
# Our identity: who we are and where we are going

Stefano Paleari*

Higher Education and Socioeconomic Development

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*Cattaneo, Meoli, Paleari, Salanti (2016), Unintended consequences of "cheese slicing" policies: The case of Italian universities

# I PART:
# Our profession: a matter of identity

# II PART:
# The trends in the Italian higher education system in the period 2008-2016

# Agenda – First part

1) The utilitarian vision of University
   - A «human capital hotbed»
   - Substantial implications
2) The role of social sciences
   - The perception of the university role
   - The peculiarities
3) Management Engineering
   - A field «at the crossroads»
   - George Akerlof's solution
   - Combination is the innovation

# The utilitarian vision of University

- Outside academia, universities and their staff are often misrepresented
- The impression is that we are faced with a purely utilitarian vision of the tasks of academic institutions
- The idea of a University at the service of production is rooted in the notion of «human capital»

# The utilitarian vision of University – a «human capital hotbed» (1/2)

- There are investments in human capital as well as in fixed capital.
- The description of the importance of what we today name human capital can already be found in the *Wealth of Nations* (Smith 1976, pp. 393-94):
  - acquired and useful skills of all inhabitants or members of society

# The utilitarian vision of University – a «human capital hotbed» (2/2)

- The idea of human capital is well rooted in the history of the economic thinking
- Universities are often seen as the last phase of the «human capital production» process
- However, it is not possible to extend all the considerations relevant to fixed capital to human capital

# The utilitarian vision of University – substantial implications (1/4)

- Unlike fixed capital, the land and other forms of immaterial capital, the human capital cannot be separated (or alienated) from its originating owner
- Human capital «walks on men's feet». Hence, any migration process implies a human capital transfer from a region to another
- Since human capital is perishable, even the investment in human capital unavoidably includes a significant depreciation

# The utilitarian vision of University - substantial implications (2/4)

- We should be able to allocate human capital resources in a way that - within each different level of instruction - allows the same marginal rate of "social" return. The latter should not be inferior than the return of alternative private investments.
- Due to the practical inability to achieve reliable estimations, the risk of *overeducation* is always present.

# The utilitarian vision of University - substantial implications (3/4)

- If we consider the human capital as a factor of production, we need to consider how it can combined with other necessary factors of production.
- To what extent can an economic system efficiently use the new human capital inserted in the system year after year?

# The utilitarian vision of University - substantial implications (4/4)

- In Italy, in the last years, some clearly interconnected issues – e.g. investments stagnation, graduates migration and wages reduction – have been often highlighted, without the emergence of a satisfying analysis of the related context

# The social sciences - the perception of the University role

- Unsurprisingly, the perception of the University role has been criticized
- The scientific disciplines (medicine and engineering) are perceived as characterized by a major and visible impact as well as by a greater social utility.
- The contribution of the so called social sciences cannot be overlooked

# The social sciences – the peculiarities (1/2)

- Social sciences belong to the fields of "human dominated" and "human influenced" systems, together with the STEM disciplines (Sciences – including medicine –, Technology, Engineering and Mathematics)
- Natural sciences exclusively depend on the behaviour of nature, which is mainly forecastable and constant over time, while social sciences study the human behaviour that continuously evolves over time

# The social sciences – the peculiarities (2/2)

- Social sciences ask the same research questions that natural sciences ask, but the answers change over time.
- Due to this feature, according to the public opinion they are seen as less "scientific".

