

JOHANNES KEPLER UNIVERSITY LINZ



(Towards) exploring the genesis of competition in economic thought



Spatial Competition and Economic Policies

Institute for Comprehensive Analysis of the Economy

Draft paper version prepared for the Young Economists Conference 2019 1-2 October 2019, Vienna Matthias Aistleitner, MSc <u>matthias.aistleitner@jku.at</u> www.jku.at/icae

FШF

Der Wissenschaftsfonds.

JOHANNES KEPLER UNIVERSITY LINZ Altenberger Straße 69 4040 Linz, Austria jku.at



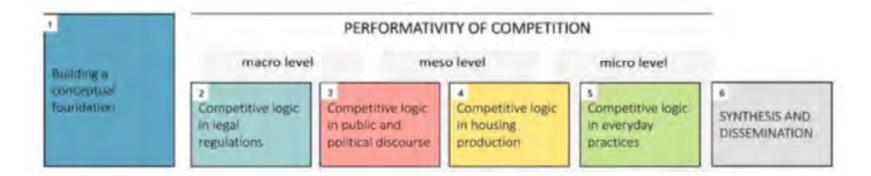
• Spatial Competition and Economic Policies (SPACE): Discourses, Institutions and Everyday Practices



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 - Investigating the impact of an increasingly strong reliance on competition as a prime mode of social organization
 - Competition as a core concept for designing social institutions



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 - Competition as a core concept for designing social institutions
- Six Working Packages







• SPACE Working Package 1: Building a conceptual foundation.



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 - How is C defined and conceptualized in economics?



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 - > Analysis of economic research literature via topic modeling
 - Topic models = algorithms that discover the content of large collections of documents via topics
 - Latent Dirichlet Allocation (LDA) as a simple and widely used topic model (Blei et al. 2003)





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 - on a more comprehensive level (e.g. whole sub-fields for a given period (Angrist et al. 2017; Jelveh et al. 2015)
- In this paper: applying topic modeling to a part of the literature which is *ex ante* constraint by a specific research topic: competition.





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 - How do major economic conceptions of C differ between economic paradigms?
 - Are there latent topics which can be assigned to economic paradigms?





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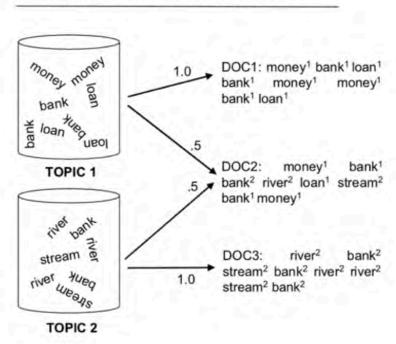
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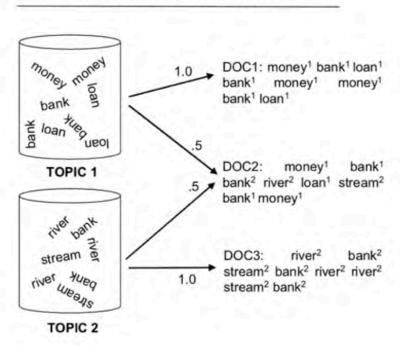
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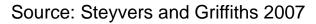
OHANNES I

• For every document in the corpus



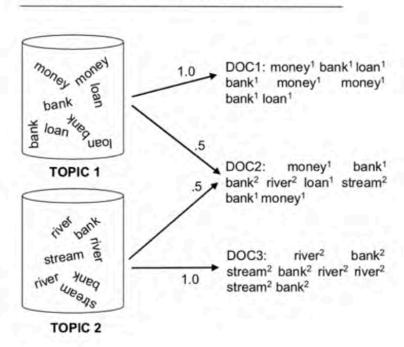
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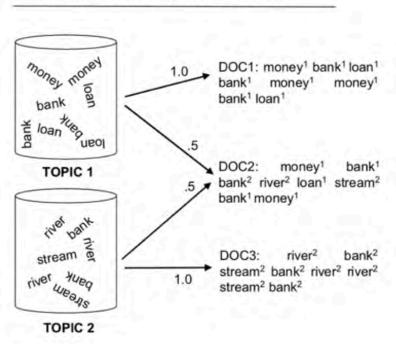
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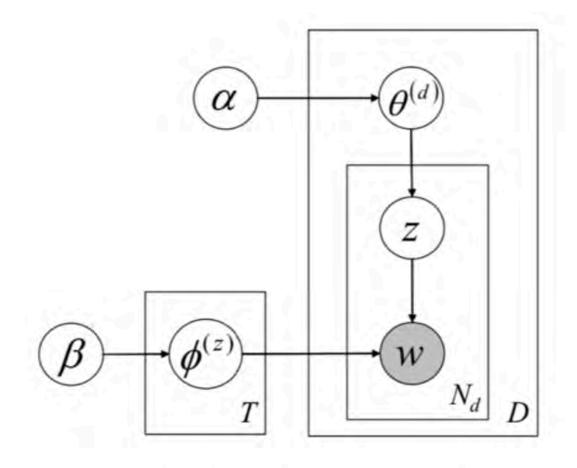




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- For every document in the corpus
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 - 2. Pick a word
 - 3. Place it in the bag until the document is complete

