MU 90
1919–2009
Výročí založení Masarykovy univerzity
Anniversary of Masaryk University

Problems of quantitative evaluation of research results

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Motto

- **Concept of the methodology of quantitative evaluation of research results in Czech Republic (2004-2009), as well as the concrete treatment of data is not adapted to the explicitly declared purposes of evaluation.**

Theses – I

- **ranking of research organizations on a unique numerical scale quantifying the quality and effectiveness of their research – just the right tool for institutional financing of groups of organizations**

Antitheses – I

- **no possibility to reasonably quantify results of activities with quality and effectiveness as their most important aspects**
- **no possibility to measure a multidimensional quantity by only one its component**

Theses – II

- **quantitative evaluation of research outcomes in all fields of research can be reduced to a unique universal scale**

Antitheses - II

- **quite specific practice in each field of research as for various ways of presentation of results**
- **extremely different financial needs in various fields of research**

History

six years of „experiments“ with a unique scale

- **2004-2007: Index SR (rate of weighted number of results and corresponding financial support) as a measure of research effectiveness**
- **2008-2009 the weighted number of results as a measure of research quality („Metodika“ 2008,09)**

Present

- **importance of features specific in various fields of research conceded for the first time**
- **no analysis of research outcomes data with respect to specific aspects of research fields**

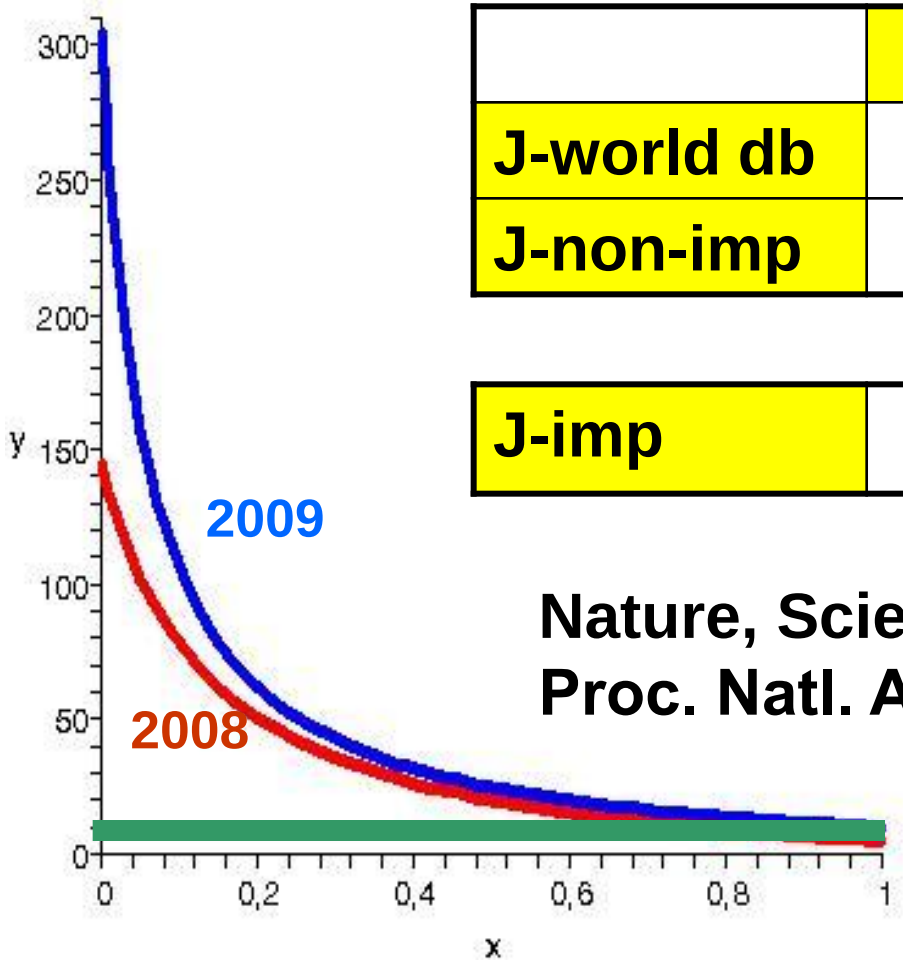
Assumptions – I

- **the weighted number of research results = the right parameter for determining financial support of great groups of organizations**

Reality – I

- **the „fine“ method of assigning weights to research results = classification of organizations accordingly their size (number of researchers)**
- **negligible differences between weighing 2008 and 2009**

Weights of results J (journals)



	NRRE	other
J-world db	12	8
J-non-imp	10	4

J-imp	normalized order

Nature, Science,
Proc. Natl. Acad. Sci. USA … 500

Weights of results B (books)

