CATÓLICA PORTO
FACULDADE DE ECONOMIA E GESTÃO

Efficiency and Value Added in Secondary Education: The case of Portugal

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Outline

- Concepts: School effectiveness/school-effect/Value-added (VA)/school efficiency
- School research in Portugal
  - Some results from the AVES program – VA analysis at the pupil level
  - Some results from BESP – benchmarking and School performance
- Conclusion

Concepts

- 2 perspectives of **School-effects** (Raudenbush and Wills, 1995)
  - 1. "The extent to which attending a particular school modifies a student outcome";
  - 2. "The effect on a student outcome of a particular policy or practice, such as the effect of reducing a student-teacher ratio or the effect of adopting a school-wide peer tutoring program".

School effectiveness – value added

school efficiency – value for money

Concepts

- Different **perspectives** of analysis, different **levels of aggregation** and different **methods**, make classifications difficult.
- Typically **Value-added** studies:
  - Analyse the effect of schools on students outcomes;
  - Use pupil-level data;
  - Results on exit of a certain cycle of studies are contextualised by results on entry at that cycle of studies and other contextual variables;
  - Use multilevel regression models (see OECD 2006 and 2008) that account for two error terms: for the pupil and for the school.
- Typically **efficiency** studies
  - Analyse if schools are employing resources efficiently;
  - Schools are seen as a production process consuming a set of resources to transform into a set of outputs (outcomes);
  - Use aggregate school data;
  - Use Frontier methods.

School Research in Portugal

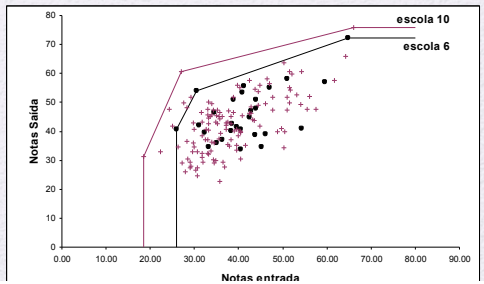
- **AVES project** – private project, which every year administers its own set of tests (cognitive skills, reasoning competencies and some opinion questionnaires) to a set of schools that adhered to the project
- **BESP project** – free website that shows a number of indicators for each school based on available student achievement on national examinations. It also serves as a tool for schools self evaluation, and incorporates DEA measure of aggregate performance of schools

Some Results from AVES

- **VA analysis** - pupil results on cognitive tests at the beginning of a cycle and at the end of that cycle of studies are matched – this is done for 3 school cycles.
- A frontier approach is used to compute intra-school performance of pupils and inter-school performance – the comparison of which results in a VA measure. (see Portela and Thanassoulis 2001 and Portela and Camanho 2010)
- Inputs used regard attainment on entry and outputs regard attainment on exit

Some Results from AVES

- A frontier for each school is constructed
- VA is obtained from the comparison of the school frontier with the global frontier.



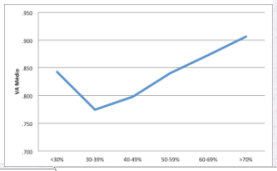
Some Results from AVES

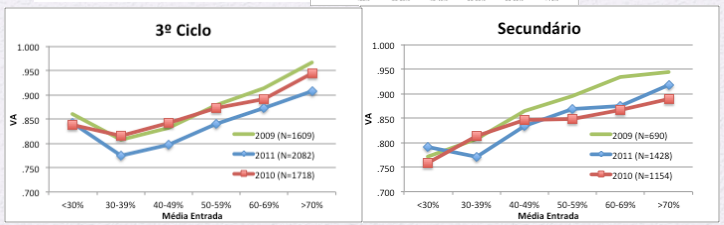
- The VA report of each school includes:
  - Aggregate measure of VA and the histogram of VA scores;
  - Intra-school and inter-school average performance measures;
  - VA per ability group on entry (to investigate for differential school effectiveness);
  - Frontiers for all subjects included in the VA assessment, such that schools can identify potential for improvement;
  - Plots for the VA of schools and their socio-economic background to see whether some schools may show a very small (big) VA due to a disadvantaged (advantaged) location;
  - Longitudinal analysis of VA to show schools VA patterns over time.