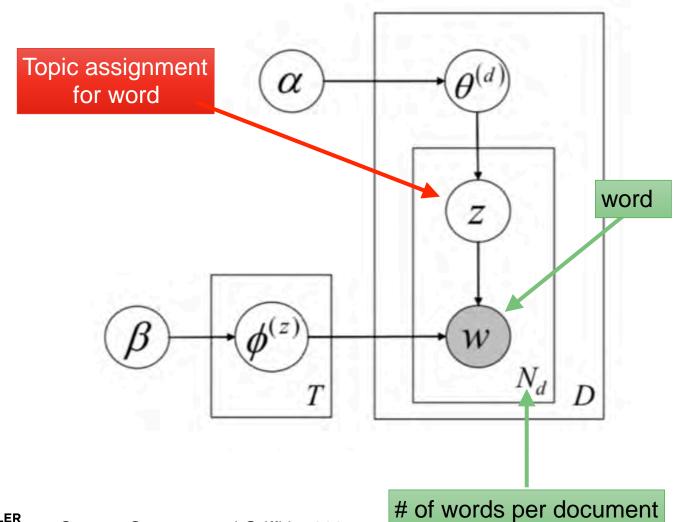


The LDA model and its parameters





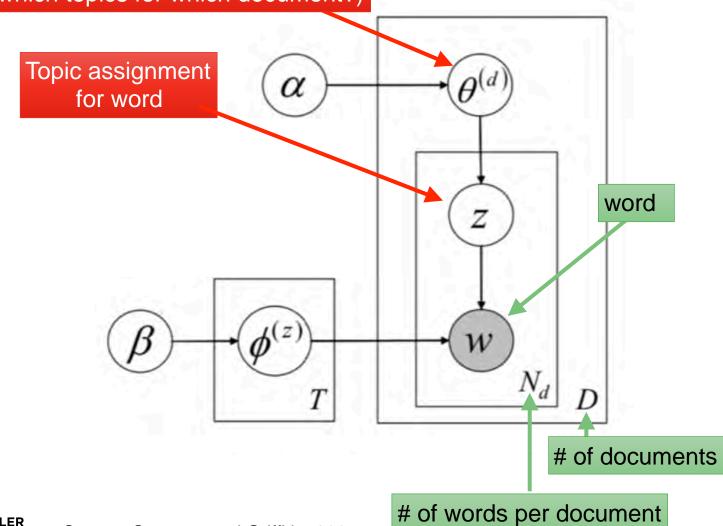
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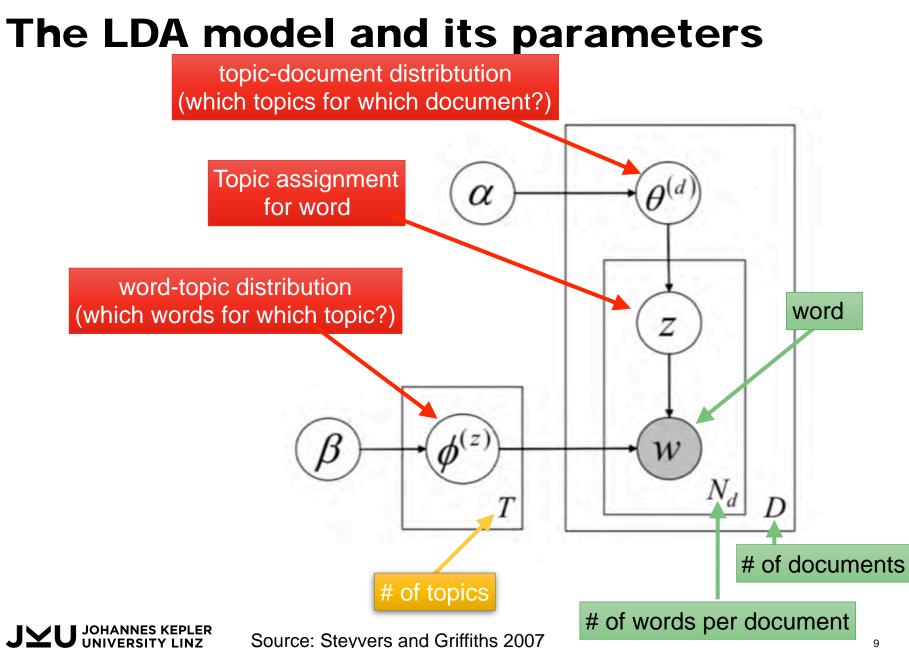
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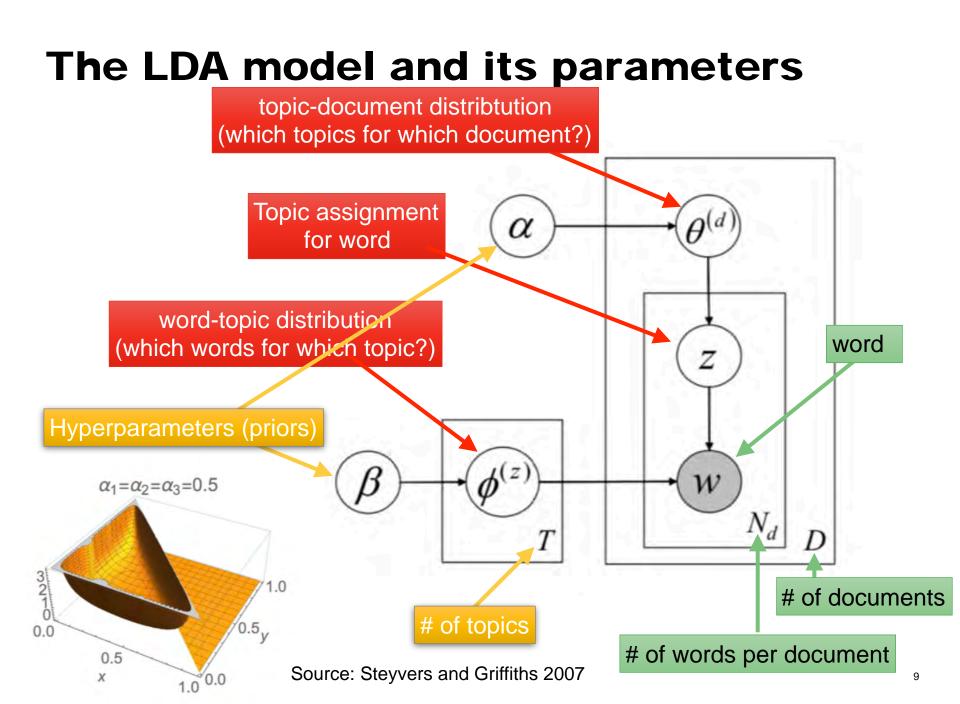
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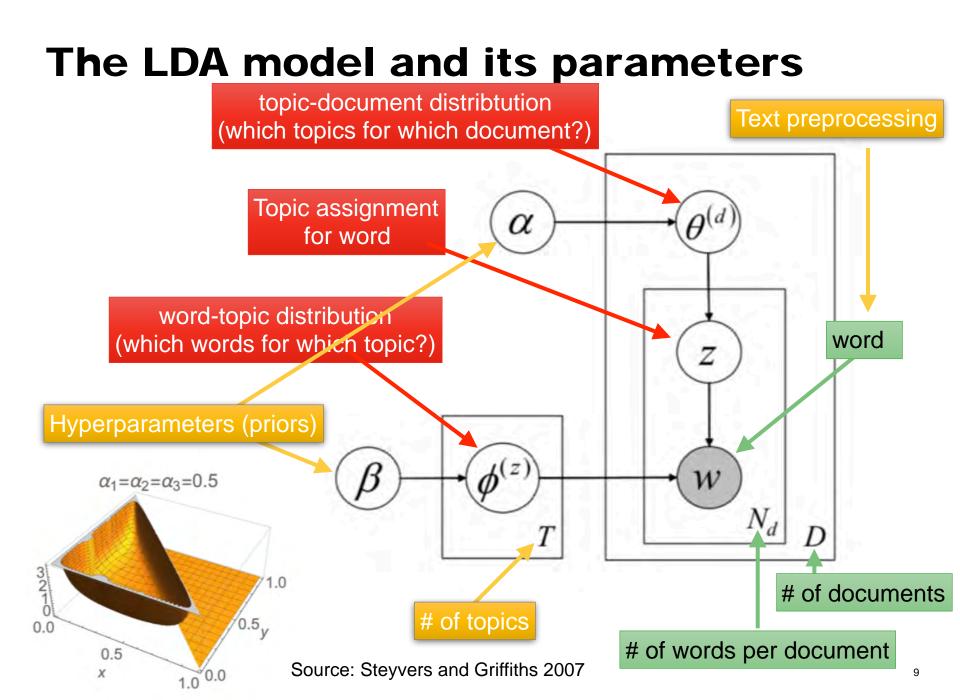
topic-document distribution (which topics for which document?)



