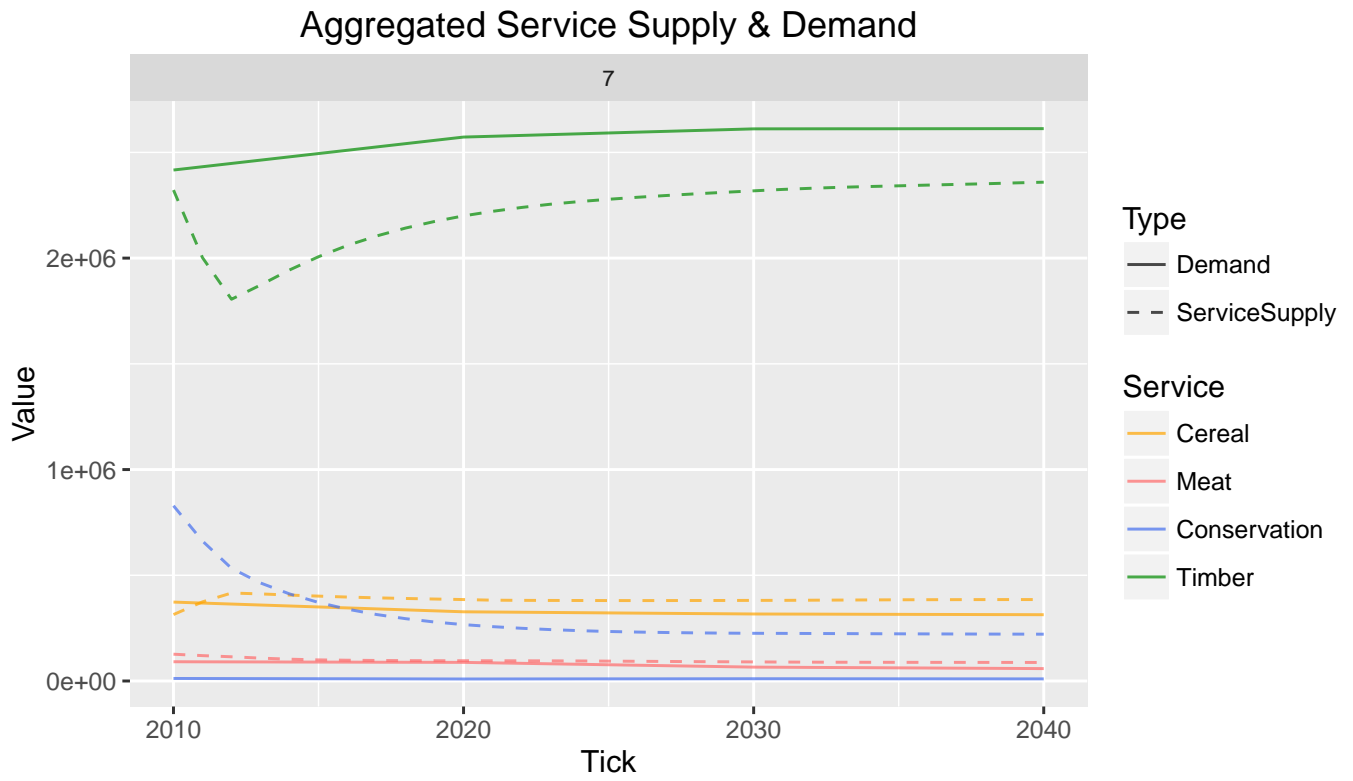
$\partial a_{i,j} / \partial a_i$



3 Results

3.1 Aggregated Data

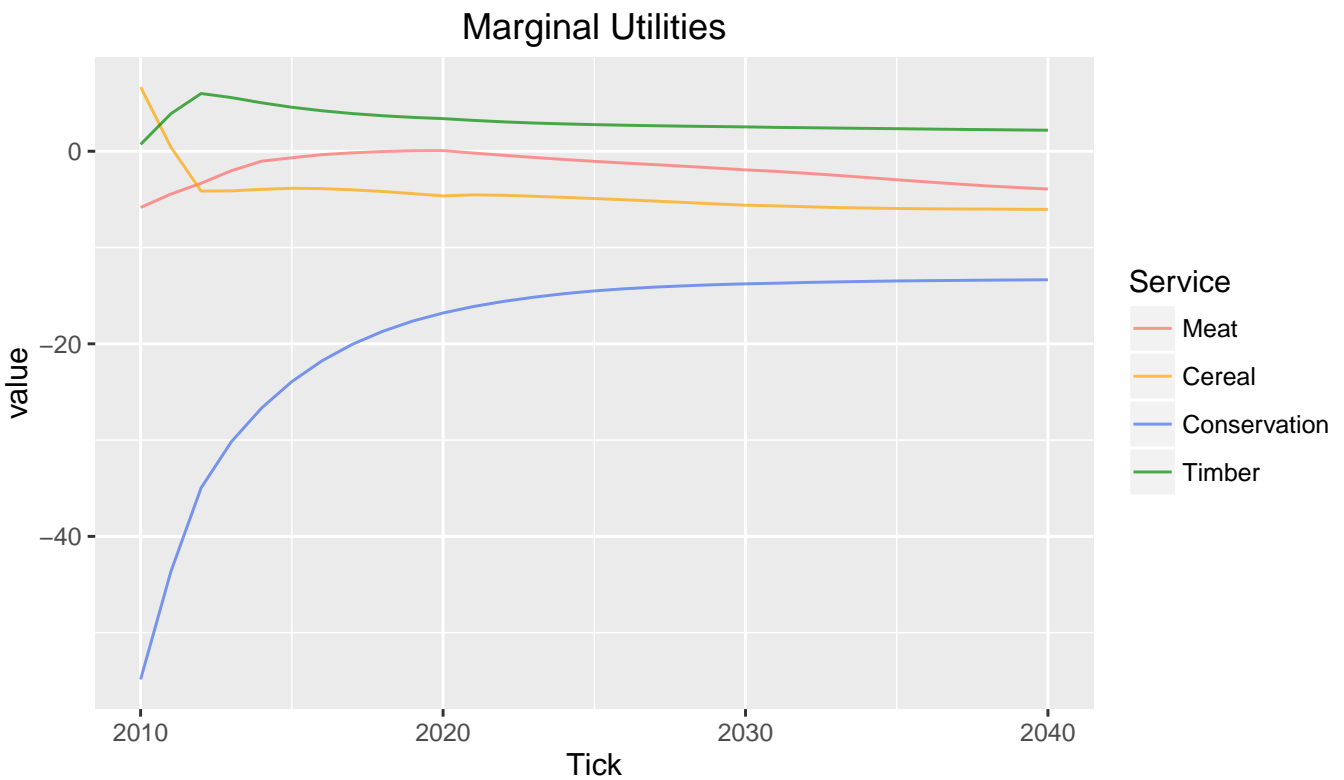
3.1.1 Demand and Supply



Tick	ServiceSupply.Meat	ServiceSupply.Cereal	ServiceSupply.Recreation	ServiceSupply.Timber
2010	126687.48	314076.73	828890.92	2321801.35
2011	119900.28	374207.98	661998.53	2002287.65
2012	114398.26	416038.22	532875.43	1805503.73
2013	108163.83	411883.94	463624.78	1872601.68
2014	103128.48	406345.65	411786.51	1943992.80
2015	99729.17	401396.87	371390.62	2006657.95
2016	98169.51	396884.22	339573.51	2060218.13
2017	97029.01	393237.73	314408.42	2104604.24
2018	96300.34	390238.99	294689.10	2142232.89
2019	95918.37	387593.25	278926.66	2173328.31
2020	95743.85	385085.51	266593.45	2199840.94
2021	95698.17	382205.30	256946.50	2221355.21
2022	95506.40	381278.60	249237.89	2239693.50
2023	95171.27	380898.18	243016.33	2254990.36
2024	94631.77	380661.48	238020.02	2267563.11
2025	93899.46	380405.88	234113.47	2278353.82
2026	93106.83	380334.08	231320.71	2287926.61
2027	92304.95	380404.36	229198.41	2296304.20
2028	91549.40	380618.96	227546.34	2304169.30
2029	90849.49	380845.44	226382.93	2311325.68
2030	90187.96	381229.14	225561.79	2318269.79
2031	89538.66	381320.90	225110.00	2324892.19
2032	89067.54	382088.13	224592.47	2330458.21
2033	88686.75	382825.44	224112.77	2335073.94
2034	88407.81	383445.39	223586.39	2338737.65
2035	88205.57	384038.54	223058.61	2341921.44
2036	88048.76	384460.53	222659.27	2345369.88
2037	87943.27	384726.39	222247.44	2348716.07
2038	87836.05	384963.00	221828.23	2351754.94
2039	87747.98	385167.56	221622.92	2355677.25
2040	87632.53	385103.54	221396.55	2359182.02