Some Results from AVES

- VA is shown per level of ability on entry

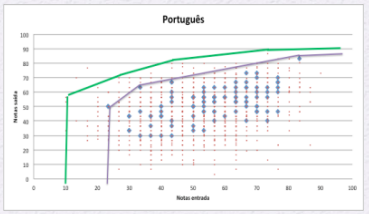
Média à entrada	Frequências	Média Valor Acrescentado
<30%	79	.843
30-39%	352	.774
40-49%	681	.798
50-59%	635	.840
60-69%	284	.873
>70%	51	.907
Total	2082	

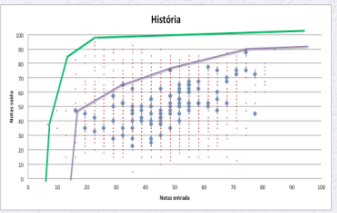




Some Results from AVES

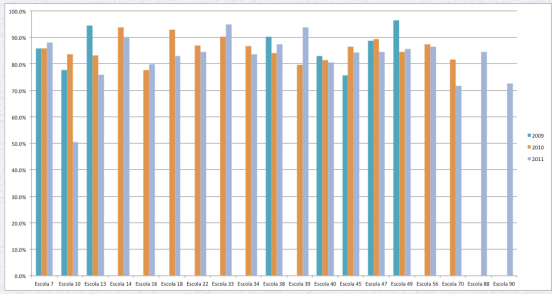
- Frontiers for specific subjects are shown to identify improvement potential





Some Results from AVES

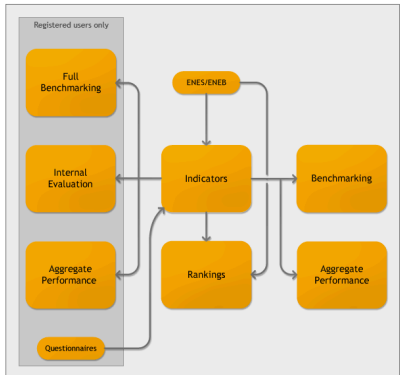
- Longitudinal graphs are shown:



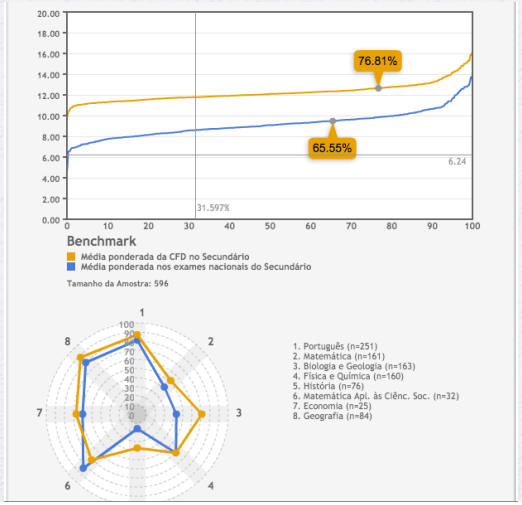
- Problem of non-comparability of VA measures because the overall frontier changes over time.
- Using a stable frontier, Portela et al. (2013) show that the VA change is equivalent to a measure of frontier shift in Malmquist indices. Catch-up is also analysed in that study.

Some Results from BESP

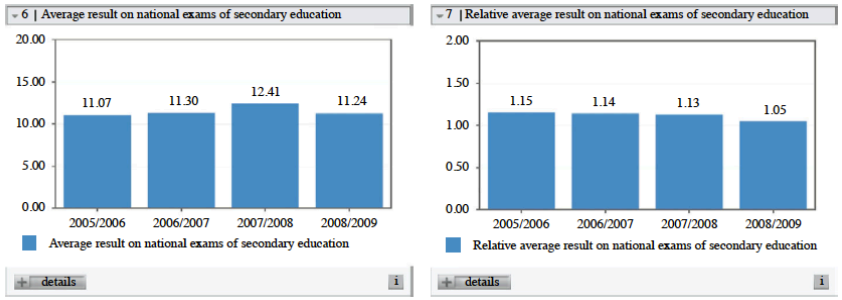
- BESP is a free web-site with a public space and a private space – that schools can access under a login – see http://feg.porto.ucp.pt/besp (see Portela et al, 2011 for a description of BESP)