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$$p(\theta, \phi, \mathbf{z} | \mathbf{w}, \alpha, \beta) = \frac{p(\theta, \phi, \mathbf{z}, \mathbf{w} | \alpha, \beta)}{p(\mathbf{w} | \alpha, \beta)}$$



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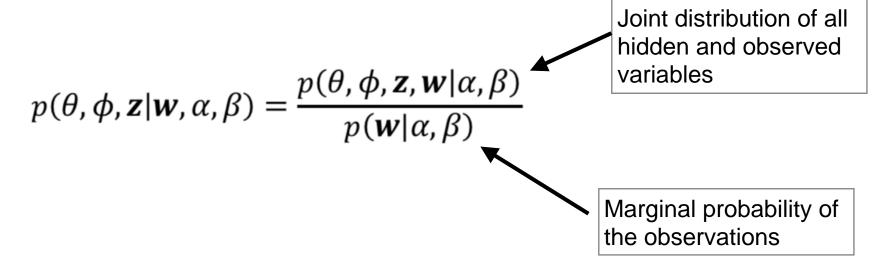
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"[The marginal probability] is the probability of seeing the observed corpus under any topic model." (Blei 2012, 81)



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Summing up all possible ways of assigning each observed word (usually in the order of millions!) to one of the topics

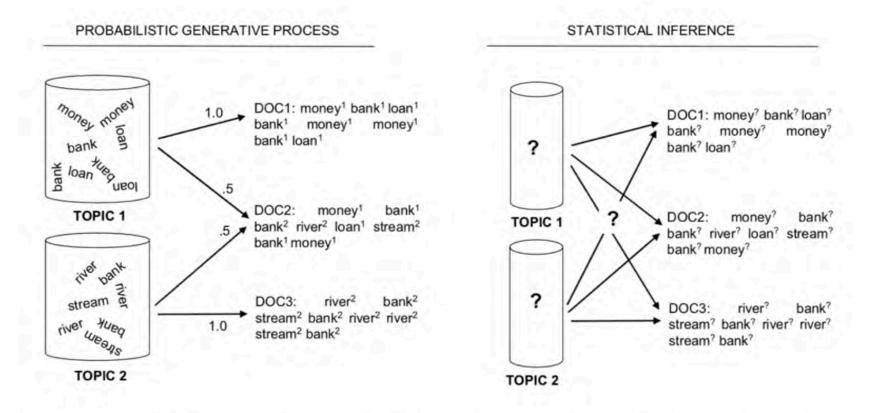


Figure 3: Illustration of the generative process of LDA and the corresponding puzzle of statistically inferring the topic structure. Source: <u>Steyvers and Griffiths 2007</u>, 3.



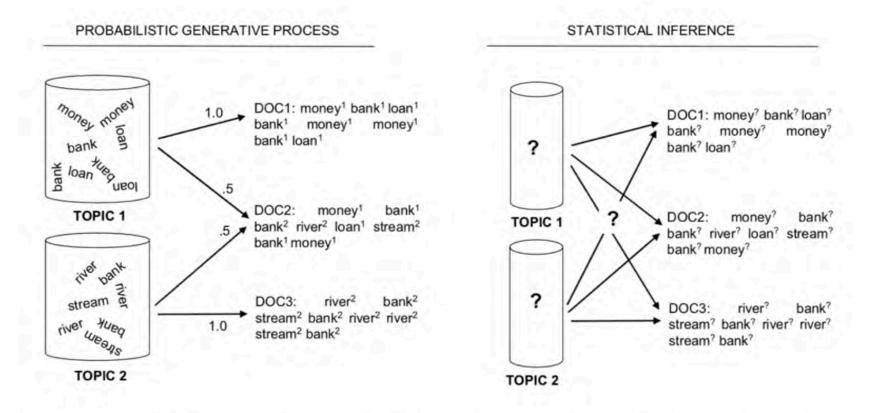


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$$\phi'_{i}^{(j)} = \frac{C_{ij}^{WT} + \beta}{\sum_{k=1}^{W} C_{kj}^{WT} + W\beta}$$

$$\theta'^{(d)}_{j} = \frac{C^{DT}_{dj} + \alpha}{\sum_{k=1}^{T} C^{DT}_{dk} + T\alpha}$$

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- 124.749 items published in 260 journals between 1851-2017



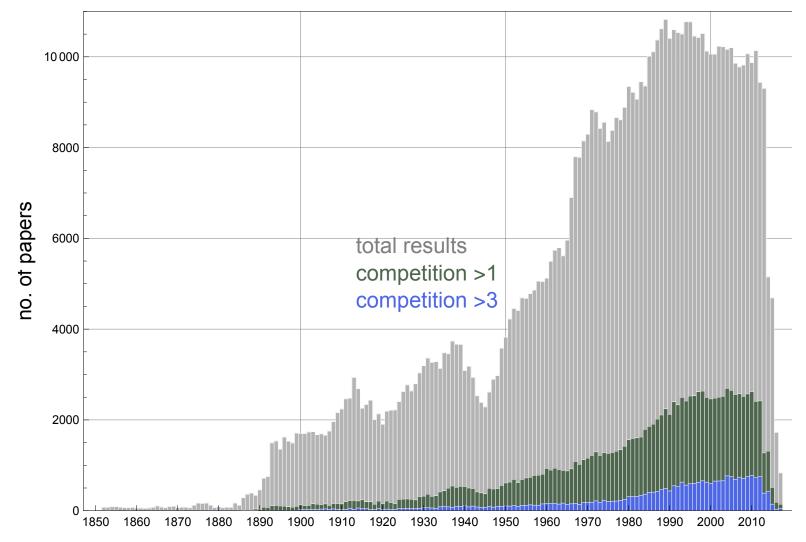
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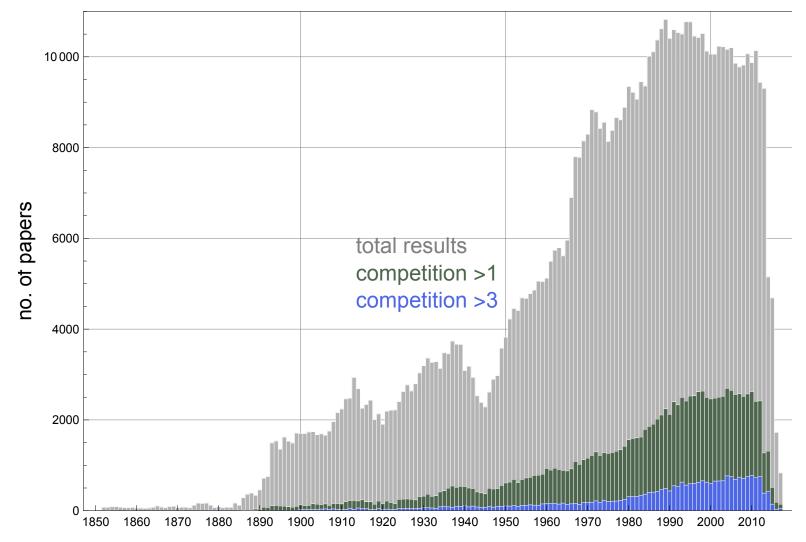
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- "Narrow" sample: items containing "competition" > 3
 - > 27.488 articles
 - 227 journals (thereof 34 heterodox journals)
 - Text preprocessing + "pseudo" abstracts as final input for the model
 - > 98.572 unique words (5.496.608 total words in the corpus)