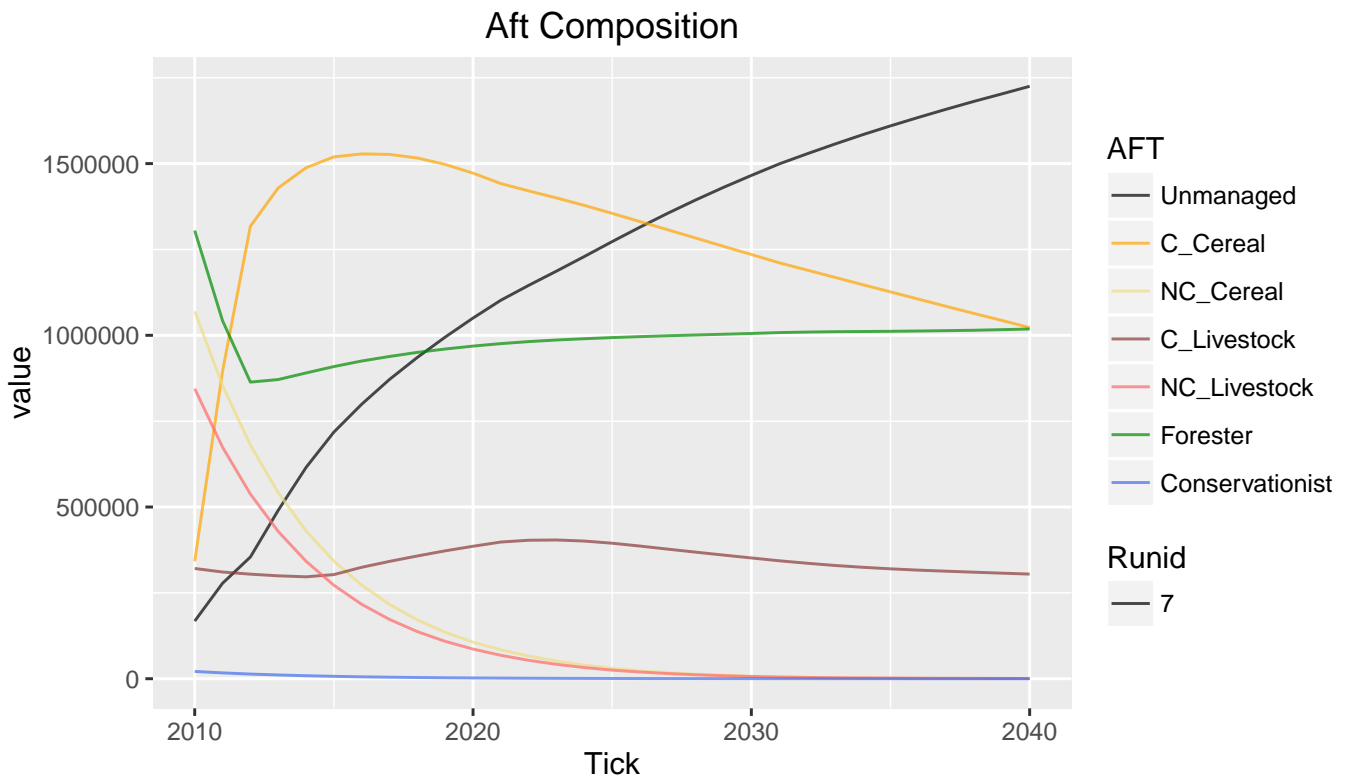
Table 13: Service supply

3.1.2 Marginal Utilities



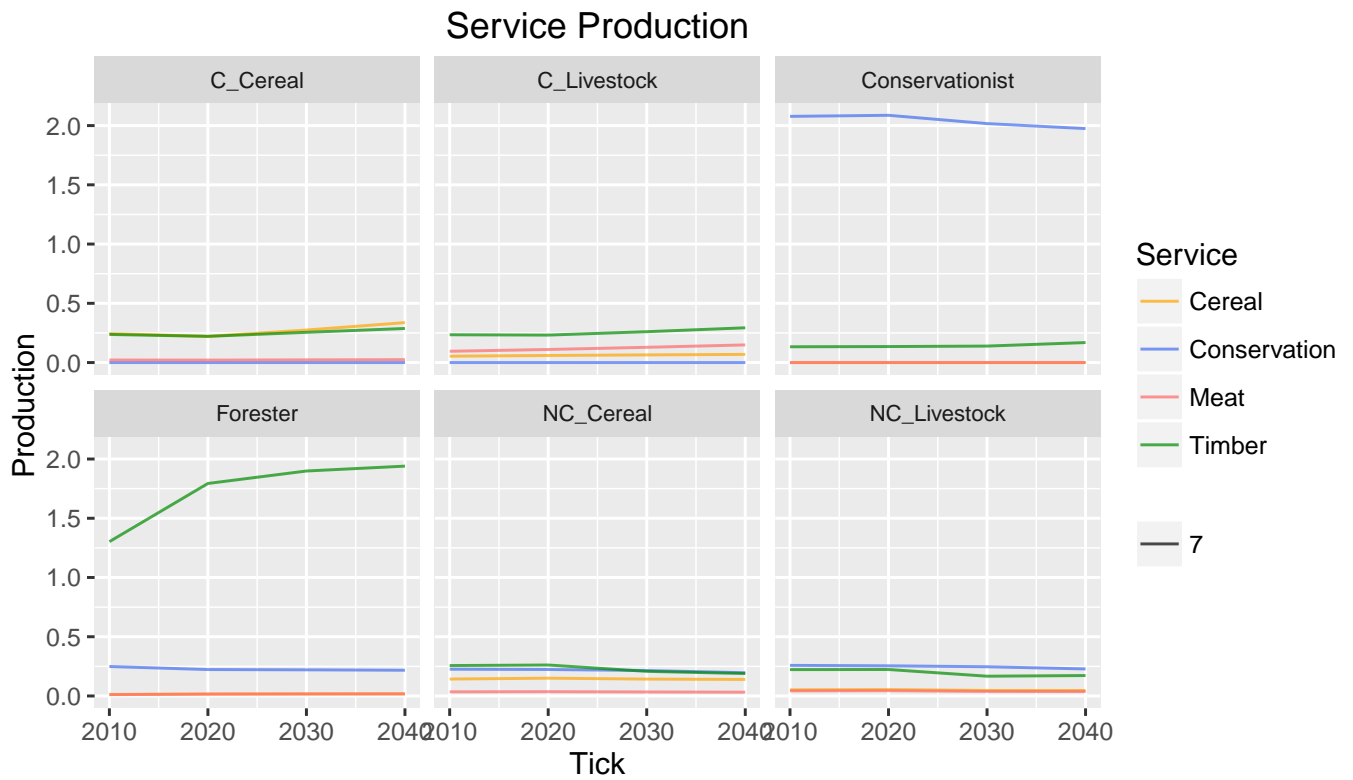
3.1.3 AFT Composition

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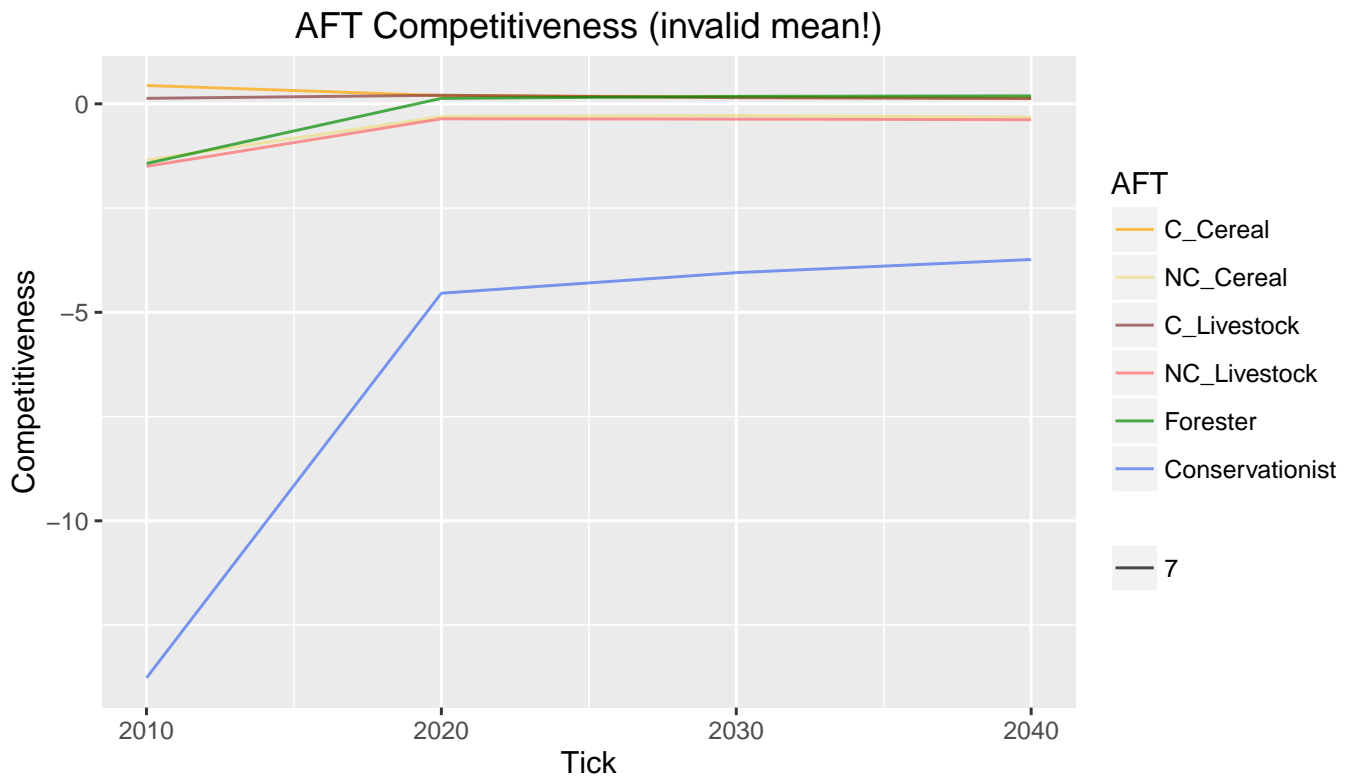


3.1.4 AFT Production

ja name="aftProductionLines3" i/a_i



3.1.5 AFT Competitiveness



3.1.6 AFT TakeOvers (GU + GI)

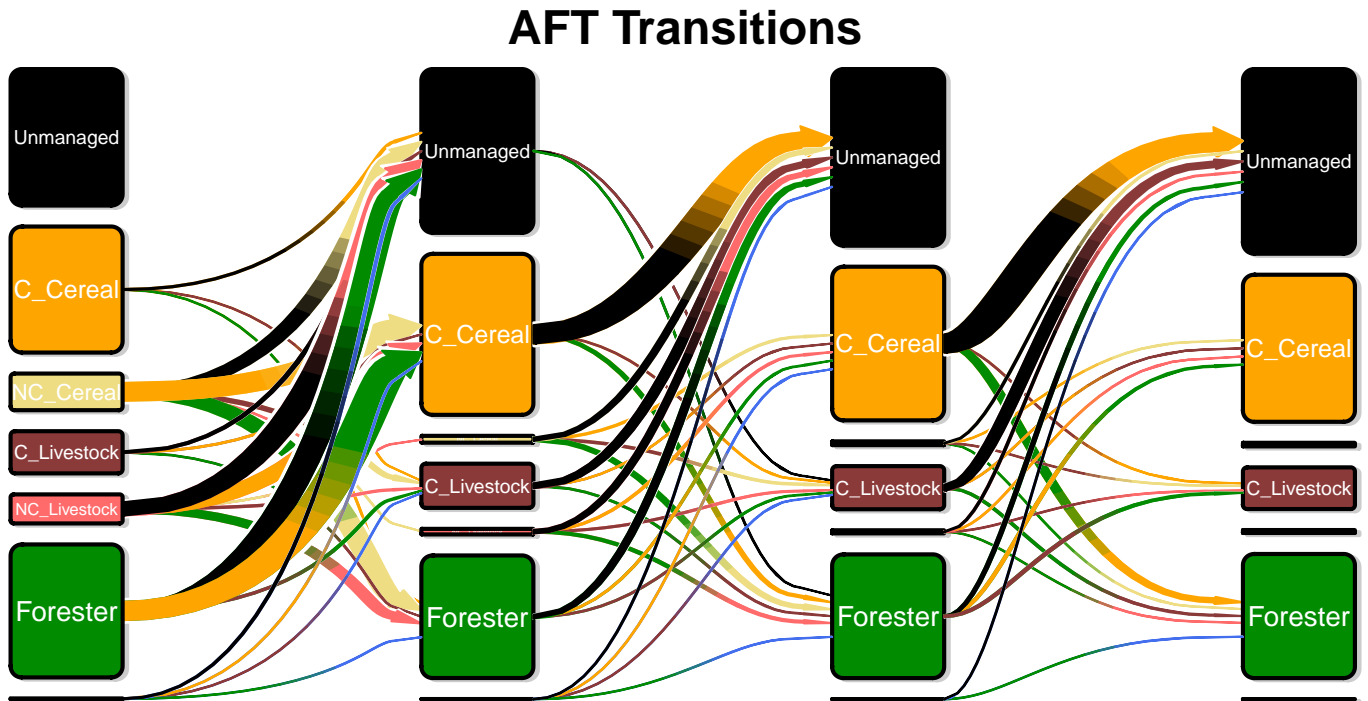


Figure 1: Transitions between AFTs because of take overs (giving in + allocation). Straight lines represent a transition from an agent of a specific AFT to a new agent applying the same type of land use. Ends of arrows are coloured according to the AFT they lead to. Furthermore, arrows summarise transitions of years in between the shown ones. Therefore, the number of transitions is potentially higher.