# Management Engineering – a field "at the crossroads" (1/2)

- Management Engineering lies "in the middle ground"
- It can be considered a successful experiment (in the social sciences?)
- However, there are frequent debates over a neither engineering nor economical formation and the combination of «real engineering» topic with technical-economical research field

# Management Engineering – a field "at the crossroads" (2/2)

- Going back to social sciences, the aim of social science research can be:
  - To forecast possible future developments
  - To inspire the actions of decision-makers

# Management Engineering - George Akerlof's solution

- The most difficult issue is always to solve big problems by proposing simple solutions
  - George Akerlof won the Nobel prize in 2001 by identifying and rationalizing a complex problem related to information asymmetries on the markets
  - However, the solution of the problem was a simple mathematical model

# Management Engineering- combination is the innovation

- Innovation in education is based on the combination of different disciplines, both in terms of contents and methodologies
  - Polytechnics were born from the combination of engineering and architectural disciplines. Today they will combine engineering disciplines with the medical ones, which are even richer in technologies

# Conclusions (1/2)

- Maybe the fact that Universities are increasingly perceived in utilitarian terms has at least an explanation
  - The investment in human capital
- In such a context, the critical position of social sciences compared to STEM disciplines is evident
- It is really difficult to innovate at the «crossroad»

# Conclusions (2/2)

- Management Engineering is a successful experiment along with the difficulty to characterize it *(It's like the beauty and the time)*
- Social sciences need to gain more and more importance as scientific disciplines which can impact on the future developments of society


# II part

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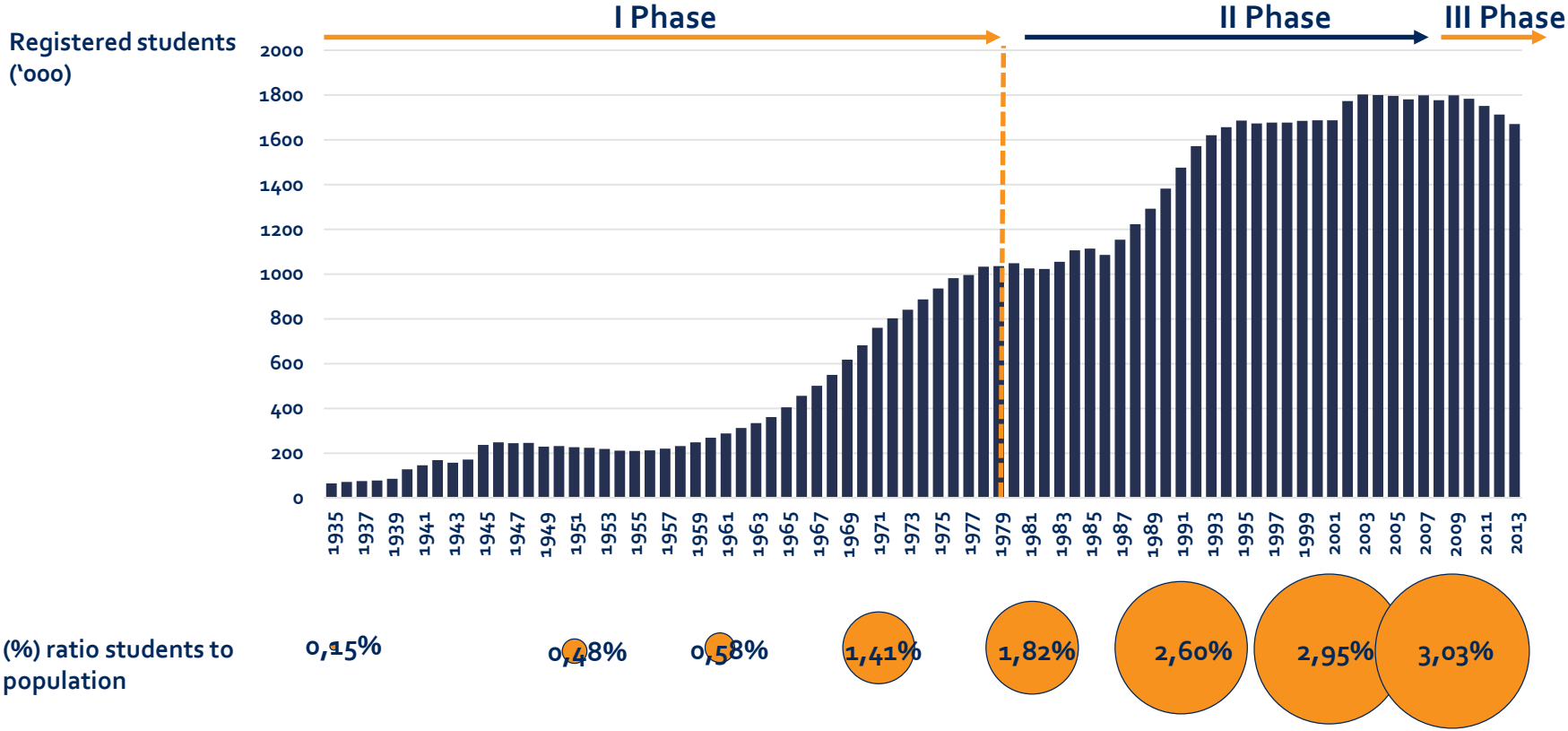
# Agenda – Second part