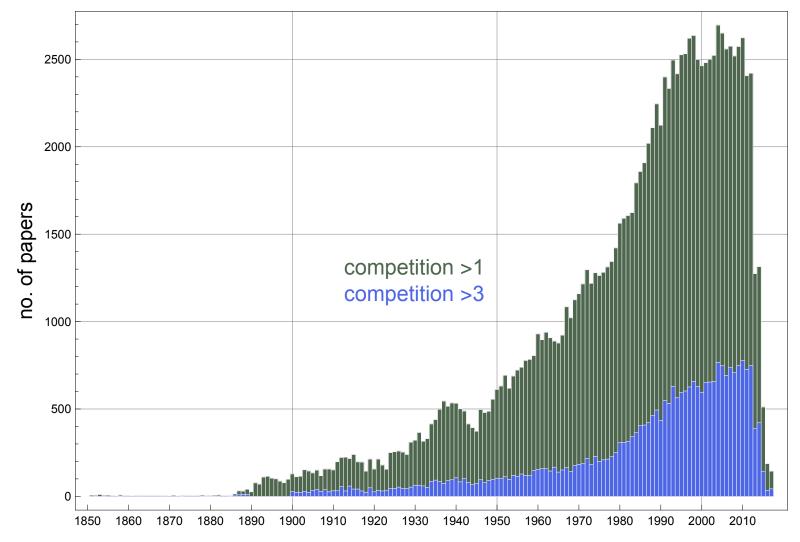
(preliminary) results I: descriptives

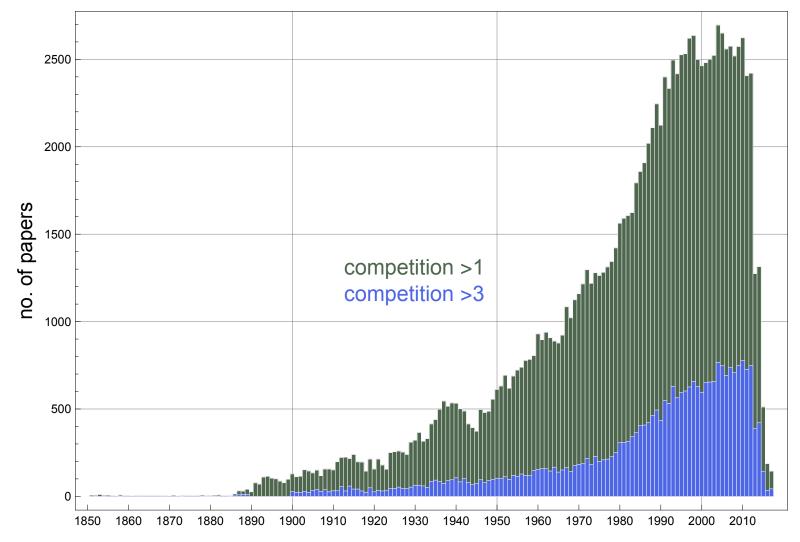












	journal (listed in JSTOR)	no. of articles (27.488)	relative share (100%)	cumulative share (100%)
1	The American Economic Review	1679	6.1	6.1
2	Economic and Political Weekly	1036	3.8	9.9
3	The Economic Journal	871	3.2	13.1
4	The Quarterly Journal of Economics	773	2.8	15.9
5	The Journal of Industrial Economics	739	2.7	18.6
6	Journal of Political Economy	711	2.6	21.2
7	Public Choice	710	2.6	23.8
8	Ann. Am. Acad. Political Soc. Sci.	700	2.5	26.3
9	Southern Economic Journal	640	2.3	28.6
10	The RAND Journal of Economics	602	2.2	30.8
11	Journal of Economic Issues	463	1.7	32.5
12	The Journal of Law & Economics	442	1.6	34.1
13	The Canadian Journal of Economics	437	1.6	35.7
14	Journal of Farm Economics	393	1.4	37.1
15	The Review of Economic Studies	371	1.3	38.4
16	Managerial and Decision Economics	357	1.3	39.7
17	American Journal of Agricultural Economics	354	1.3	41.0
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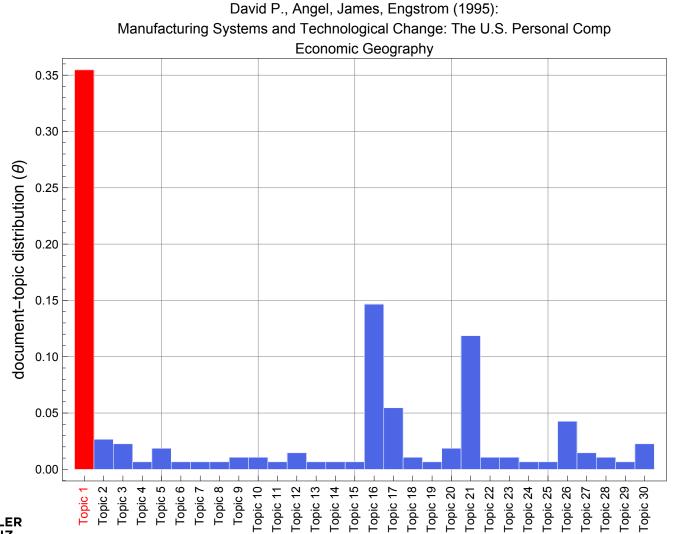
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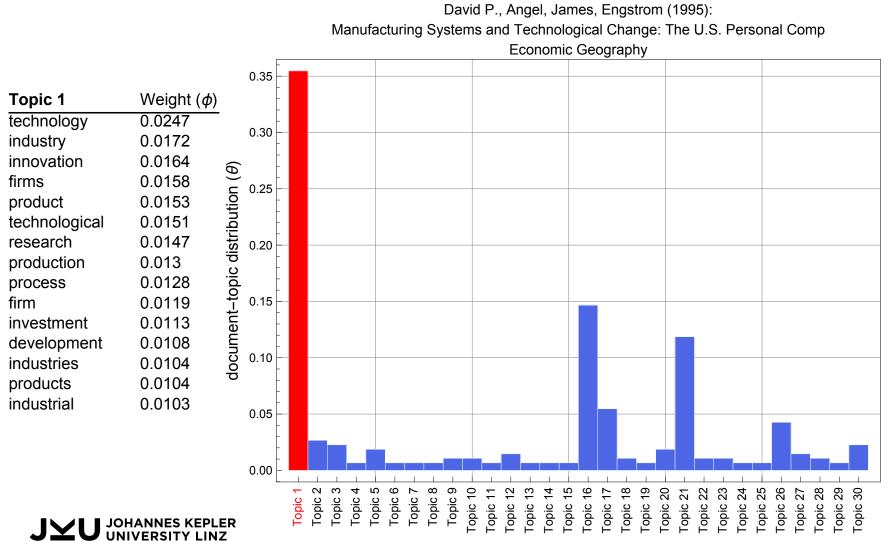
(preliminary) results II: a bird's eye's view on competition in economic research

- CGS with overall "narrow" sample
 - Number of topics T=30
 - Dirichlet hyperparameters $\alpha = 50/T$, $\beta = 0.01$
 - Number of iterations: 500



