

# The Influence of Population Quality Competitiveness to Regional Innovation: the China Case

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# Focus of competition

- the world economy is changing from the industrial economy to the *knowledge-based* economy
- the modern international competition has been turned into the competition of *science, knowledge* and *intellectuals*
- the human resource is playing a leading role in the activities of a nation's innovation

## Challenges and problems

- the adjustment of the industrial structure is being accelerated
- the skills of workers are being constantly improved
- the quality of national life is being continuously promoted
- international competition is becoming increasingly fierce
- for China: human resource needs to be strengthened in many aspects (the size, structure, utilization, mobility and quality and so on)

# Outline of research

Based on the population data of the “China Statistical Yearbook”

- 1 an overview of the features of China's population
- 2 an exploration of the relationship between human resource and regional innovation from a perspective of *population qualities*

## Population age structure: 1953-2000

**Table 1:** Population age structure: 1953-2000 (%). Stronger labor force and less burden for supporting families, as the proportion of the young and the old is decreasing

Group	1953	1964	1982	1990	2000
0-14	36.28	40.69	33.59	27.69	22.89
15-64	59.31	55.75	61.50	66.74	70.15
65 and above	4.41	3.56	4.91	5.57	6.96

## Education level structure: 1964-2000

**Table 2:** Education level structure: 1964-2000 (%). Educational quality is also increasing.

Group	1964	1982	1990	2000
Junior College and Above	0.4	0.6	1.4	3.6
Senior Secondary School	1.3	6.8	8.0	11.1
Junior Secondary School	4.7	17.9	23.3	34.0
Primary School	28.3	35.2	37.1	35.7

## Life expectancy: 1953-2000

**Table 3:** Gender and life expectancy structure: 1953-2000 (years). Higher average life expectancy has indicated a healthier population.

Group	1982	1990	2000
Average	67.77	68.55	71.40
Male	66.28	66.84	69.63
Female	69.27	70.47	73.33



## Regional structure: 1964-2000

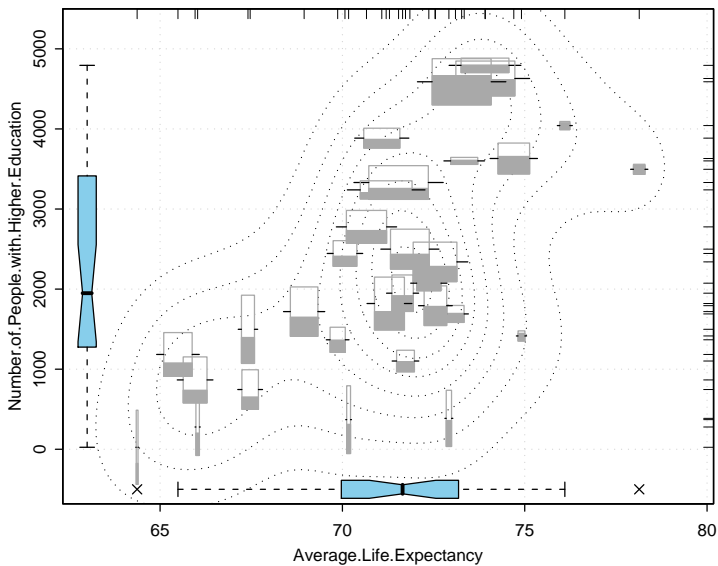
**Table 4:** Regional structure: 1964-2000 (%). Increasing proportion of urban population just shows better living conditions.

Group	1953	1964	1982	1990	2000
Urban	0.13	0.18	0.21	0.26	0.36
Rural	0.87	0.82	0.79	0.74	0.64

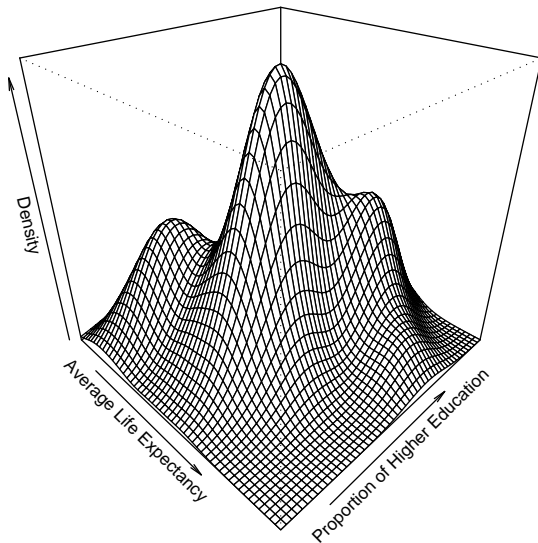
## Five variables describing the population characteristics

- gross quantity of the population
- growth rate
- health quality (life expectancy)
- educational quality (proportion of people with higher education)
- living standard (proportion of the urban population)

