

Preferred citation style

Bodenmann, B.R. (2011) Micro-simulation of firm's location choice, presentation at the *11th Swiss Transport Research Conference*, Ascona, May 2011.

Micro-simulation of firm's location choice

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Ascona, May 2011

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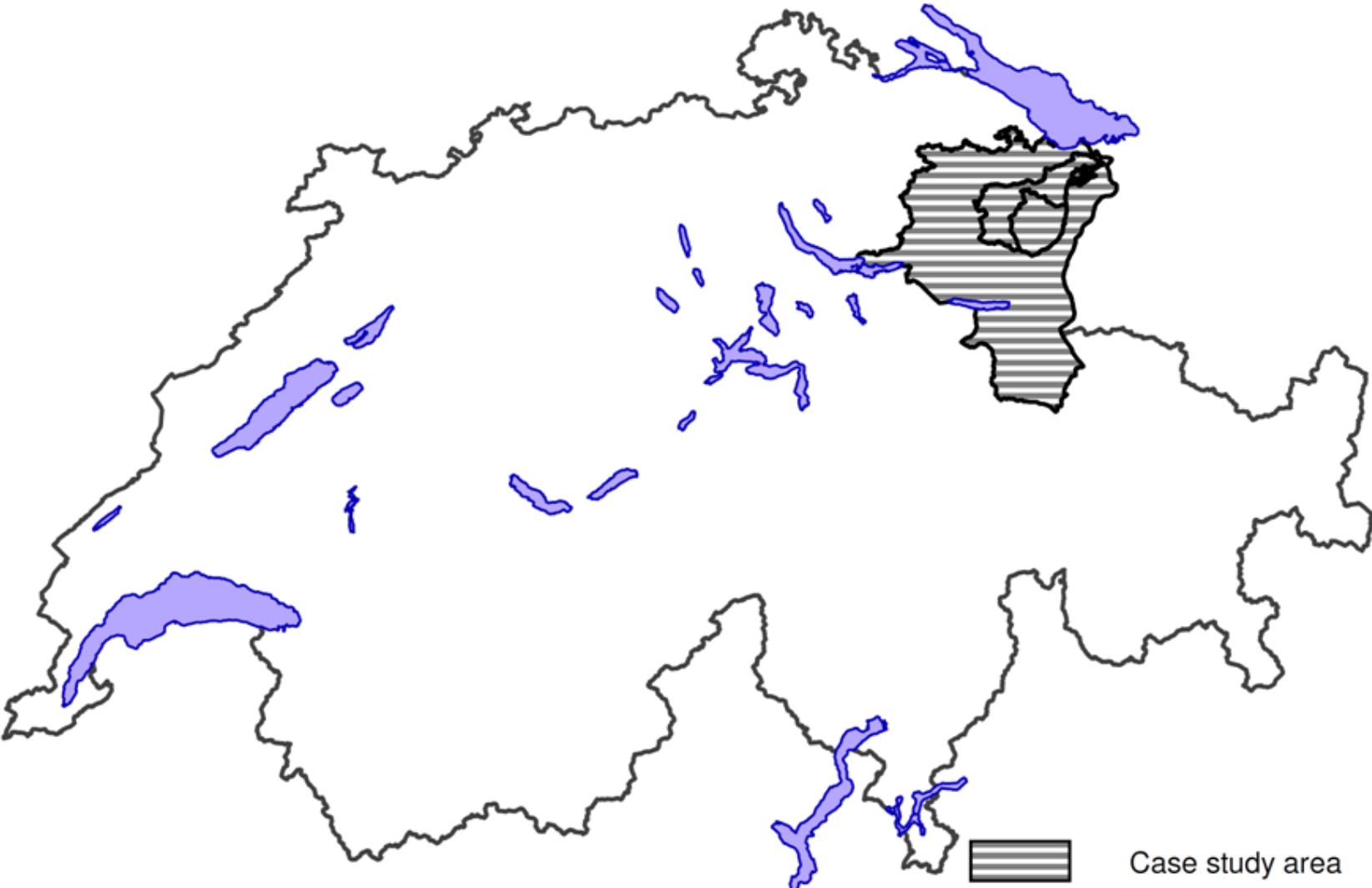
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Aim of the simulations

Testing options for cantonal and municipal authorities' intent on attracting firms:

- improvements in transport infrastructure
- designation of new building zones
- tax reductions

Case study area: St.Gallen Region



Data base

Commercial Registers

Cantons of St.Gallen and Appenzell

1991-2006

21'000-32'000 companies per year

variables:

legal seat, address, etc.