3.1.7 AFT Giving In TakeOvers

AFT Transitions

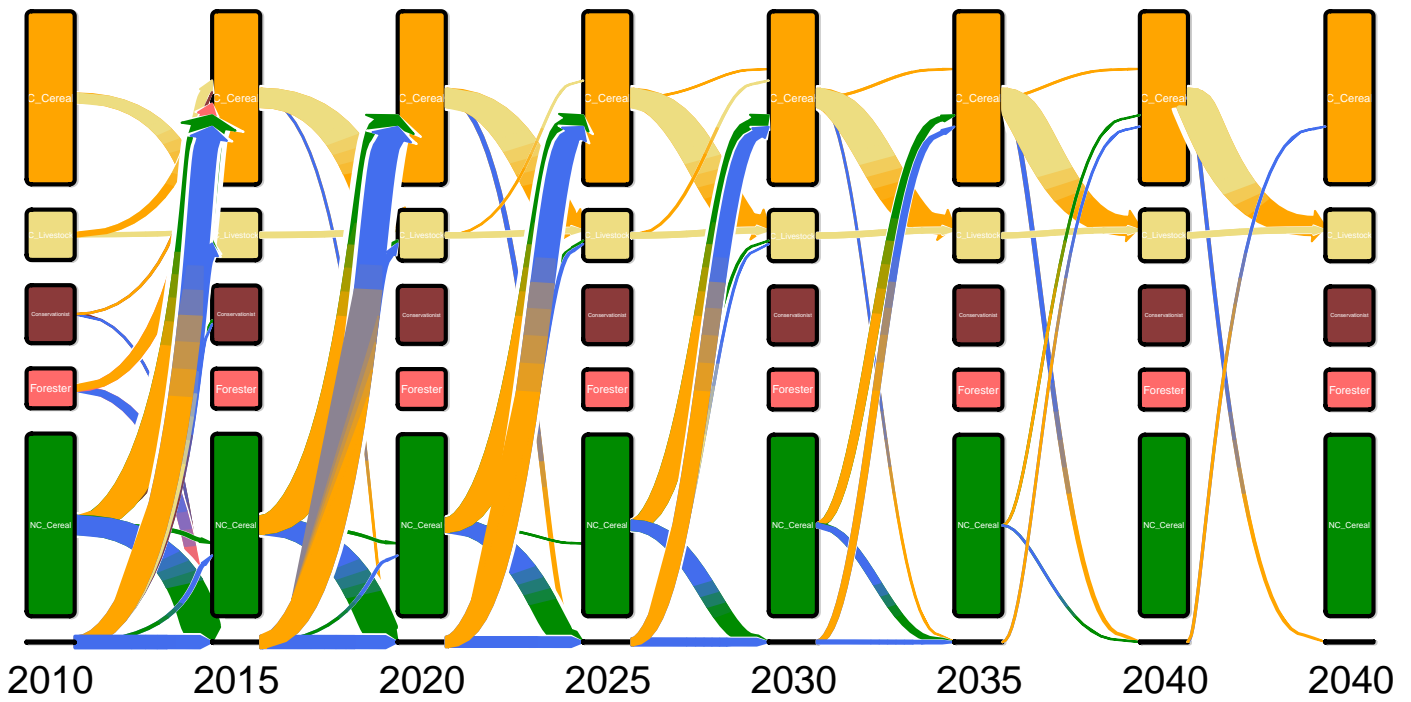


Figure 2: Transitions between AFTs because of take overs (giving in). Straight lines represent a transition from an agent of a specific AFT to a new agent applying the same type of land use. Ends of arrows are coloured according to the AFT they lead to. Furthermore, arrows summarise transitions of years in between the shown ones. Therefore, the number of transitions is potentially higher.