# A graph summarizing the five characteristics



# A perspective plot illustrating the 2D density



## Number of patents

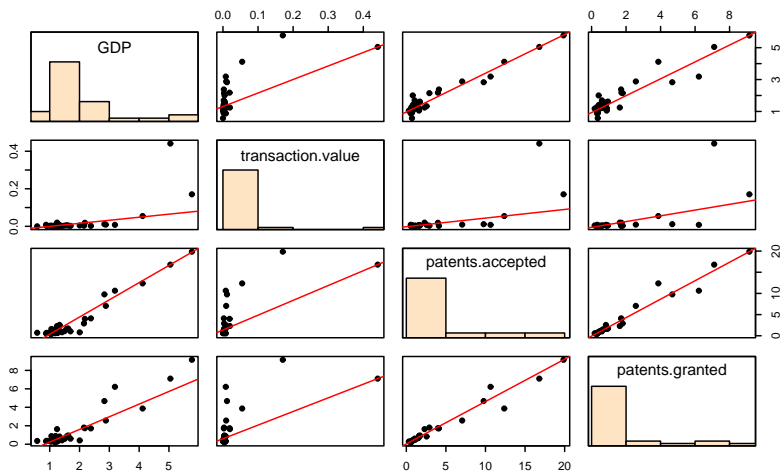
Patent is the most common indicator to evaluate the output of innovation, e.g. Griliches (1990) and Acs et al (1989) have justified that it is reasonable to use the patent data to measure the output of innovation.

- 1 the statistical data for patents is available from the current system of statistics
- 2 the actual meaning of patent is closely related to innovation
- 3 the standard for granting patents is relatively objective and the changes of standards are rather slow

# The output value of new products

The market value from innovation is also important.

# Relationship between GDP per capita, patents and transaction value in technical market

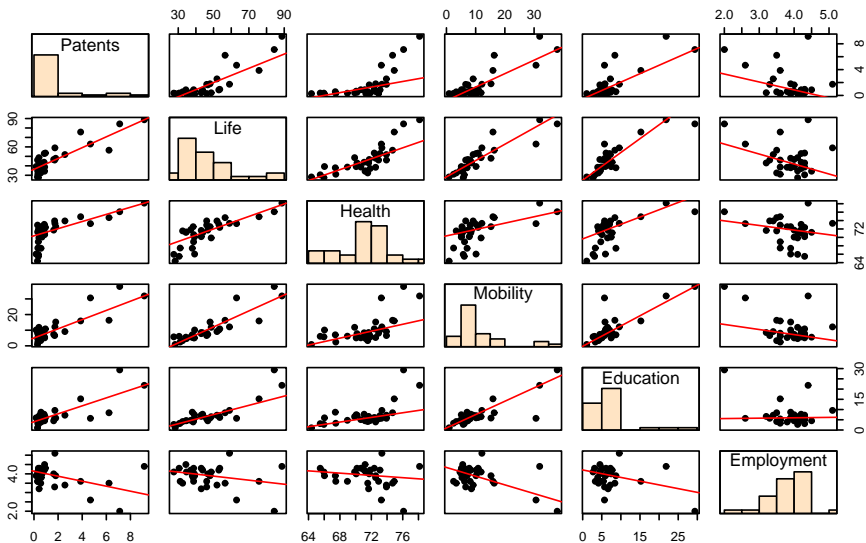


## Population qualities

- Living condition (“Life”): denoted by the proportion of urban people – larger proportion can indicate better living conditions
- Health quality (“Health”): denoted by life expectancy – longer lives mean better health
- Population mobility rate (“Mobility”): computed from the sampling survey data – it is the proportion of people who move from their hometown to other regions
- Educational quality (“Education”): denoted by the proportion of people with higher education
- Employment situation (“Employment”): denoted by the registered unemployment rate in urban areas