Business Register (BUR)

Swiss Federal Statistic Office FSO

2003-2006

29'000-31'000 companies per year

variables:

largeness and sectors



COMMERCIAL REGISTER OF CANTONS

Identification number	Legal status	Entry
CH-300.3.012.284-7	Limited or Corporation	30.03.1



All datas

In	Ca	Business name
1	7	Realbau AG für Immobilien- und Projektmanagement
7		regioConcept AG

In	Ca	Share capital (CHF)	Paid in (CHF)	Shares
1		200'000.00	200'000.00	200 Namenaktien zu je C

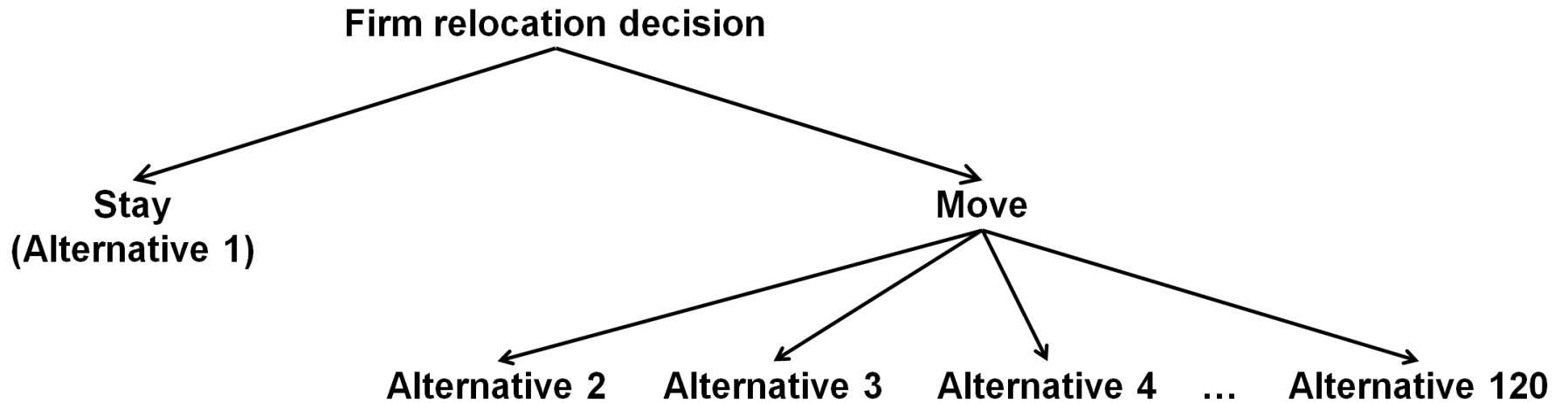
In	Ca	Purpose
1	7	Planung und Realisierung von Bauvorhaben aller Art, Verwaltung, Kauf von Immobilien. Sie kann sich an anderen Unternehmungen beteiligen, Geschäfte abschliessen, die direkt oder indirekt mit ihrem Hauptzweck zusammenhängen.
7		Zweck der Gesellschaft ist die Führung eines Dienstleistungsbetriebes und Verkehrsplanung, Architektur, Immobilienentwicklung und -verwaltung sowie verwandte Tätigkeitsgebiete wie IT, Entwicklung, Beschaffung und Verkauf von Geodaten, kartografischen Produkten sowie Entwicklung und Verkauf von Software. Die Gesellschaft kann Grundstücke erwerben, verwalten, verkaufen, sich an anderen Unternehmungen beteiligen und alle Geschäfte abschliessen, die direkt oder indirekt mit ihrem Hauptzweck zusammenhängen.