- The three phases of the Italian university system in the republican era
- Changes of the Italian university system in the last phase
- Effects of recent policies and trends across disciplines
- Management Engineering field

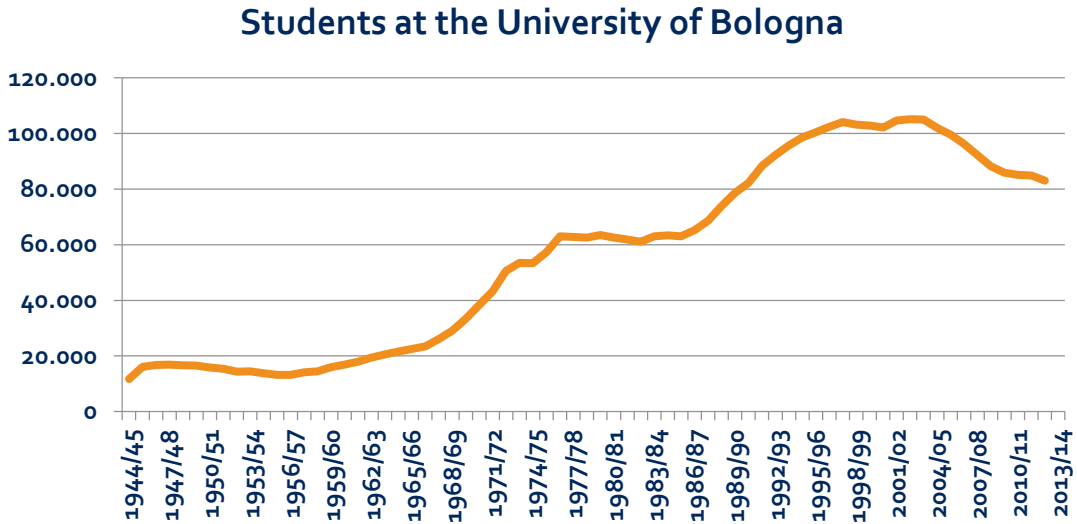
# The republican Italian university

The Italian republic has faced three important phases in the evolution of the Italian higher education system



# The republican Italian university:
## I phase (1950-1980) – I quantitative growth

- The birth of the mass university: from 300 thousands to 1 Mln students
- Dimensional growth of historical universities
- Concentration of university equipments




Source: Own elaboration on Desalvo (1988) data

# The republican Italian university:
## II phase (1980-2008) – II quantitative growth

- Growth in the number of public universities. A growth higher than the increase in the number of students
- Important growth in the number of private universities along with the growth of telematic universities

| No. of univ | Public | Private (traditional) | Private (telematic) | Tot. | No. students ('ooo) |
|---|---|---|---|---|---|
| 1950 | 35 | 4 | | 39 | **231** |
| 1960 | 36 | 4 | | 40 | **268** |
| 1970 | 41 | 5 | | 46 | **682** |
| 1980 | 46 | 6 | | 52 | **1.048** |
| 1990 | 53 | 6 | | 59 | **1.381** |
| 2000 | 65 | 13 | | 78 | **1.687** |
| 2010 | 67 | 18 | 11 | 96 | **1.783** |