Some results from BESP



Some results from BESP

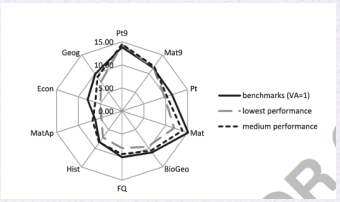


Some results from BESP

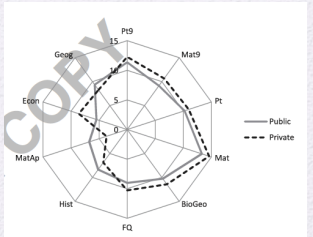
- DEA model contextualises aggregate exam scores (outputs) by the average grades obtained 2 and 3 years earlier than the period corresponding to the outputs;
- This is in the spirit of a VA score, but is not computed at the pupil level - cohorts on entry do not entirely coincide with those on exit.
- In Portela et al. (2012) we analyse in detail these results using a model with weight restrictions to reflect the importance of the outputs (based on the number of exams done for each of the 8 subjects)

Some results from BESP

- Schools were compared with benchmark schools:



- Private schools perform better (89%) than public schools (87%)



Some results from BESP

- Stability of performance measures in 2008 and 2009 were analysed – correlation measures above 0.6;
- Private schools showed more stability than public schools

	Value-added correlation	*Rank correlation*
Private	0.64	0.66
Public	0.60	0.58

- Stability for small schools and big schools was also analysed. The results did not corroborate the idea that within small schools there is lower stability of results

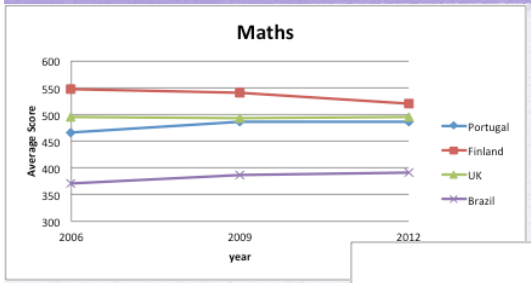
Conclusions

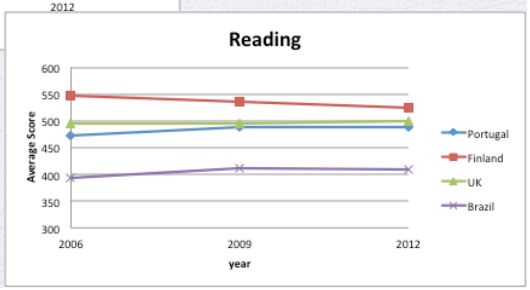
- There are several tools available to evaluate schools.
- The issue is how are these tools used by school directors and teachers, and how has this led to improvements in the quality of education – which is one of the main reasons underneath evaluation.
- From Aves experience
  - Some schools do not use the VA information – they are in the program for marketing and visibility reasons;
  - Some schools discuss greatly the results provided by Aves (VA and others) and really try to get benefits out of it (minority);
  - Some schools may use perversely the results and get negative consequences out of it (More likely when raw results and league tables are the main evaluation instrument).

Conclusions

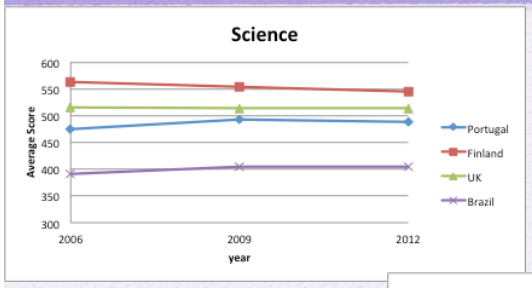
- The issue is therefore "Getting value out of value added" and more generally "getting value out of school performance evaluations" (CFE – Center for education , 2010)
- Not much evidence yet about the consequences of school evaluation
  - Consequences for parents – in the choice of schools;
  - Consequence for teachers – In the US the EVAAS provides reports on teacher effectiveness – likely to change the behaviour of teachers;
  - Consequences for students – are pupils improving their performance, due to higher efforts from schools and teachers? According to PISA reports there is still a long way to to go to catch up with Finland.