In	Ca	Remarks
6		Mitteilungen erfolgen mit Brief, Telefax, E-Mail oder andern Übertragungsmitteln. Den Nachweis durch Text ermöglichen.
6		Gemäss Erklärung des Verwaltungsrates vom 23.06.2009 untersteht die Gesellschaft keiner ordentlichen Revision und verzichtet auf eine eingeschränkte Revision.
7		Die Übertragbarkeit der Namenaktien ist nach Massgabe der Statuten geregelt.

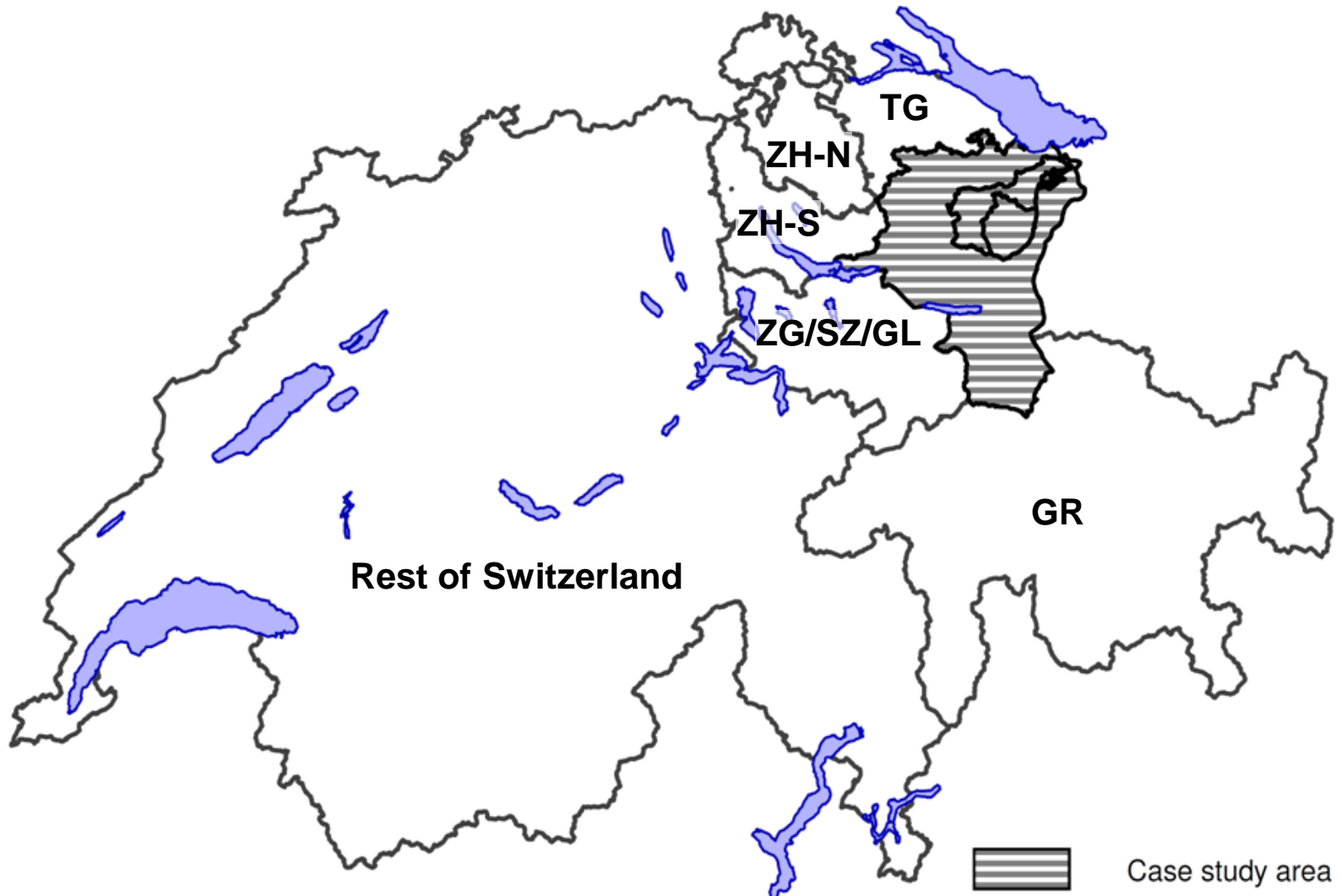
In	Ca	Qualified facts

In	Ca	Branch offices	In	Ca

Modelling destination choice: structure



Modelling destination choice: alternatives (114+6)