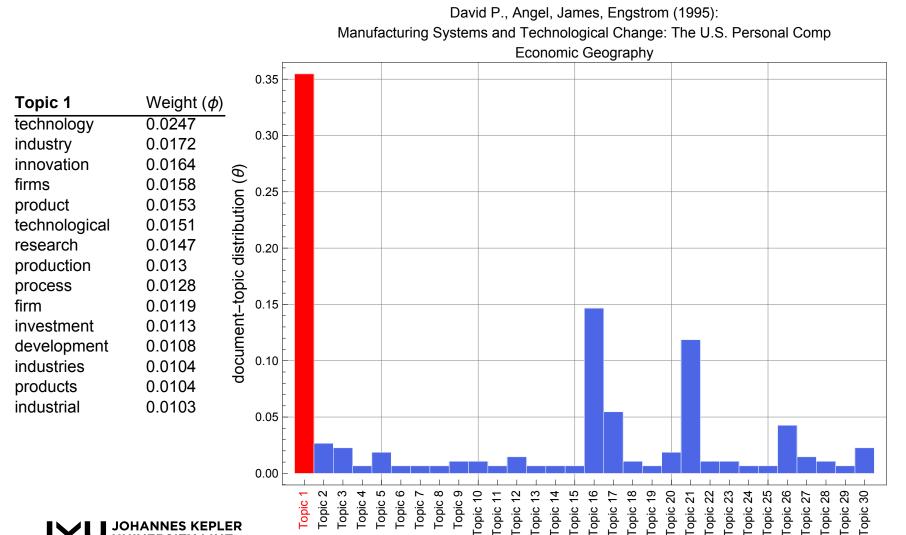


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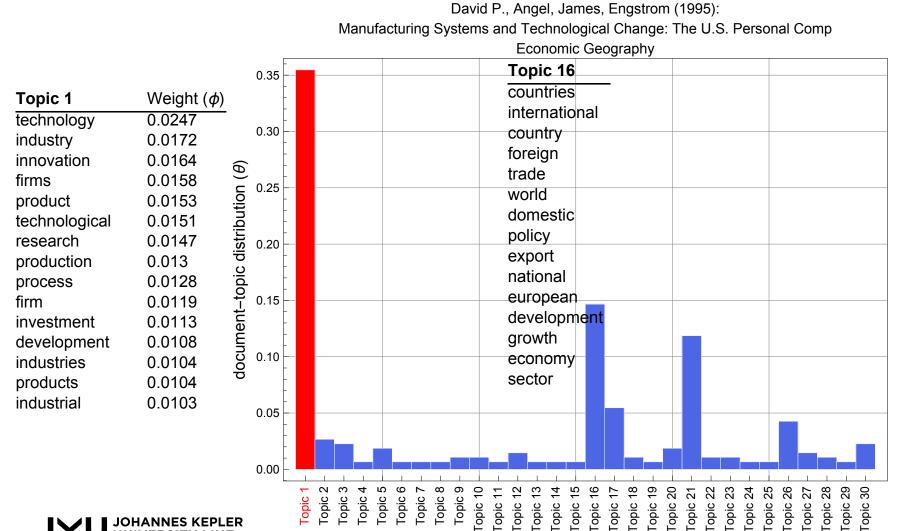
• Topic1: technological innovation and industrial development



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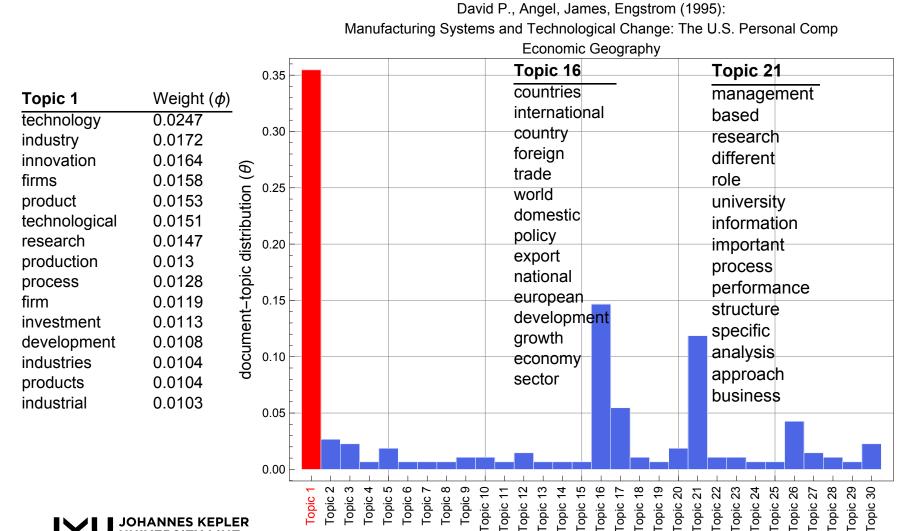


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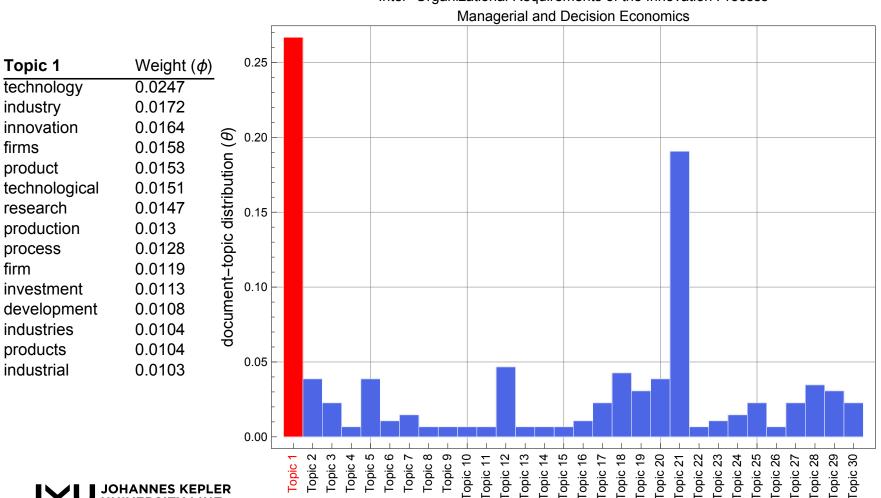


Topic1: technological innovation and industrial development





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David J., Teece (1989):

Inter-Organizational Requirements of the Innovation Process



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• Topic1: technological innovation and industrial development

Managerial and Decision Economics **Topic 5** 0.25 **Topic 1** Weight (ϕ) law 0.0247 technology act 0.0172 industry public innovation 0.0164 document-topic distribution (heta) control 0.20 0.0158 firms government product 0.0153 states 0.0151 technological commission research 0.0147 0.15 policy production 0.013 federal 0.0128 process com 0.0119 firm legal 0.10 0.0113 investment cases development 0.0108 power industries 0.0104 case products 0.0104 0.05 business 0.0103 industrial 0.00

Fopic 13

Fopic 10 Fopic 11 Fopic 12

Topic 8 Topic 9

Topic 6

Topic 4

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Topic .

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Topic Topic Fopic 15 Fopic 16

Copic 14

Fopic 18 Fopic 19 Fopic 20

Topic 17

Fopic 21 Fopic 22

Copic 23

Fopic 25 Fopic 26

Topic 24

Topic 28

Fopic 29

Topic 30

Fopic 27



Topic1: technological innovation and industrial development

				0	Managerial and	Decision Econo	omics
		-		Topic 5	Topic 12		
Topic 1	Weight (ϕ)	0.25	_	law	price		
technology	0.0247	F			prices		
industry	0.0172	-		act public	product		
innovation	0.0164			control	sales		
firms	0.0158	0.20		government	market		
product	0.0153 🚊	5		states	consumer		
technological	0.0151			commission	costs		
research	0.0104 0.0158 0.0153 0.0151 0.0147 0.0147 0.013 0.0128 0.0119 0.0113 0.0108 0.0108 0.0104	0.15		policy	consumers		
production	0.013	5 -		federal	cost		
process	0.0128	$\frac{1}{2}$		com	competitive		
firm	0.0119			legal	demand		
investment	0.0113	0.10		cases	firms		
development	0.0108	2 -		power	markets		
industries	0.0104	5		case	firm		
products	0.0104	0.05		business	products		
industrial	0.0103	-					
		-					
		-					
		0.00					
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	HANNES KEPLER	!	Topic Topic	Topic Topic Topic Topic Topic	Topic Topic Topic Topic	Topic Topic Topic Topic Topic	Topic Topic Topic Topic Topic Topic Topic Topic

David J., Teece (1989): Inter-Organizational Requirements of the Innovation Process



Topic1: technological innovation and industrial development

			Managerial and Decision Economics								
Topic 4	Maisht (1)	0.25		Topic 5	Topic 12 price	—Topic 18					
Topic 1 technology industry innovation firms product technological research production process firm investment development industries products industrial	Weight (φ) 0.0247 0.0172 0.0164 0.0158 0.0153 0.0151 0.0147 0.013 0.0128 0.0113 0.0113 0.0113 0.0104 0.0104 0.0103	(a) 0.20 -		law act public control government states commission policy federal com legal cases power case business	prices product sales market consumer costs consumers cost competitive demand firms markets firm products	theory economics analysis press university journal economists economy york cambridge new american general view approach					
	HANNES KEPLEF	0.00	Topic 1 - Topic 2 -	Topic 3 Topic 4 Topic 5 Topic 6 Topic 6 Topic 8 Topic 8	Topic 10 Topic 11 Topic 12 Topic 13 Topic 14		opic 21 -			Topic 26 - Topic 27 - Topic 28 -	Topic 29 - Topic 30 -