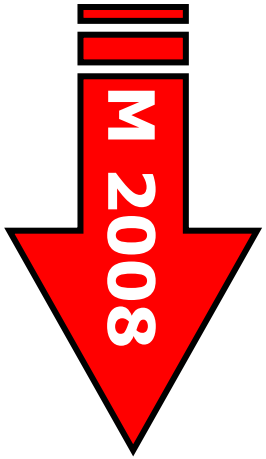
pages no suppl.		printing		language NRRE		language other		cont-ent
< 100	≥ 100	< 200	≥ 200	world	CZ	world	CZ	?
NO	YES	NO	YES	40	40	40	20	?

1 paper in Science ≈ 12 books
apart from the content

Weights and size of institutions

groups of research organizations

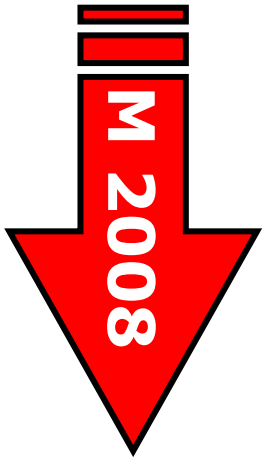
group of universities
group of institutes of Czech Acad. Sci.



results	accepted		all
	number/person	points/person	number/person
universities	2,2	43,6	8,3
institutes	3,8	104,3	7,2

Weights and size of institutions

groups of research organizations



group of universities

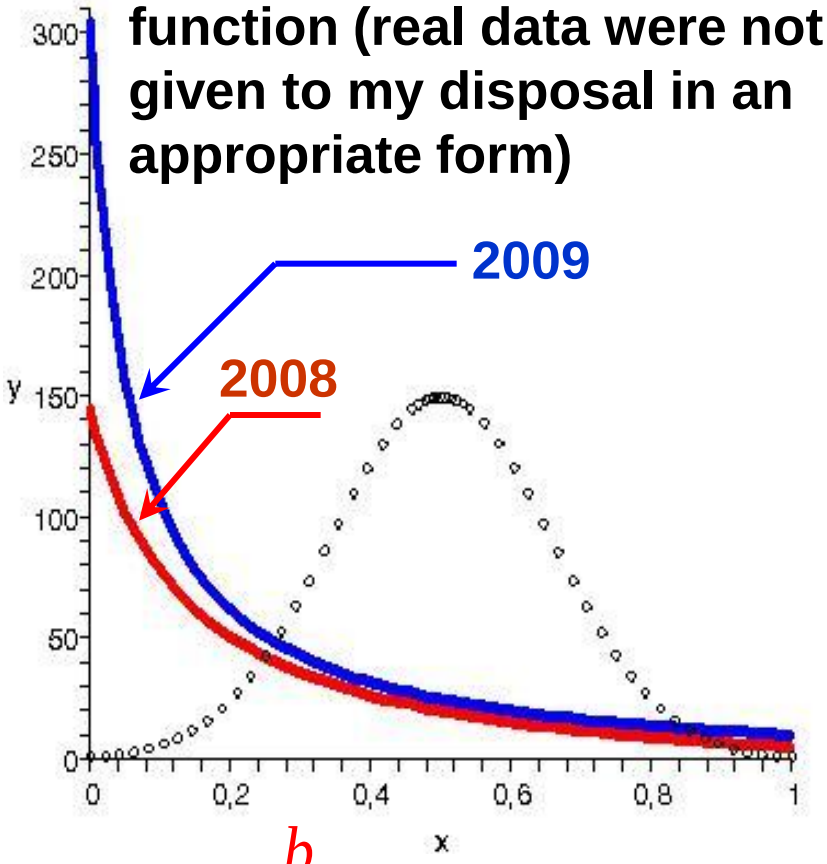
research / teaching = 0.5 / 0.5

group of institutes of Czech Acad. Sci.

results	accepted		all
	number/person	points/person	number/person
universities	4,4	87,2	16,6
institutes	3,8	104,3	7,2