Modelling destination choice: Parts of the utility-functions

	part of the utility-function for alternative				
	1	2	3	...	120
Parts of the utility-functions					
advantage of not migrating	Constant	-	-		-
distance to previous site	-	Distance	Distance		Distance
site related factors	Set of factors	Set of factors	Set of factors		Set of factors
Nests					
nest of the previous site	Nest A*	-	-		-
nest of other communities	-	Nest B	Nest B		Nest B
Selection Bias**					
block of the previous site	Sel. Bias	-	-		-

* fixed

** New estimator of Bierlaire *et al.* (2008)

Variables tested apart distance

Factors of production

degree of land use in building zones

rate of unemployment and population with graduate degree

Land prices

Business environment

large or intermediate city

employees within the same sector (agglomeration effects)

diversity in sectors (urbanisation effects)

Governmental environment

tax burden for different legal forms

highway connection / rail connection / accessibility

duration of the process for building licence

cantonal business development

Results: general information

Model including all observed companies

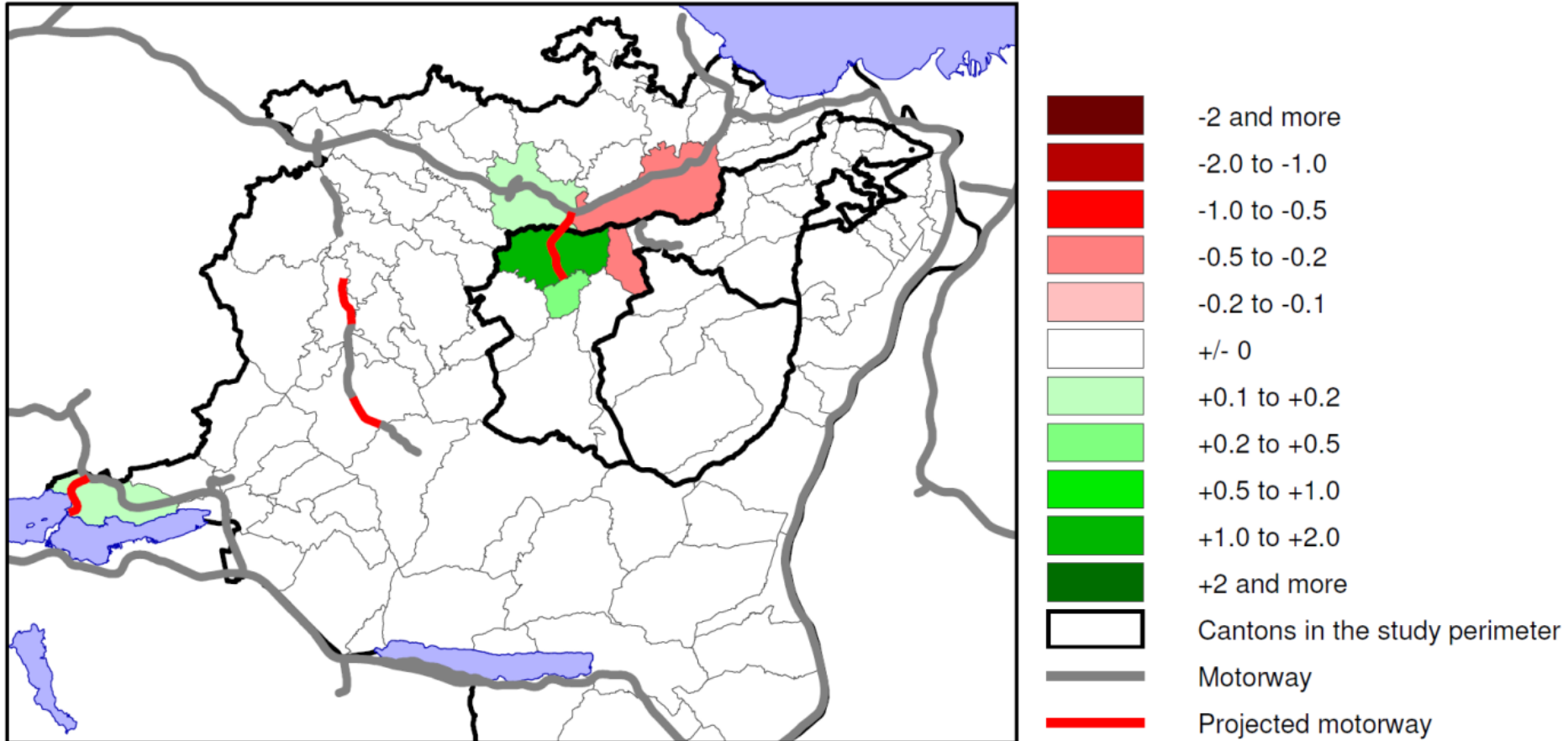
Number of observations	10'700
movers	7'200
non-movers (representing 386'000)	3'500
Null log-likelihood	-51'400
Final log-likelihood	-31'200
Adj. Rho-square	0.392