3.1.8 AFT TakeOver Fluctuations

AFT Fluctuations

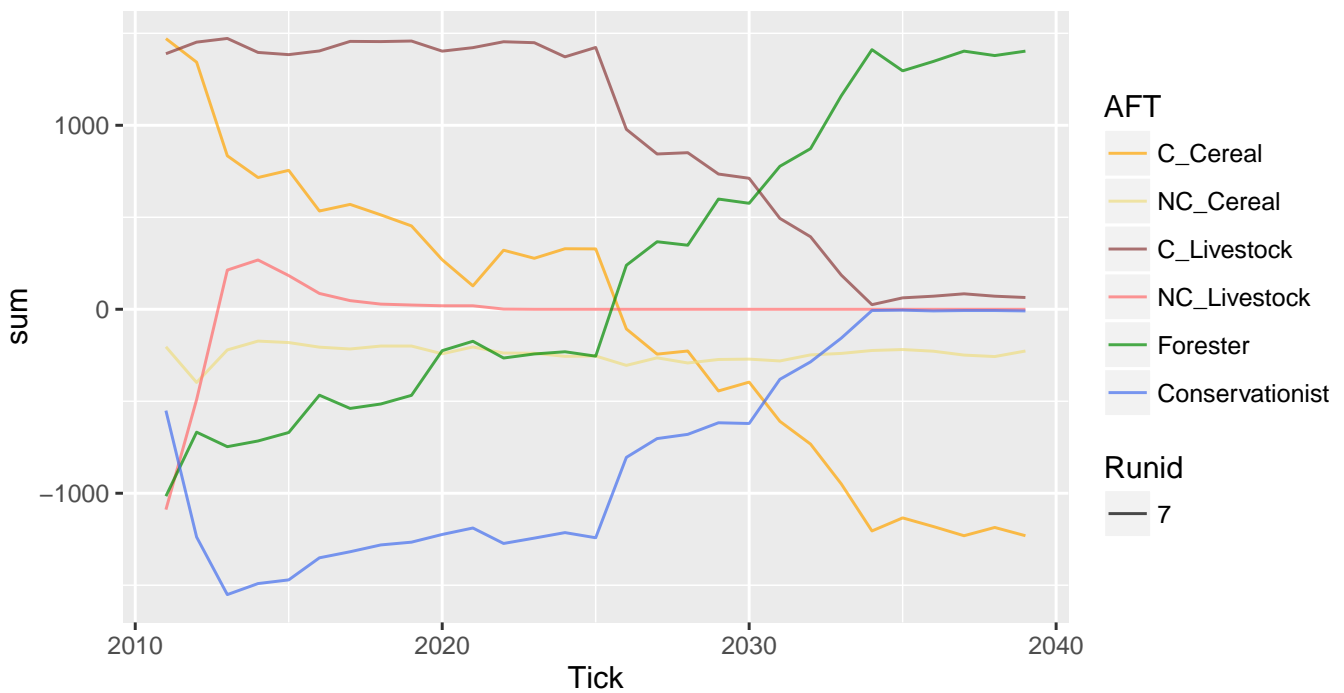
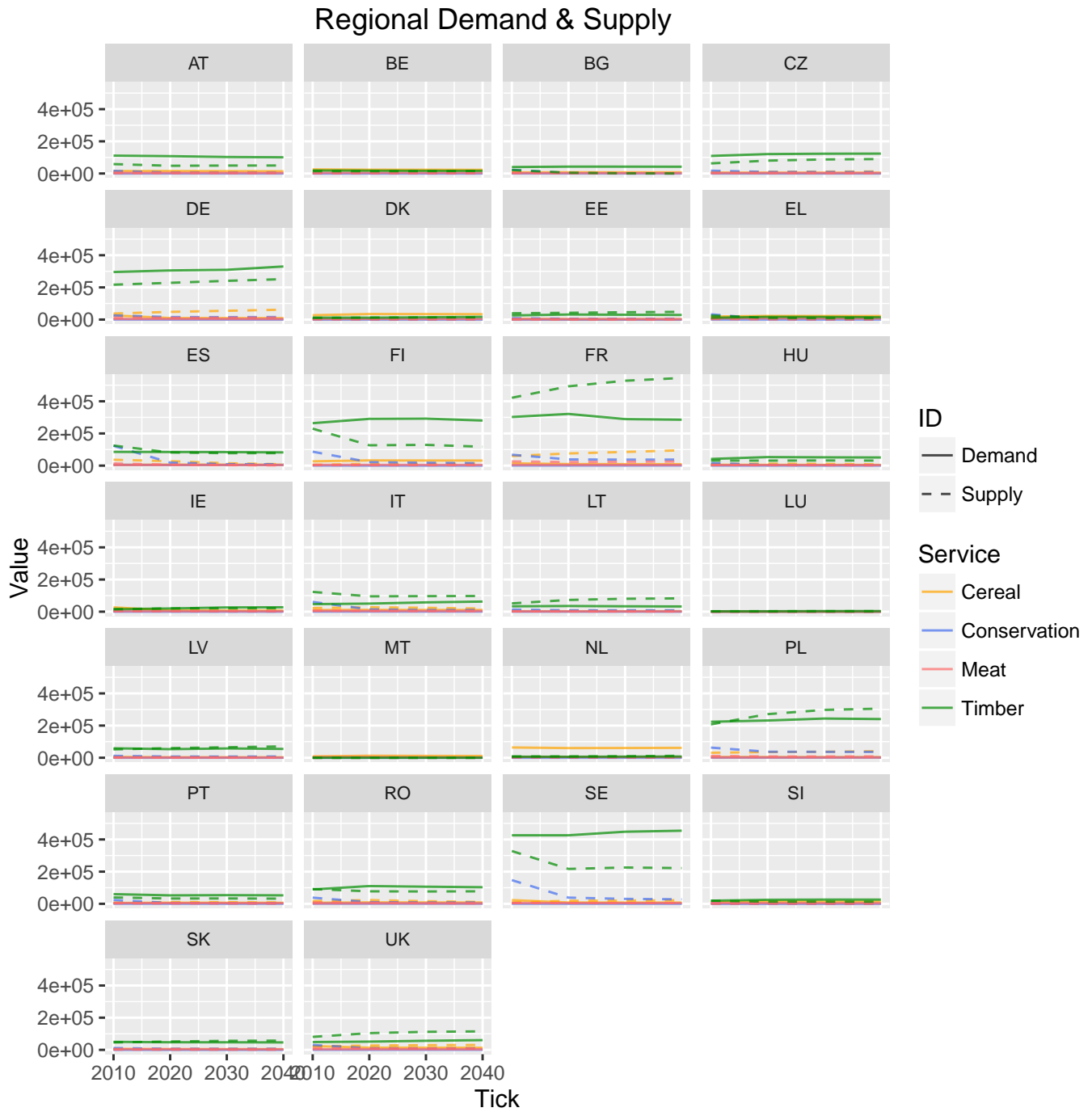