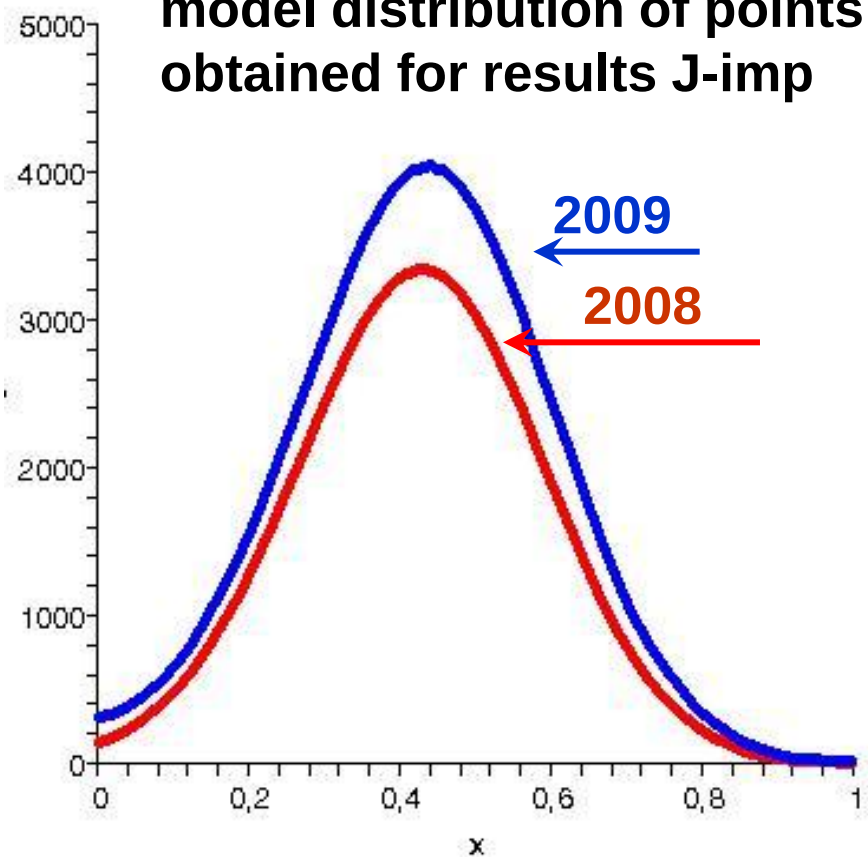
Weight function

model distribution of number of results J-imp and weight function (real data were not given to my disposal in an appropriate form)