# Recent changes in the Italian university system

## III phase (2008-2016) – System contraction

| Characteristics | 2008 | 2016 |
|---|---|---|
| • Rector mandate | *Renewable by statute* | *6 years (non-renewable)* |
| • Funding | *Historical base* | *Perfomance-based mechanism and standard-cost approach* |
| • FFO | *7,3 Mld €* | *6,9 Mld €* |
| • Performance evaluation | *NO* | *ANVUR* |
| • Non-academic board members | *Not mandatory* | *At least 3 out of 11* |
| • Recruiting | *Local calls* | *National habilitation* |
| • Tenured academic staff | *62.768* | *50.192* |
| • Registered students | *1,817 Mln* | *1,642 Mln (2014-15)* |

# The impact of the third phase on disciplinary groups

1. What happens at the level of each **(28) disciplinary group** (e.g. ING-IND; ICAR; AGR; BIO)?

2. What about the **(369) SSDs** (e.g. IND-IND35; ING-IND34)?

3. How has ING-IND35 evolved compared to its macro disciplinary sector ING-IND, mainly considering the trend in students?


# Focus: Disciplinary groups

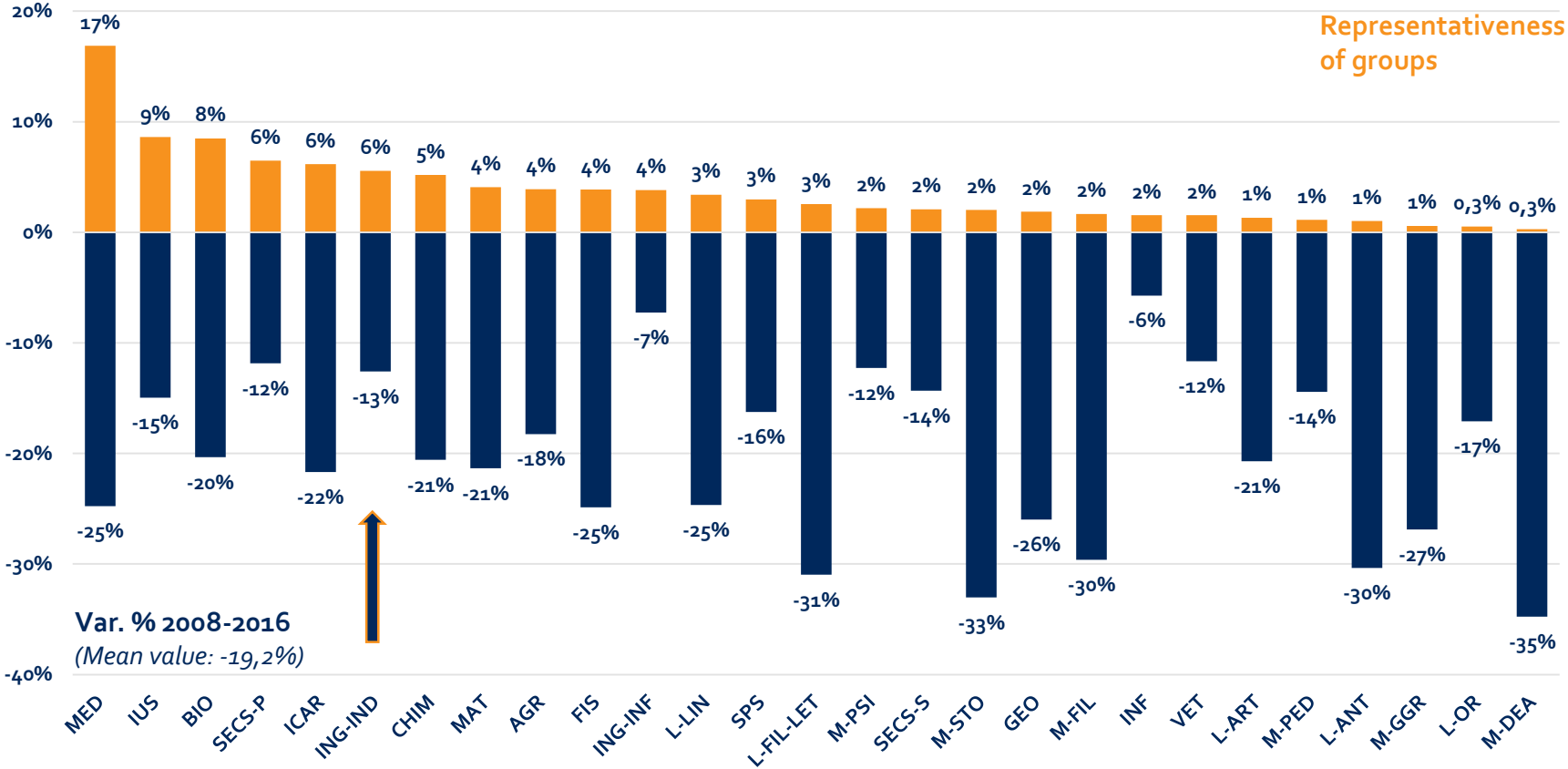
# Legenda: 28 disciplinary groups

| Code | Disciplines | Code | Disciplines |
|---|---|---|---|
| AGR | Agrarie | MAT | Matematiche |
| BIO | Biologiche | MED | Mediche |
| CHIM | Chimiche | M-DEA | Scienze demoetnoantropologiche |
| SECS-P | Economia politica | M-FIL | Scienze filosofiche |
| ING-IND | Economico-industriali | M-GGR | Scienze geografiche |
| SECS-S | Economico-statistiche | GEO | Scienze geologiche |
| FIS | Fisiche | M-EDF | Scienze motorie |
| IUS | Giuridiche | M-PED | Scienze pedagogiche |
| INF | Informatiche | SPS | Scienze politiche |
| ICAR | Ingegneria civile e architettura | M-PSI | Scienze psicologiche |