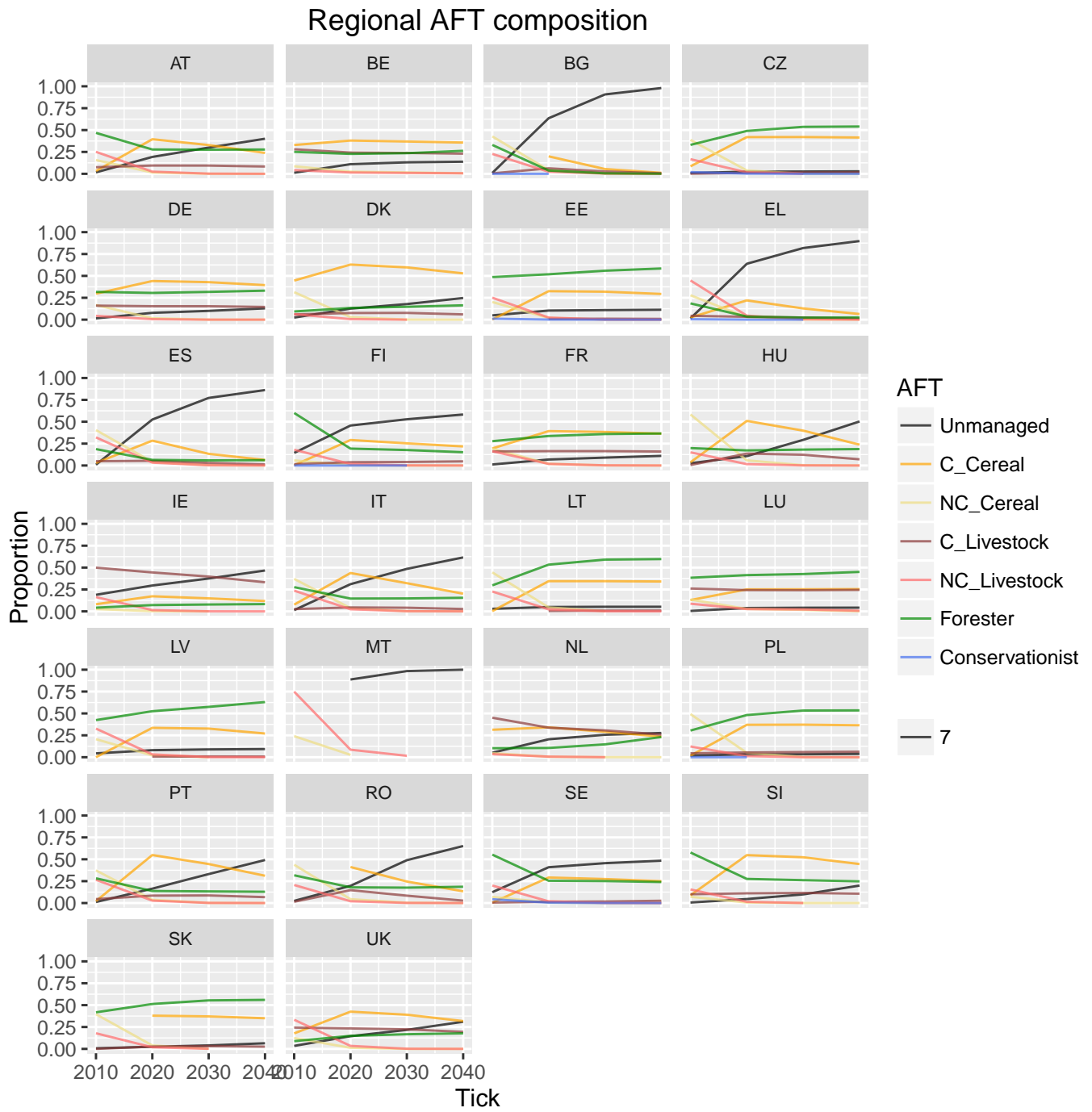
Figure 3: Fluctuations in numbers of AFT only due to take overs.