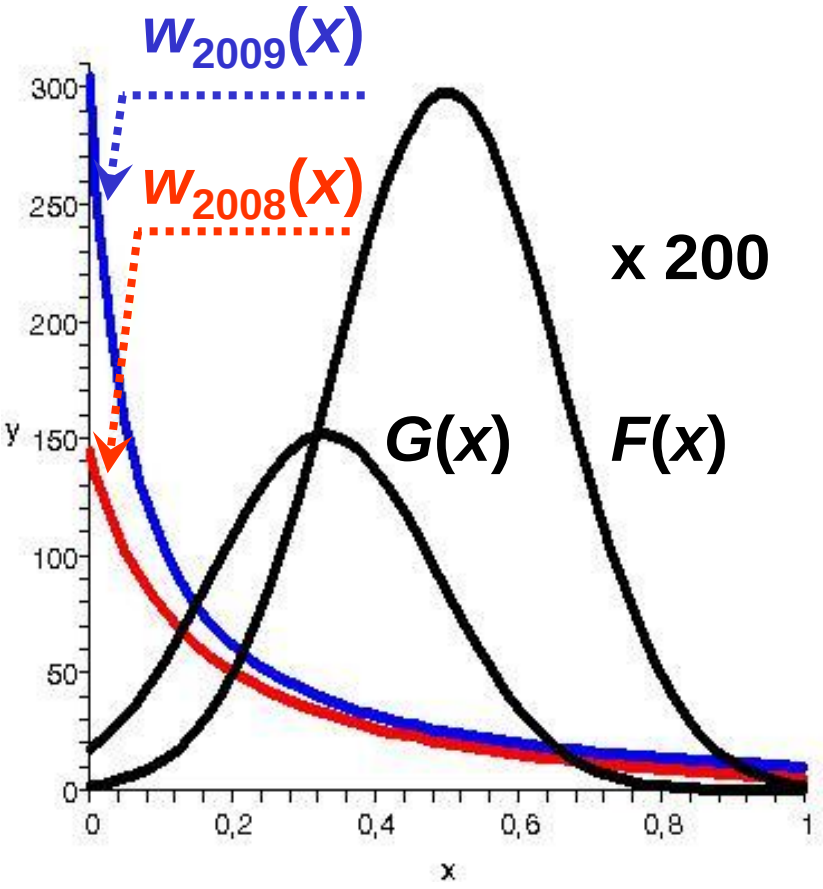


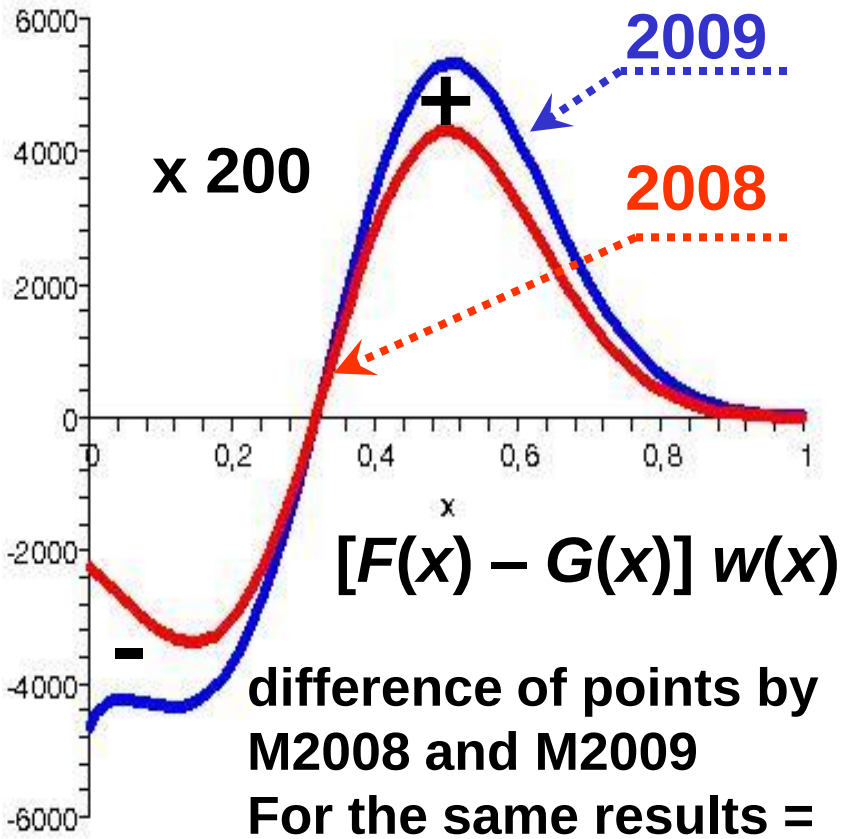
$$y = a + \frac{b}{x + C}$$

model distribution of points obtained for results J-imp



Influence of weight function – I





$[F(x) - G(x)]\, w(x)$

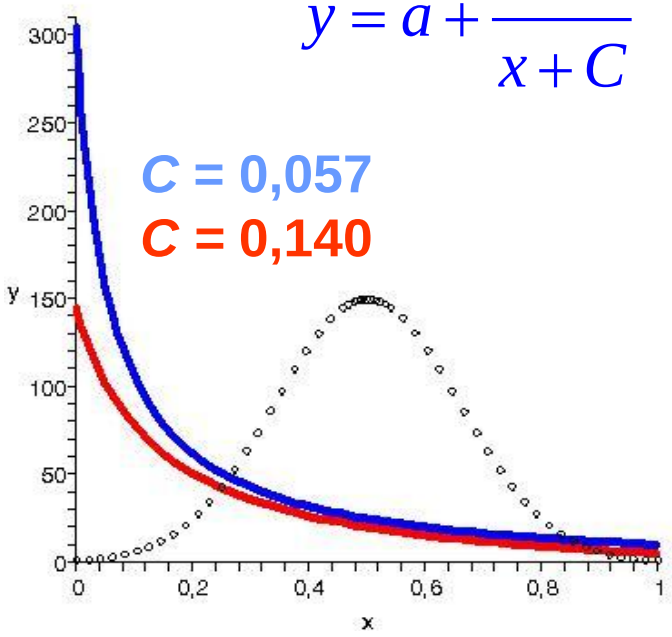
difference of points by M2008 and M2009
For the same results = sum of areas between graphs (with signs)