| ING-INF | Ingegneristico-informatiche | VET | Scienze veterinarie |
| L-FIL-LET | Lettere | L-ANT | Scienze dell'antichità |
| L-OR | Lingue orientali | L-ART | Storia dell'arte |
| L-LIN | Linguistica generale e alle lingue e letterature straniere | M-STO | Storiche |

Source: CINECA

# Representativeness & evolution

## Tenured academic staff (Full prof., Associate Prof., Researchers)




*M-EDF: Var. % 2002-2016 : 586%; Var. % 2008-2016: 14%  Data at 31° August 2016*

Source: CINECA

# Evolution of students over time per disciplinary group (nr. registered students)

| Disciplinary groups | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 | Δ % |
|---|---|---|---|---|---|---|---|---|
| ECONOMICS-STATISTICS | 238.935 | 239.955 | 238.730 | 236.299 | 232.768 | 227.654 | 222.988 | **-7,2%** |
| ENGINEERING | 204.615 | 207.159 | 206.495 | 209.354 | 207.688 | 210.034 | 212.440 | **3,7%** |
| MEDICINE* | 150.703 | 156.199 | 161.936 | 165.453 | 165.935 | 168.452 | 176.659** | **14,7%** |
| LAW | 216.015 | 212.930 | 211.787 | 207.189 | 195.018 | 187.781 | 176.578 | **-22,3%** |
| SOCIO-POLITICAL | 197.813 | 188.808 | 181.263 | 170.198 | 163.351 | 156.297 | 152.064 | **-30,1%** |
| LITERARY | 159.072 | 152.576 | 144.205 | 138.017 | 130.760 | 124.836 | 120.781 | **-31,7%** |
| LINGUISTIC | 96.189 | 95.864 | 94.124 | 92.888 | 95.618 | 96.263 | 97.699 | **+1,5%** |
| Tot. students system level | 1.814.344 | 1.799.542 | 1.781.786 | 1.704.428 | 1.709.408 | 1.676.956 | 1.652.592 | **-8,92%** |
| % ENGINEERING on tot. | **11,28%** | **11,51%** | **11,59%** | **12,28%** | **12,15%** | **12,52%** | **12,85%** | |