Conclusion

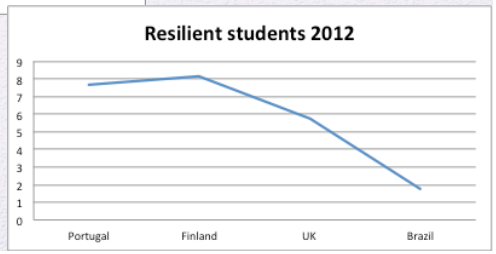


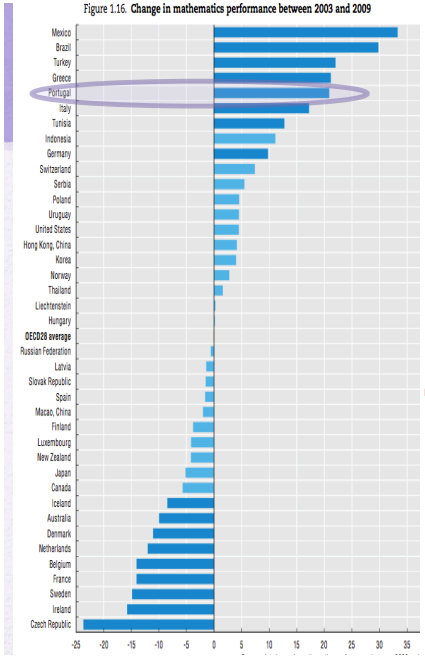


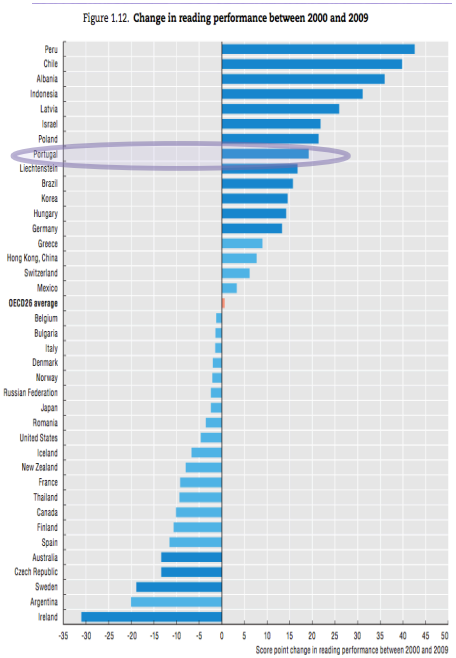
Conclusion



students in the bottom quarter of the PISA index of economic, social and cultural status who perform in the top quarter of students internationally in maths), after accounting for socio-economic status (percentage)







References

- CFE, Getting Value Out of Value-Added: Report of a Workshop (2010) Center for Education:
- Hanushek, E. and L.Wossmann (2007), The Role of Education Quality in Economic Growth, World Bank Policy Research Working Paper 4122, February 2007
- OECD, *The use of value-added models for school accountability*, 2006;
- OECD Measuring Improvements in Learning Outcomes: Best Practices to Assess the Value-Added of Schools. 2008
- Portela, M.C.A.S, and Thanassoulis, E. (2001) Decomposing school and school type efficiency, *European Journal of Operational Research*, 132/2, pp. 114-130.
- Portela, M.C.A.S. and Camanho, A.S., (2010) Analysis of complementary methodologies for the estimation of school value-added, Journal of the Operational Research Society, 61, 1122-1132.
- Portela, M.C.A.S., Camanho, A.S. and Borges, D. (2011) "BESP - Benchmarking of Portuguese Secondary Schools", Benchmarking: and International Journal 18/2, 240-260
- Portela, M.C.A.S., and Camanho A.S. and Borges, D. (2012), "Performance assessment of secondary schools: the snapshot of a country taken by DEA", Journal of the Operational Research Society, 63, 1098-1115
- Portela, M.C.A.S., Camanho A.S. and Keshvari, A. (2013), "Assessing the evolution of school performance and value-added: trends over four years" , Journal of Productivity Analysis, 39/1, 1-14.
- Raudenbush and Wills, (1995), The estimation of school effects. J Educ Behav Stat. 20(4). 307-335