Results: Ranking of estimated parameters

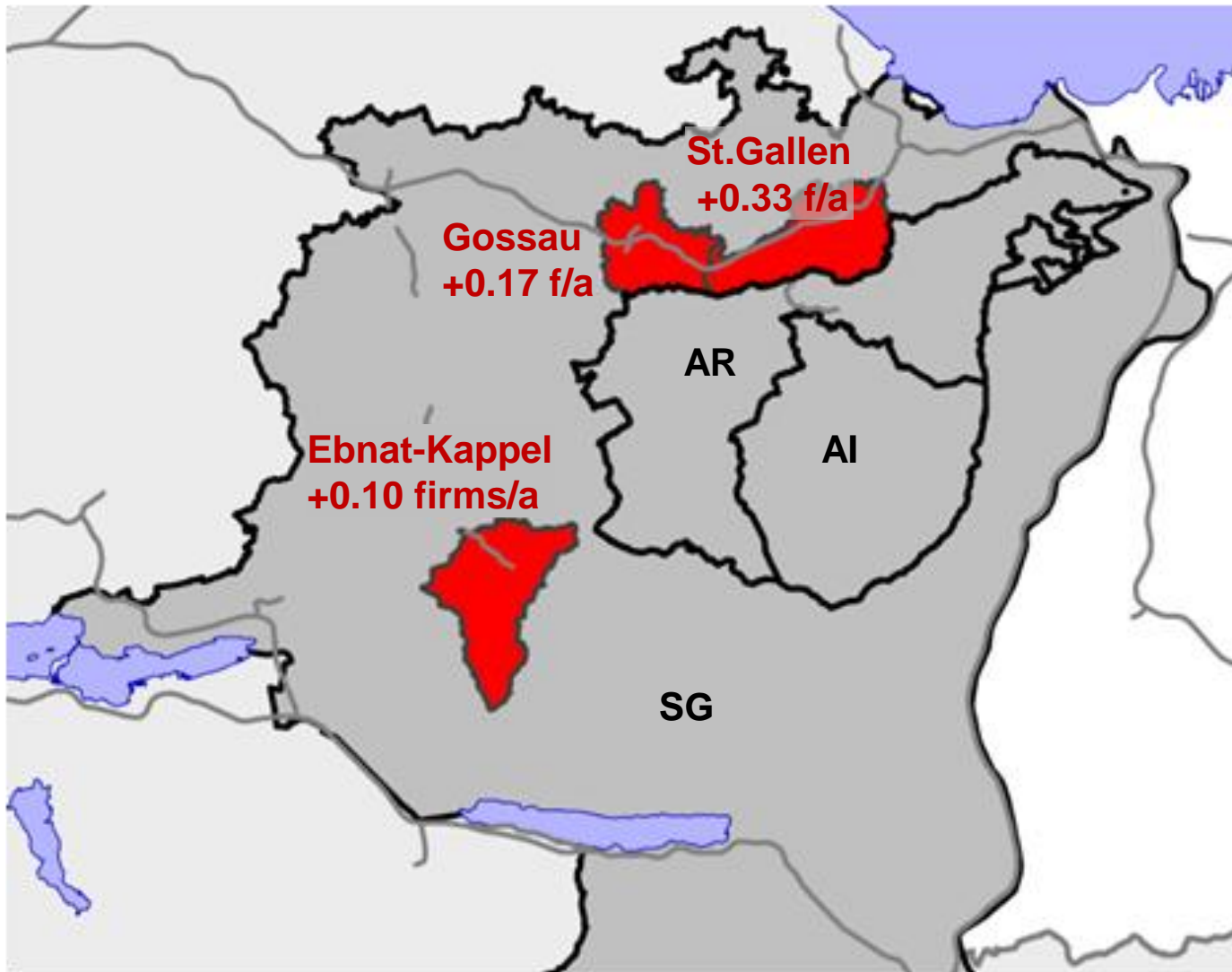
all	Parameter	Manu- fact.	Whole- sale	Bus. service	Pers. service
1*	Alternative is a city	3*	2*	2*	1*
2*	Cantonal business development	2*	3*	3*	2*
3*	Tax burden for joint stock comp.	4*	4*	4*	4
4	Previous site is in a city	1*	1	1*	8
5*	Municipality with a rail connection	6*	5*	8*	3*
6*	Index of diversity in sectors	5*	9*	5*	11
7*	Population with graduate degree	8*	14*	5*	14
8*	highway connection	10*	6*	9*	6
9*	Tax burden for partnerships	7*	8*	7*	10
10*	Accessibility to employees	9*	10*	10*	5*
...
18	Land price for commerce	17	18	18	16