Note: We consider those sectors having at least 90,000 students in 2014/2015 (the representativeness of the considered groups is **64,2%** at a system level)
* Trend partly due to non-regular students
** **46,5%** of students has enrolled at Medicine and Surgery

Source: Own elaboration on MIUR data

# Evolution of students over time per disciplinary group (nr. enrolling students)

| Disciplinary groups | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 | Δ % |
|---|---|---|---|---|---|---|---|---|
| ECONOMICS-STATISTICS | 45.348 | 43.374 | 41.922 | 40.654 | 36.347 | 35.800 | 36.060 | -20,48% |
| ENGINEEERING | 33.447 | 34.983 | 34.755 | 35.491 | 34.316 | 34.110 | 35.052 | 4,80% |
| MEDICINE** | 25.613 | 26.449 | 26.049 | 24.554 | 22.121 | 23.241 | 26.262 | 2,53% |
| SOCIO-POLITICAL | 29.554 | 29.814 | 27.873 | 26.669 | 22.744 | 23.900 | 24.667 | -16,54% |
| LAW | 30.565 | 32.085 | 32.055 | 30.355 | 25.177 | 23.240 | 20.780 | -32,01% |
| LINGUISTIC | 17.645 | 17.185 | 16.711 | 17.539 | 18.071 | 18.957 | 19.585 | 10,99% |
| LITERARY | 23.191 | 21.123 | 19.010 | 19.208 | 16.248 | 16.428 | 17.005 | -26,67% |
| Tot. students system level | 295.518 | 294.724 | 288.286 | 279.025 | 253.848 | 252.457 | 255.294 | -13,61% |
| % ENGINEERING on tot. | 11,32% | 11,87% | 12,06% | 12,72% | 13,52% | 13,51% | 13,73% | |

Note: We consider those sectors having at least 15,000 enrolling students in 2014/2015

**Courses with a limited number of available places

Source: Own elaboration on MIUR data

# Mis-matching between total academic staff and students in 2008-2016

- «Suffering» disciplinary groups in terms of academic staff

| Var. 2008-2016 | Academic staff | Registered students | Enrolling students |
|---|---|---|---|
| Medicine | -25,0% | 14,7% | 2,53% |
| Engineering | -14,9%* | 3,7% | 4,8% |
| Linguistic | -24,7% | 1,5% | 10,99% |

- «Suffering» disciplinary groups in terms of students

| Var. 2008-2016 | Academic staff | Registered students | Enrolling students |
|---|---|---|---|
| Law | -15,0% | -22,3% | -32,01% |
| Socio-political | -11,8% | -30,1% | -16,54% |

* Weighted-average considering ICAR; ING-INF; ING-IND

Note: 1) For students, data refer to disciplinary groups identified by MIUR in 2014/15 (more updated data), while for academic staff, data refer to disciplinary sectors (es. IND-IND; ICAR; MED). 2) The socio-political sector also includes the group SECS-P

Source: Own elaboration on MIUR data


# Focus: Settori Scientifico-Disciplinari

# SSD distribution per size

**(Full prof., Associate Prof., Assistant Prof.)**

Identification of 8 classes of SSD per number of tenured academic staff members in years 2008 e 2016

| Classes per size (Tenured academic staff) | No. SSD (2008) | No. SSD (2016) | Var. members % 2008/2016 |
|---|---|---|---|
| <=5 | 3 | 9 | -39,76% |
| 5-10 | 15 | 19 | -24,28% |
| 10-20 | 19 | 17 | -20,58% |
| 20-50 | 46 | 48 | -18,57% |
| 50-100 | 74 | 100 | -16,76% |
| 100-150 | 70 | 67 | -18,54% |
| 150-200 | 44 | 38 | -19,42% |
| >200 | 99 | 71 | -19,22% |
| **Tot** | **370** | **369** | **-19,19%** |