Influence of weight function – II

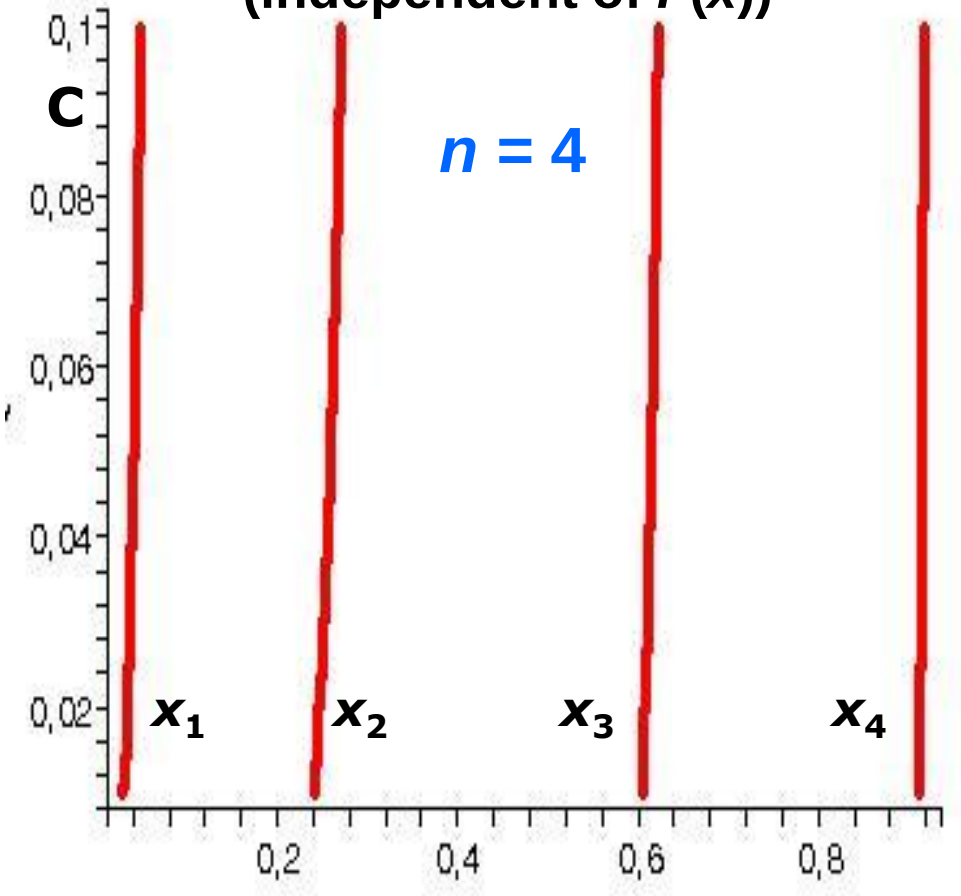
Gauss quadrature

$$\int_a^b F(x)\,w(x)\,\mathrm{d}x \approx \sum_{j=1}^{n} \lambda_j\, F(x_j)$$

$$y = a + \frac{b}{x + C}$$



changes of x_j with C (independent of $F(x)$)



Why previous estimations?

- **problem: complete sets of data – not given to my disposal in the form appropriate for numerical treatment**

Requirement

- **for institutions – a possibility of preliminary self--evaluation of results based on data analysis**

Assumptions – II

- **usability of the weighted number of research results as the scaling parameter inside the groups of research organizations**

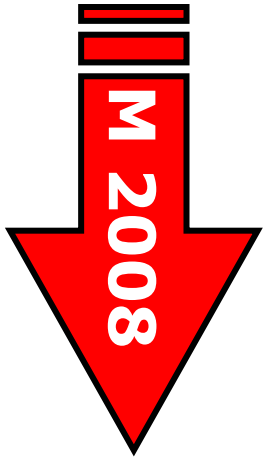
Reality – II

- **great inner differences between fields of research caused in principle by their specificities**

„Metodika“ and fields of research

groups of Acad. Sci. institutes
fields of research

I. science, mathematics, informatics
II. humanities, social sciences, economy



results	accepted		all
	number/person	points/person	number/person
group I	3,1	107,6	5,7
group II	7,3	88,1	14,3

Academy and universities

results group I	accepted		all
	number/person	points/person	number/person
UK	4,8	152,0	9,4
MU	5,0	131,6	15,4
Acad. Sci.	3,1	107,6	5,7

results group II	accepted		all
	number/person	points/person	number/person
UK	3,1	45,6	8,8
MU	3,5	45,1	11,6
Acad. Sci.	7,3	88,1	14,3

Structure of results Acad. Sci.

Institutes of Acad. Sci. – fields of research

I. science, mathematics, informatics
II. humanities, social sciences, economy

amount of results J (journal) and B (book) on number / weighted number of all results

	number		points	
	J [%]	B [%]	J [%]	B [%]
group I	81,3	9,1	88,1	1,9
group II	46,4	53,2	42,7	56,2

Concluding thesis

- **evaluation of research quality and effectiveness – an audit primarily based on extra financed external (international) expertises**

Concluding antithesis

- **1st step: own analysis of accessible data to disclose specific practice and financial needs in various fields of research**
- **2nd step: cooperation of all representations of the academic community in formulating concept of evaluation**
- **3rd step: concluding international expertises**

Concluding remark

steps 1 and 2

- **the own intellectual potential of research institutions**
- **during several months**
- **without additional financial requirements**

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