* Significant according to t-test

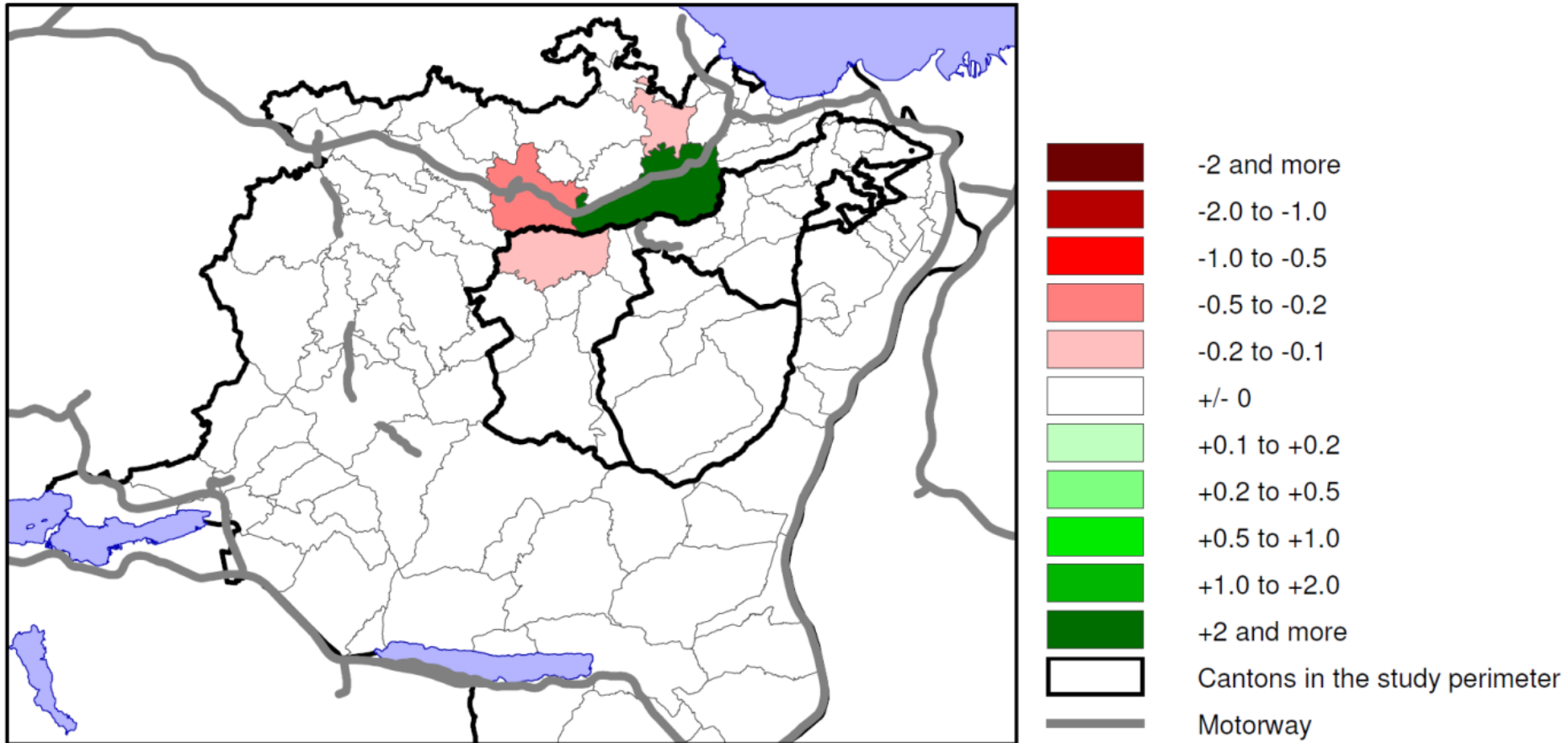
Improvements in transport infrastructure