*Note: data at 31° August 2016*

Source: CINECA

# Growing SSDs 2008-2016: Top 10

## Tenured academic staff (Full prof., Associate Prof., Assistant Prof.)

| Top 10 growing SSDs per tenured academic staff | 2008 | 2016 | Var. % |
|---|---|---|---|
| • Bioingegneria industriale | 56 | 68 | **21,4%** |
| • Lingue e letterature del Giappone e della Corea | 29 | 32 | **10,3%** |
| • Scienze tecniche di medicina di laboratorio | 91 | 100 | **9,9%** |
| • Medicina fisica e riabilitativa | 58 | 63 | **8,6%** |
| • Psicobiologia e psicologia fisiologica | 116 | 126 | **8,6%** |
| • Ingegneria sanitaria-ambientale | 144 | 156 | **8,3%** |
| • Finanza aziendale | 73 | 78 | **6,8%** |
| • Organizzazione aziendale | 135 | 141 | **4,4%** |
| • Diritto pubblico comparato | 113 | 117 | **3,5%** |
| • **Ingegneria economico-gestionale** | **186** | **190** | **2,2%** |

*Note: data at 31° August 2016*
*The analysis refers to those SSD having at least 20 members in 2002*

Fonte: CINECA

# Descreasing SSDs 2008-2016:
# Worst 10

**Tenured academic staff (Full prof., Associate Prof., Assistant Prof.)**

| Worst 10 decreasing SSDs per tenured academic staff | 2008 | 2016 | Var. % |
|---|---|---|---|
| • Urbanistica | 245 | 147 | **-40,0%** |
| • Fisica nucleare e subnucleare | 150 | 90 | **-40,0%** |
| • Storia della filosofia | 314 | 187 | **-40,4%** |
| • Storia e istituzioni delle Americhe | 34 | 20 | **-41,2%** |
| • Lingua e letteratura latina | 275 | 160 | **-41,8%** |
| • Topografia antica | 47 | 27 | **-42,6%** |
| • Indologia e tibetologia | 16 | 9 | **-43,8%** |
| • Storia dell'Europa Orientale | 43 | 23 | **-46,5%** |
| • Letteratura francese | 220 | 115 | **-47,7%** |
| • Didattica e storia della fisica | 46 | 20 | **-56,5%** |

*Note: data at 31° August 2016*
*The analysis refers to those SSD having at least 20 members in 2002*

Source: CINECA


# Focus: ING-IND 35

# Trend ING-IND 35
## Total academic staff (Full/Associate/Assistant Professors)

Source: CINECA

| Type | 2002 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | Var.% 2002-2016 | Var. % 2008-2016 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Full P. | 44 | 62 | 62 | 60 | 62 | 62 | 62 | 63 | 61 | 62 | 41% | 0% |
| Associate P. | 52 | 51 | 50 | 50 | 55 | 57 | 56 | 74 | 81 | 82 | 58% | 61% |
| Tenured A.P. | 38 | 73 | 73 | 79 | 84 | 81 | 80 | 59 | 48 | 46 | 21% | -37% |
| A.P.(TenureT) | | | | | | | | 0 | 2 | 4 | - | - |
| A.P.(no TenureT.) | | | | | | | 3 | 8 | 15 | 16 | - | - |
| **Tot. ING-IND 35** | **134** | **186** | **185** | **189** | **201** | **200** | **201** | **204** | **207** | **210** | **57%** | **13%** |
| **Tot. ING-IND** | **2.871** | **3.193** | **3.125** | **3.021** | **3.033** | **3.047** | **3.046** | **3.046** | **3.096** | **3.135** | **9,20%** | **-1,82** |
| **Tot. Italy** | **57.499** | **62.770** | **60.876** | **57.745** | **56.536** | **55.976** | **55.412** | **54.617** | **53.884** | **54.308** | **-5,55%** | **-13,48%** |