3.2 Regional Data

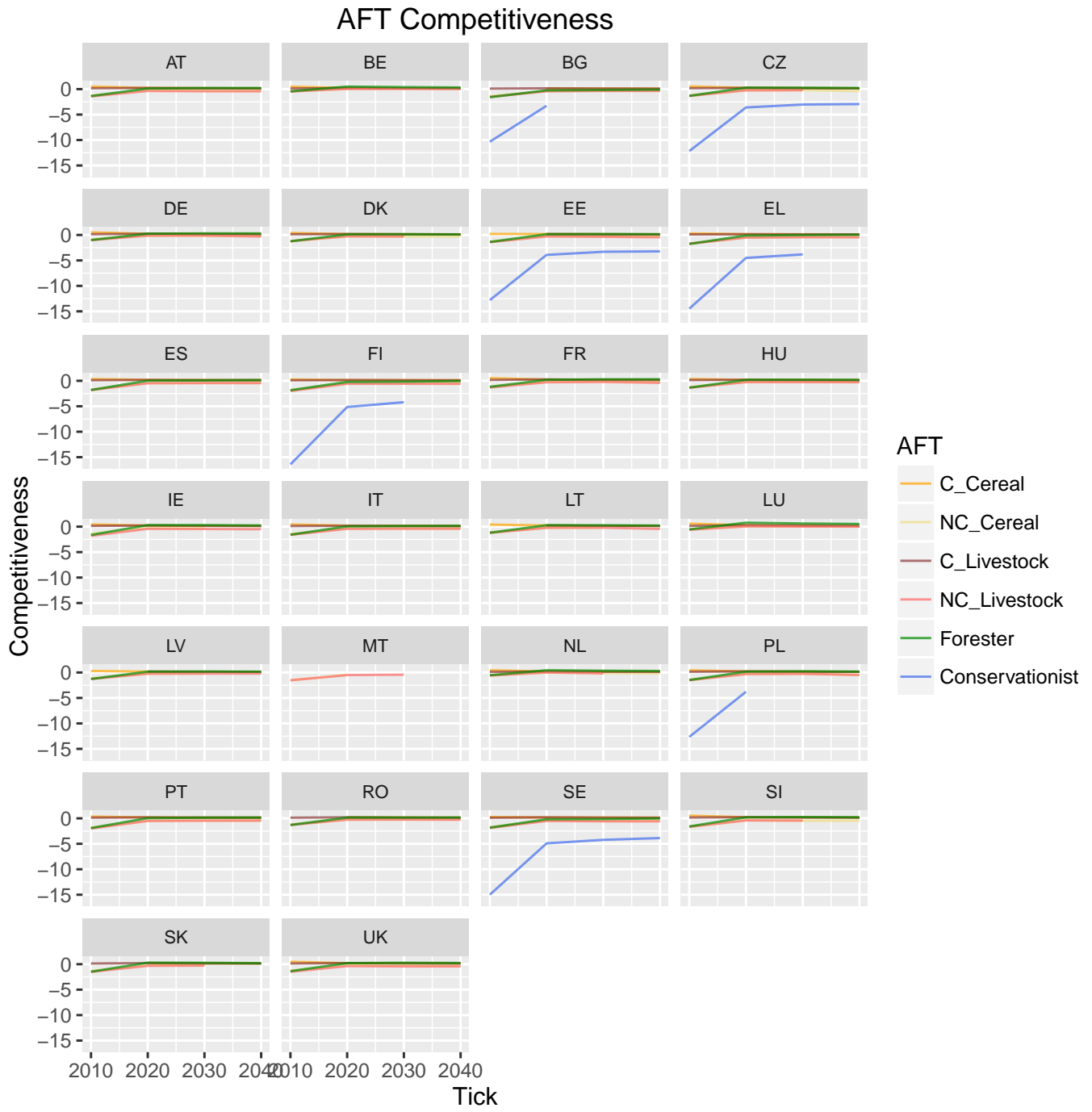
3.2.1 Regional Demand and Supply



3.2.2 Regional AFT Composition



3.3 Regional AFT Competitiveness



3.4 Map Data

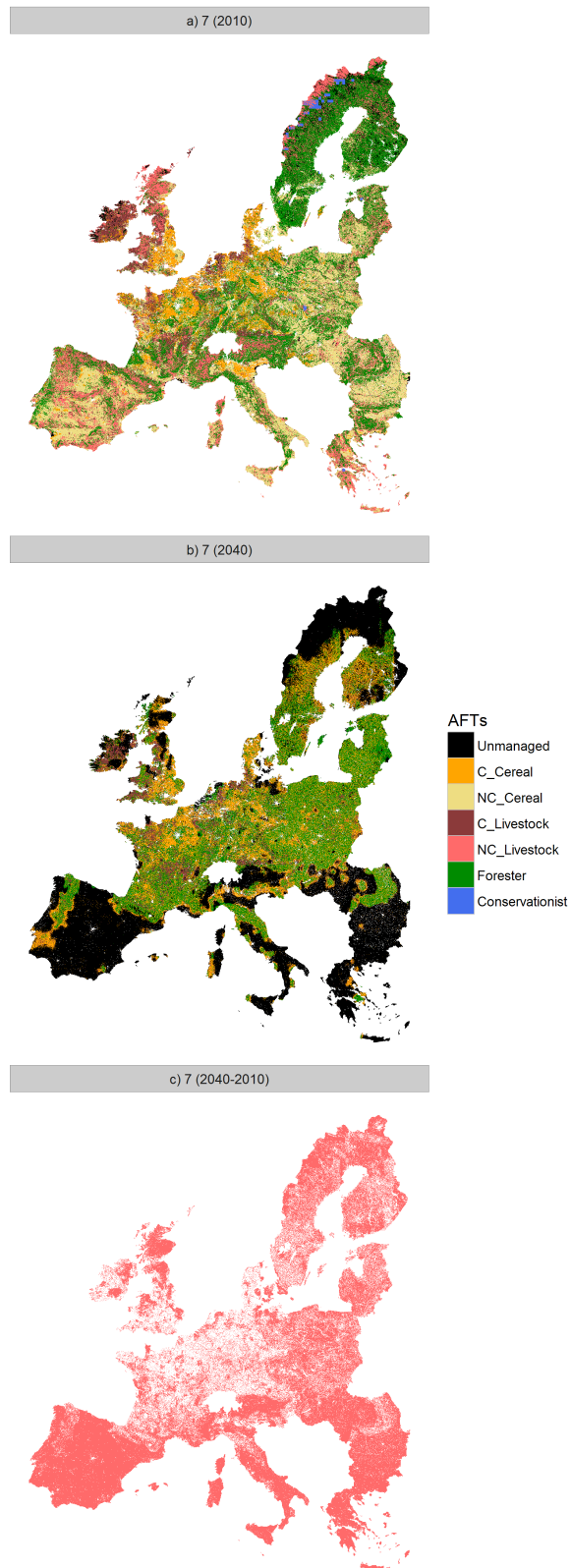


Figure 4: AFT map

4 Observations

- Still, the number of **unmanaged cells** increases massively (3.1.3), on the expense of non-commercial farmers. Most of unmanaged cells can be found in Southern Europe (3.4).
- **Supply of timber decreases** during the first 10 years (figure 3.1.1). This could be due to the multiproductivity of foresters which also produce heavily oversupplied conservation.
- Compared to A1, less supply of Meat and Cereals (slightly), higher supply of recreation and timber.

5 Open Questions

- Why are not more foresters allocated?