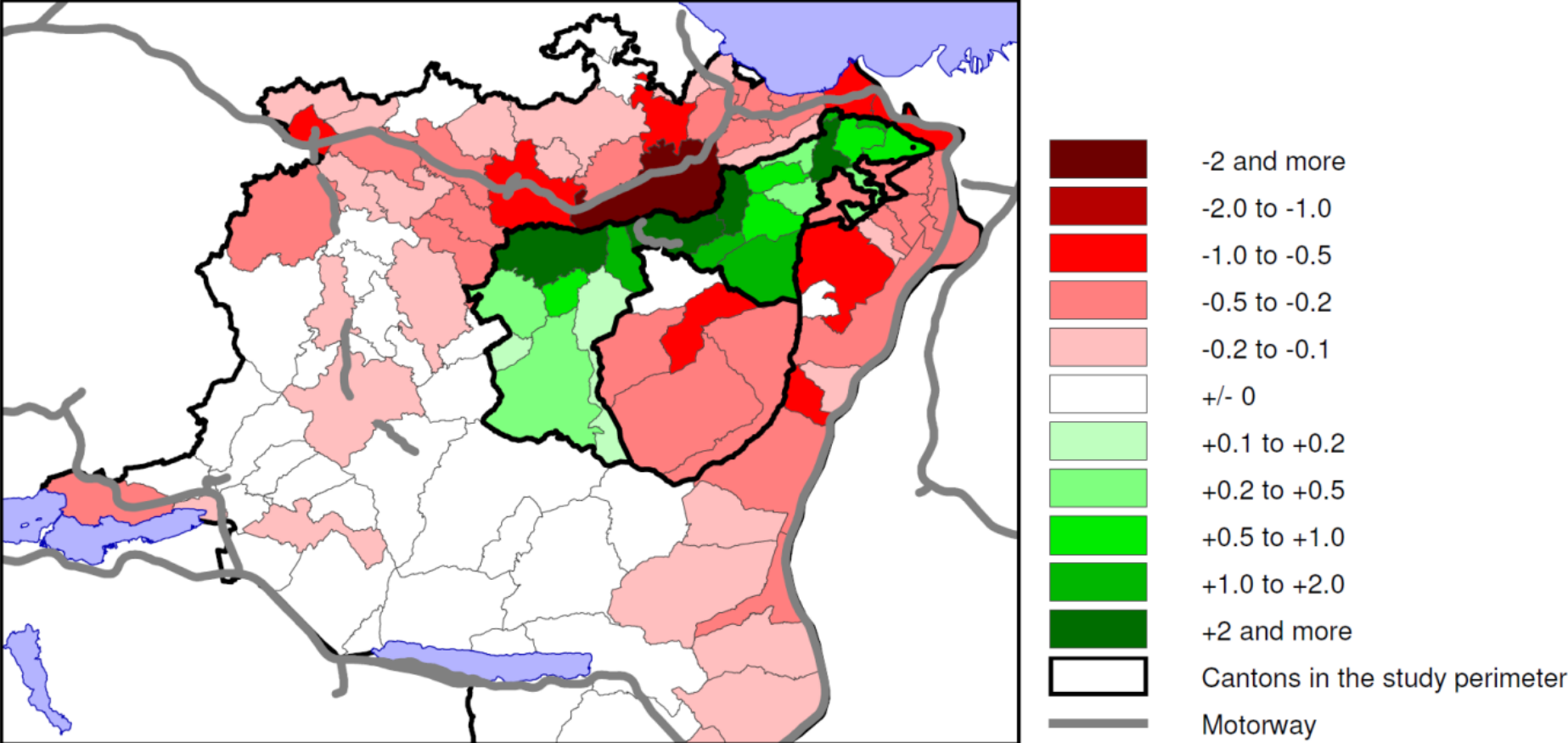
Designation of new building zones (+10 ha)