Inter-Organizational Requirements of the Innovation Process

David J., Teece (1989):

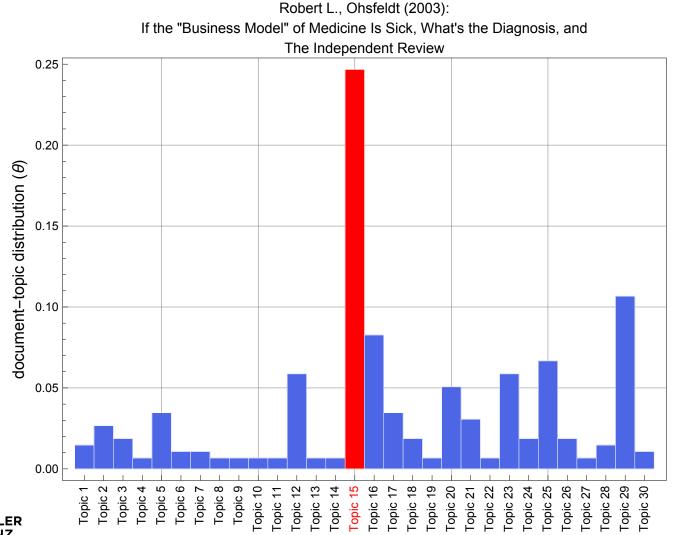


David J., Teece (1989): Inter-Organizational Requirements of the Innovation Process

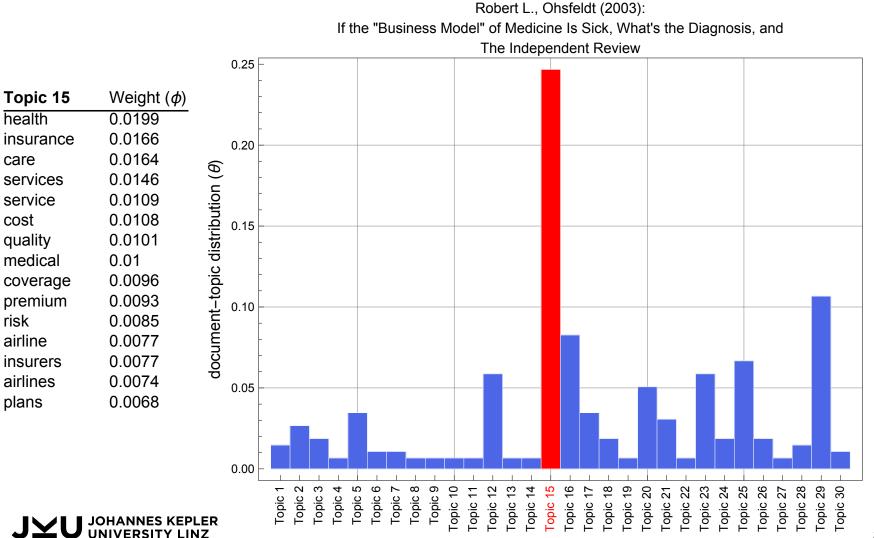
Topic1: technological innovation and industrial development

				Inter–Organ	izational Require	ments of the Innova	ation Process
		_			Managerial and [Decision Economic	^s Topic 21
		-		Topic 5	Topic 12	—Topic 18	management
Topic 1	Weight (ϕ)	0.25		law	price	theory	based
technology	0.0247	-		act	product	economics	research
industry	0.0172	F		public	sales	analysis	different
innovation	0.0164	0.20		control	market	press	role
firms	0.0158			government	consumer	university	university
product	0.0153			states	costs	journal	information
technological research	0.0158 0.0153 0.0151 0.0151 0.0147	-		commission	consumers	economists	important
production	0.0147	0.15		policy	cost	economy	process
process	0.0128 0.0119 0.0113 0.0108 0.0104			federal	competitive	york	performance
firm	0.0119	E E		com	demand	cambridge	structure
investment	0.0113	0.10		legal	firms	new	specific
development	0.0108	-		cases	markets	american	analysis
industries	0.0104			power	firm	general view	approach
products	ت 0.0104 ^ح	· -		case	products		business
industrial	0.0103	0.05		business		approach	
		0.00 -					
		0.00	- 0 ω 4	5 6 6 8 9 9	0 <i>L</i> 0 6 <i>L k k</i>	2 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	22 23 26 26 27 28 22 27 28 22 27 28 22 27 22 22 23 22 23 22 23 23 23 23 23 23 23
	HANNES KEPLER		Topic Topic Topic		Topic 1 Topic 1 Topic 1 Topic 1 Topic 1		Topic 2 Topic 2 Topic 2 Topic 2 Topic 2 Topic 2 Topic 2 Topic 2





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• Topic15: health care and insurance

Robert L., Ohsfeldt (2003): If the "Business Model" of Medicine Is Sick, What's the Diagnosis, and The Independent Review 0.25 Topic 15 Weight (ϕ) health 0.0199 0.0166 insurance 0.20 0.0164 care document–topic distribution (heta) 0.0146 services service 0.0109 0.0108 cost 0.15 quality 0.0101 medical 0.01 0.0096 coverage 0.0093 premium 0.10 0.0085 risk airline 0.0077 0.0077 insurers airlines 0.0074 0.05 plans 0.0068 0.00

> Topic 9 Fopic 10

Topic 8

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Topic ; Topic 4 Topic 4 Fopic 13