*Data on 31 August 2016 – Values in slide n. 8, given A.P. component (ex Art.1 comma 14 L. 230/05) and CINECA data*

# Representativeness of Management Engineering: Total number of students (BSc+MSc)

| Students | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 | Δ % (2008/09-2014/15) |
|---|---|---|---|---|---|---|---|---|
| Management Eng. | 23.553 | 23.655 | 23.665 | 24.399 | 24.275 | 24.407 | 24.959 | **5,97%** |
| Tot. Engineering | 204.615 | 207.159 | 206.495 | 209.354 | 207.688 | 210.034 | 212.440 | **3,82%** |
| ***% Management Eng.*** | ***11,51%*** | ***11,42%*** | ***11,46%*** | ***11,65%*** | ***11,69%*** | ***11,62%*** | ***11,75%*** | |
| Details: | | | | | | | | |
| BSc Management Eng. | 16.439 | 16.388 | 16.635 | 16.643 | 16.620 | 16.799 | 17.265 | **5,02%** |
| BSc Tot. Engineering | 156.732 | 156.921 | 156.675 | 156.854 | 153.894 | 154.445 | 155.357 | **-0,88%** |
| **% BSc Management Eng.** | ***10,49%*** | ***10,44%*** | ***10,62%*** | ***10,61%*** | ***10,80%*** | ***10,88%*** | ***11,11%*** | |
| MSc Management Eng. | 7.114 | 7.267 | 7.030 | 7.756 | 7.655 | 7.608 | 7.694 | **8,15%** |
| MSc Tot. Engineering | 47.883 | 50.238 | 49.820 | 52.500 | 53.794 | 55.589 | 57.083 | **19,21%** |
| ***% MSc Management Eng.*** | ***14,86%*** | ***14,47%*** | ***14,11%*** | ***14,77%*** | ***14,23%*** | ***13,69%*** | ***13,48%*** | |

*See appendix for data definition.

Source: Statistica MIUR

# Conclusions 1/2

- In the period 2008-2016, the academic staff has declined comparatively more than the student number, even if the ratio students/professors was high with respect to the Italian system
- As regards disciplinary groups, there is an important mis-matching between academic staff and student number
  - An excess of staff (law and socio-political studies)
  - A deficit of staff (medicine-health studies, engineering, foreign languages)
- The case of the Italian Higher Education system shows the unintended effects of «cheese slicing» policies (i.e. equal linear cuts)

# Conclusions 2/2

- There were several disciplinary fields (SSD) that suffered a severe reduction in terms of academic staff. Reduction above 40% over the period 2008-2016
- With respect to an average drop of 20% in terms of tenured academic staff, the disciplinary group ING-IND performed better (-13%)
- In such a scenario, the disciplinary field ING-IND35 has grown in terms of academic staff, although such growth has not been featured by an equivalent growth in terms of students, especially for MSc degrees


# Our identity: who we are and where we are going

Stefano Paleari*

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# Appendix

- Management Engineering degrees in the MIUR database were identified by using the keywords «Ingegneria gestionale» in the field «corso di studi»
- MSc degrees were idenfied by selecting the following degree classes: 34/s; 35/S; LM-31; LM-32; LM-33
- Engineering degrees were identified by selecting all two-year degrees LM/ and /S for 2014/2015 in the MIUR database, with the exclusion of LM-34, included in the «architettura» group, and the inclusion of LM-44 «*Modellistica matematico-fisica per l'ingegneria*» and LM-53 «*Scienza e ingegneria dei materiali*»