Tax reductions for natural persons (City of St. Gallen, -1sd)



Tax reductions for legal persons (AR, -1 sd)



Conclusions

Discrete choice model proves effects of

- distance
- business friendliness
- taxes on capital and benefit

Simulations show

- effects and side effects decrease with distance
- Cities are more affected (also over long distances)

Financial aspect

- only tax reductions for companies and designation of new building zones pay of

Thank you for your attention



Literature

- Amt für Raumentwicklung Kanton St.Gallen (2003) Bauzonen im Kanton St.Gallen, *Themenbericht zur Raubeobachtung im Kanton St.Gallen*, **1**, ARE SG, St.Gallen.
- Bierlaire, M., 2003. BIOGEME: a free package for the estimation of discrete choice models. In: Proceedings of the Third Swiss Transportation Research Conference, Ascona, Switzerland, www.strc.ch.
- Bierlaire M., D. Bolduc and D. McFadden (2008) The estimation of generalized extreme value models from choice-based samples, *Transportation Research Part B*, **42** (4) 381-394.
- Bodenmann B.R. (2007) Modelle zur Standortwahl von Unternehmen, in T. Bieger, C. Lässer und R. Maggi (Hrsg.) Jahrbuch 2006/2007 Schweizerische Verkehrswirtschaft, SVWG, St. Gallen.
- Bodenmann, B.R. and K.W. Axhausen (2008) Schweizer Unternehmen - quo vaditis? Firmendemographische Trends am Beispiel des Wirtschaftsraums St. Gallen, *Raumforschung und Raumordnung RuR*, **66** (4) 15-28.
- Maoh, H.F. and P.S. Kanaroglou (2005) *Agent-Based Firmographic Models: A Simulation Framework for the City of Hamilton*, PROCESSUS Second International Colloquium on the Behavioural Foundations of Integrated Land-use and Transportation Models: Frameworks, Models and Applications, University of Toronto, Toronto, June 2005.

Generated taxes

type of taxpayer		New establ. firms (all)	existing companies			Partner- ships (all)
			low	medium	high	
Empoyees	[number]	2	9	9	9	9
Wages	[kCHF]	180	790	790	790	790
Taxable entities						
Profit	[kCHF]	0	4	24	95	0*
Assets	[kCHF]	100	200	400	900	100*
Taxes generated in						
St. Gallen	[kCHF]	20.17	72.37	75.00	84.15	71.70
Gossau (SG)	[kCHF]	17.81	63.97	66.60	75.75	63.30
Herisau (AR)	[kCHF]	19.46	70.25	72.65	80.40	69.42

* taxable entity of partnerships are the natural persons (owners)

Sources: FTA (2007, 2009); FSO (2009)