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Topic 12

Fopic 11

Fopic 18 Fopic 19 Fopic 20 Fopic 22 Fopic 23 Fopic 24 Fopic 25 Fopic 26

Copic 21



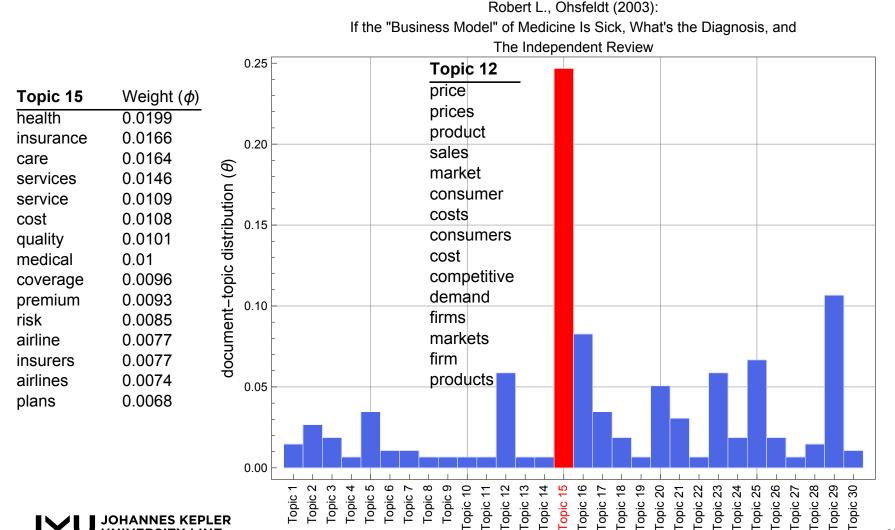
Topic 29

Topic 30

Fopic 28

Fopic 27

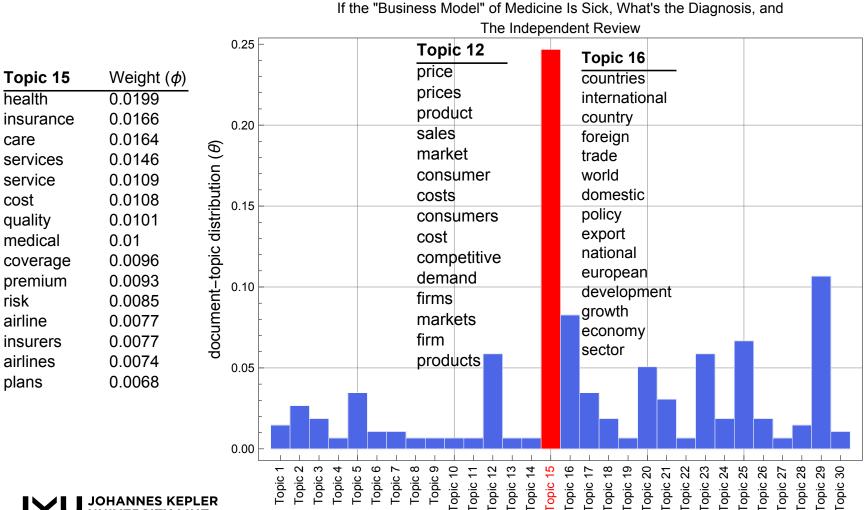
Topic15: health care and insurance





Robert L., Ohsfeldt (2003):

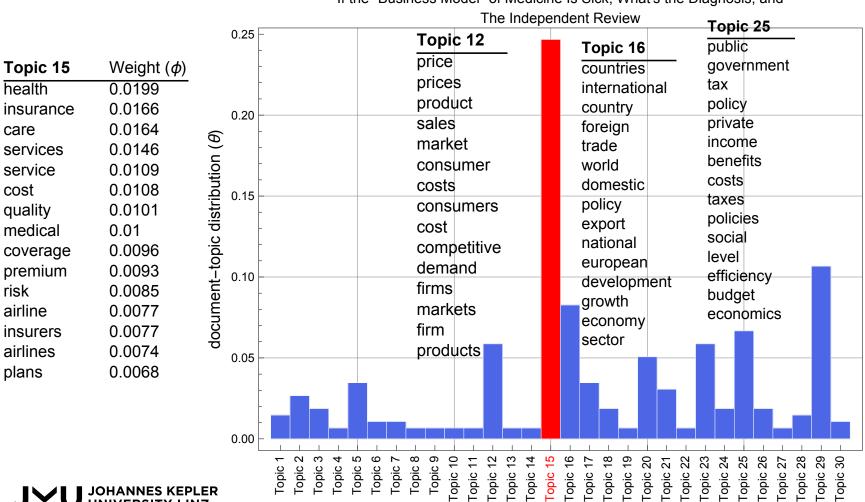
Topic15: health care and insurance







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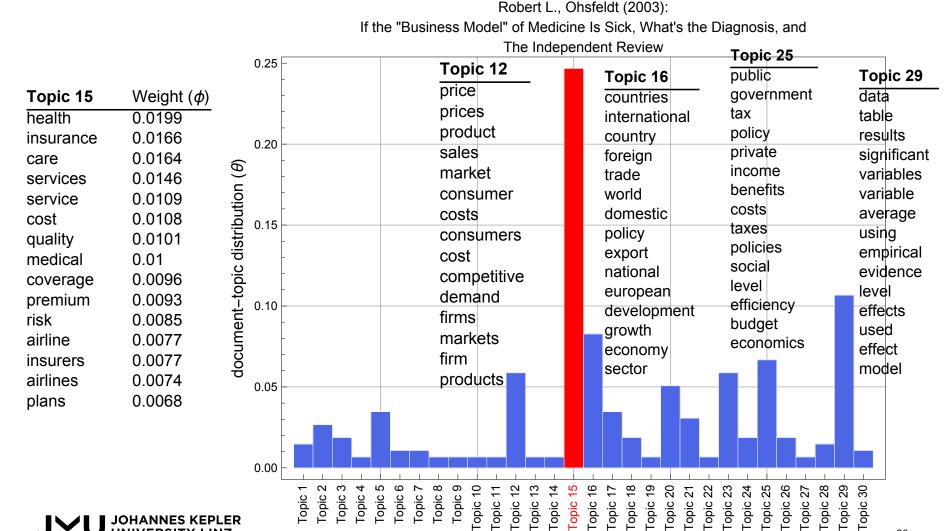


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Topic15: health care and insurance



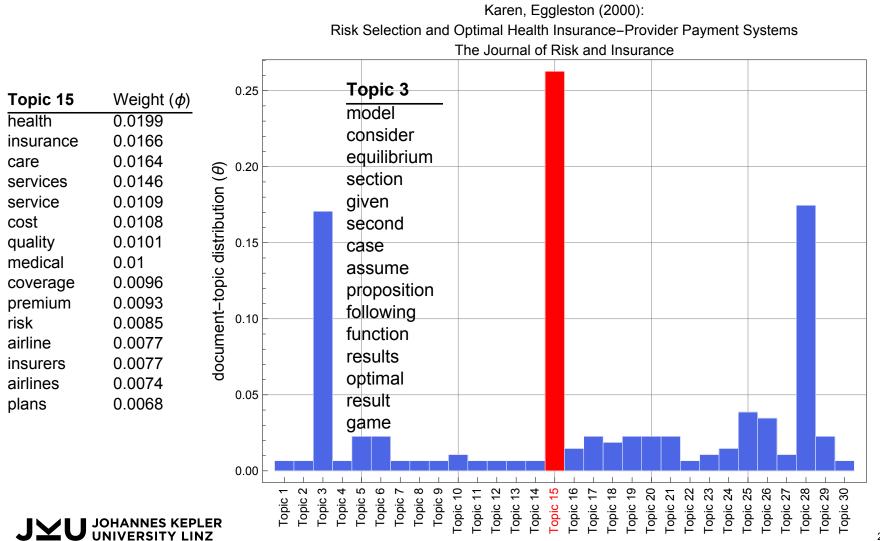


Topic15: health care and insurance

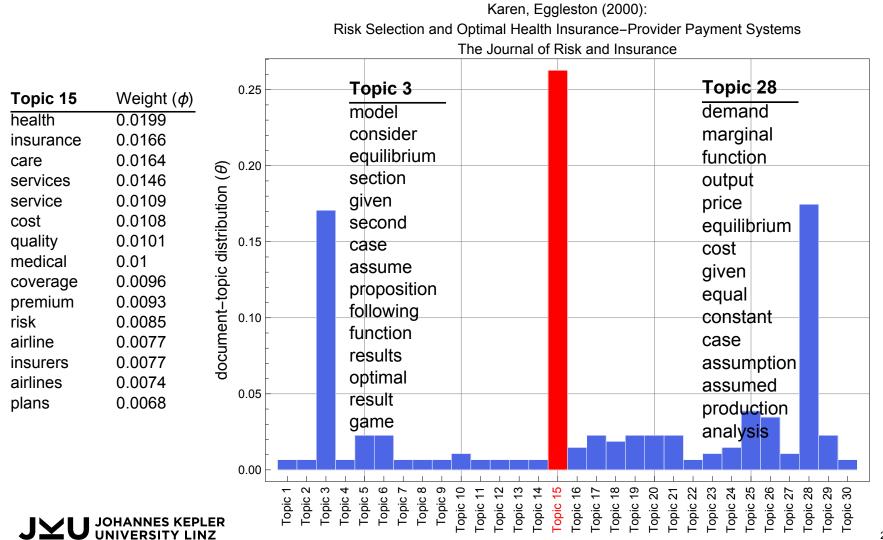
Karen, Eggleston (2000): Risk Selection and Optimal Health Insurance-Provider Payment Systems The Journal of Risk and Insurance 0.25 Topic 15 Weight (ϕ) health 0.0199 0.0166 insurance 0.0164 care 0.20 document–topic distribution (heta) 0.0146 services service 0.0109 0.0108 cost quality 0.0101 0.15 medical 0.01 0.0096 coverage 0.0093 premium 0.10 0.0085 risk airline 0.0077 0.0077 insurers airlines 0.0074 0.05 plans 0.0068 0.00 Fopic 13 Fopic 15 Fopic 16 Fopic 19 Fopic 10 Copic 12 Fopic 14 Topic 17 Fopic 18 Topic 20 Topic 22 Copic 23 Topic 24 Fopic 25 Fopic 26 Topic 6 Topic 8 Topic 9 Fopic 11 Copic 21 **Fopic 27** Fopic 28 Topic 29 \sim З S Topic 30 4 \sim Topic 4 Topic (Topic Topic Topic Topic .