# Relationship between patents and population qualities

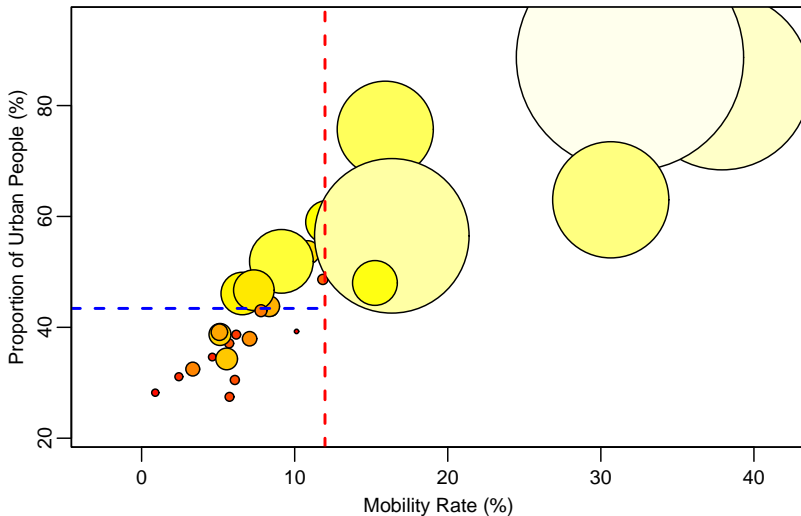


## Multivariate regression

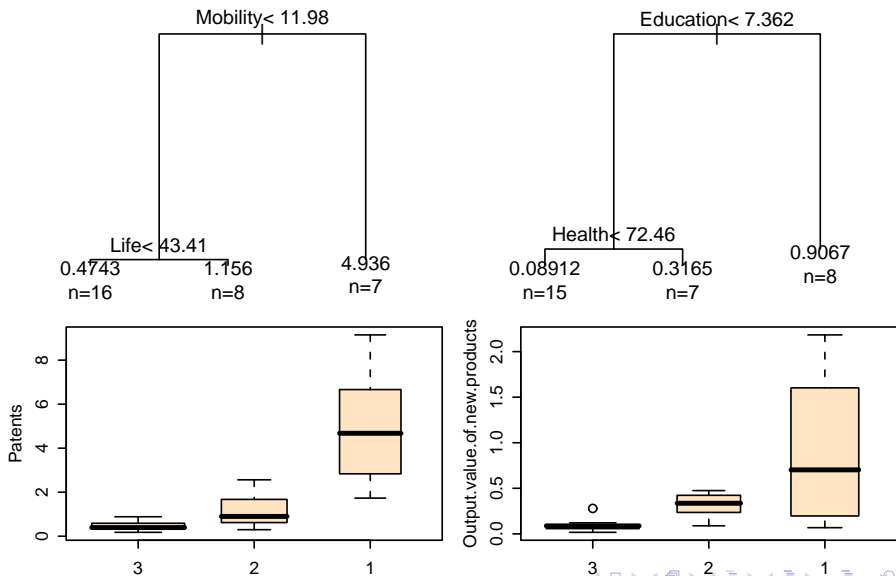
**Table 5:** Multivariate regression on the innovation output against population qualities

	Coefficient	Standard error	t	Pr(> t )
Intercept	-16.0396	7.65277	-2.096	0.0468
Life	-0.00124	0.04618	-0.027	0.9788
Health	0.21005	0.1165	1.803	0.084
Mobility	0.16287	0.05692	2.861	0.0086
Education	0.05962	0.0695	0.858	0.3995
Employment	0.15628	0.38655	0.404	0.6896

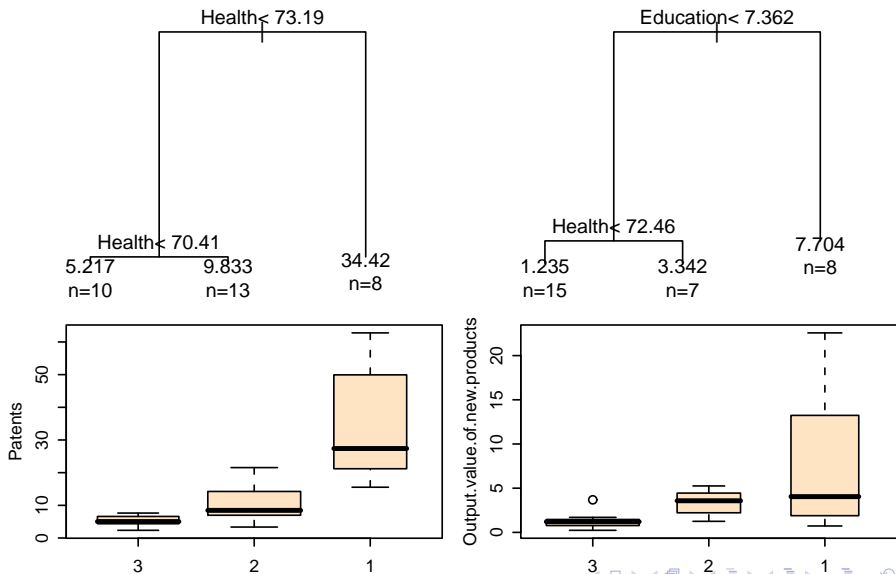
# Introduction to classification and regression tree (CART)



# Classification and regression tree (1)



# Classification and regression tree (2)



# Conclusions

- from the data of national population census in history: the population quality competitiveness is rather unbalanced for all the 31 regions, and the characteristic of spatial clustering of population qualities is obvious
- using patents as the indicator of innovation output, we discovered that the mobility of population is the most important factor in regional innovation (in the sense of *all* the people)

## Conclusions (cont'd)

- when using the “output value of new products” as the indicator, the educational level plays the most critical role in regional innovation
- the other two factors “health quality” and “living condition” can discriminate regions with middle and low levels of innovation

# Thanks!

Any questions?

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