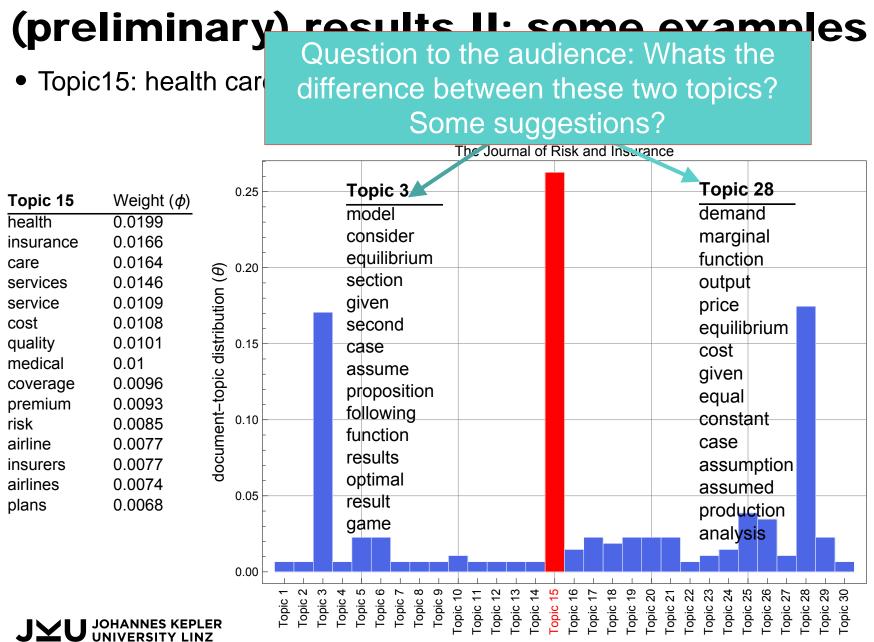
Topic15: health care and insurance



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21





Topic 22	Weight (ϕ)
anthony	0.0087
morris	0.0066
occurring	0.0064
klaus	0.0053
capturing	0.004
observers	0.0036
tighter	0.0036
chowdhury	0.0034
tai	0.003
phillip	0.0025
stayed	0.0025
quiet	0.0023
vic	0.0023
fication	0.0023
stacking	0.0021



• Topic22:???

Weight (ϕ)
0.0087
0.0066
0.0064
0.0053
0.004
0.0036
0.0036
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0.003
0.0025
0.0025
0.0023
0.0023
0.0023
0.0021



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morris

klaus

tighter

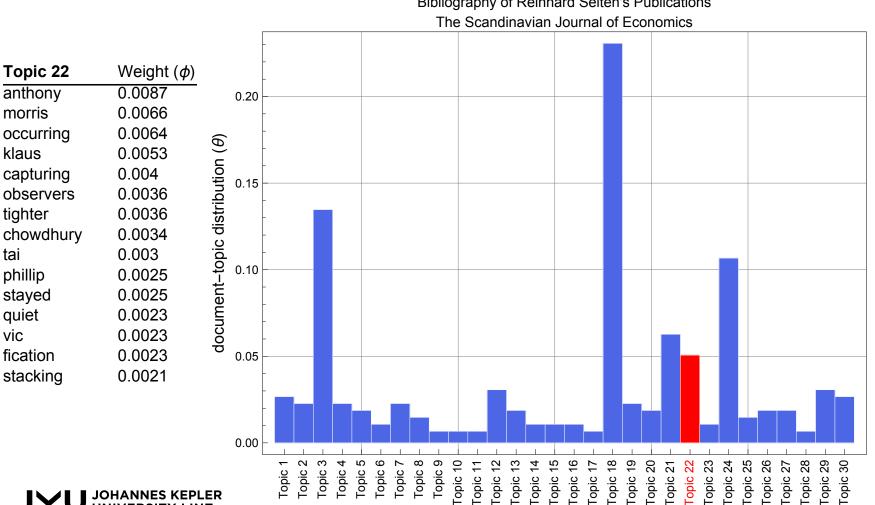
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vic fication

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(1995): **Bibliography of Reinhard Selten's Publications**

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Topic 22

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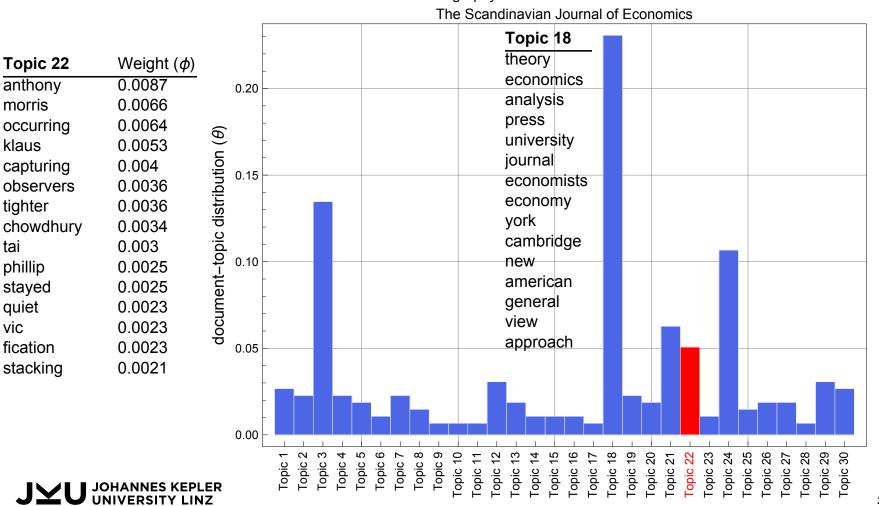
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Summary & Outlook



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 - Starts with a time lag of about 10-15 years to intensify compared to the overall development of economic research output
 - Is highly concentrated in terms of publication outlets: a third of all articles in the sample are published in 10 journals
 - Is given the marginalization of heterodox approaches within economics – somewhat balanced: a substantial part of the literature related to competition is published in (a few) heterodox journals





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 - Analysis of the topic-document distributions enables
 - a reconstruction of the genesis of specific topics (and its disappearance)
 - an analysis of co-occurrences between specific topics that relate to competition





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 - Word stemming or not?

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 - Extracting topics from period/decade subsamples (e.g. 1960s, 1970s,... see also Ambrosino et al. 2018)
 - Replication for other fields (e.g. Sociology, Political Science, Anthropology)



