Health care system typologies and objectives in cross country comparisons: applications to health care expenditure

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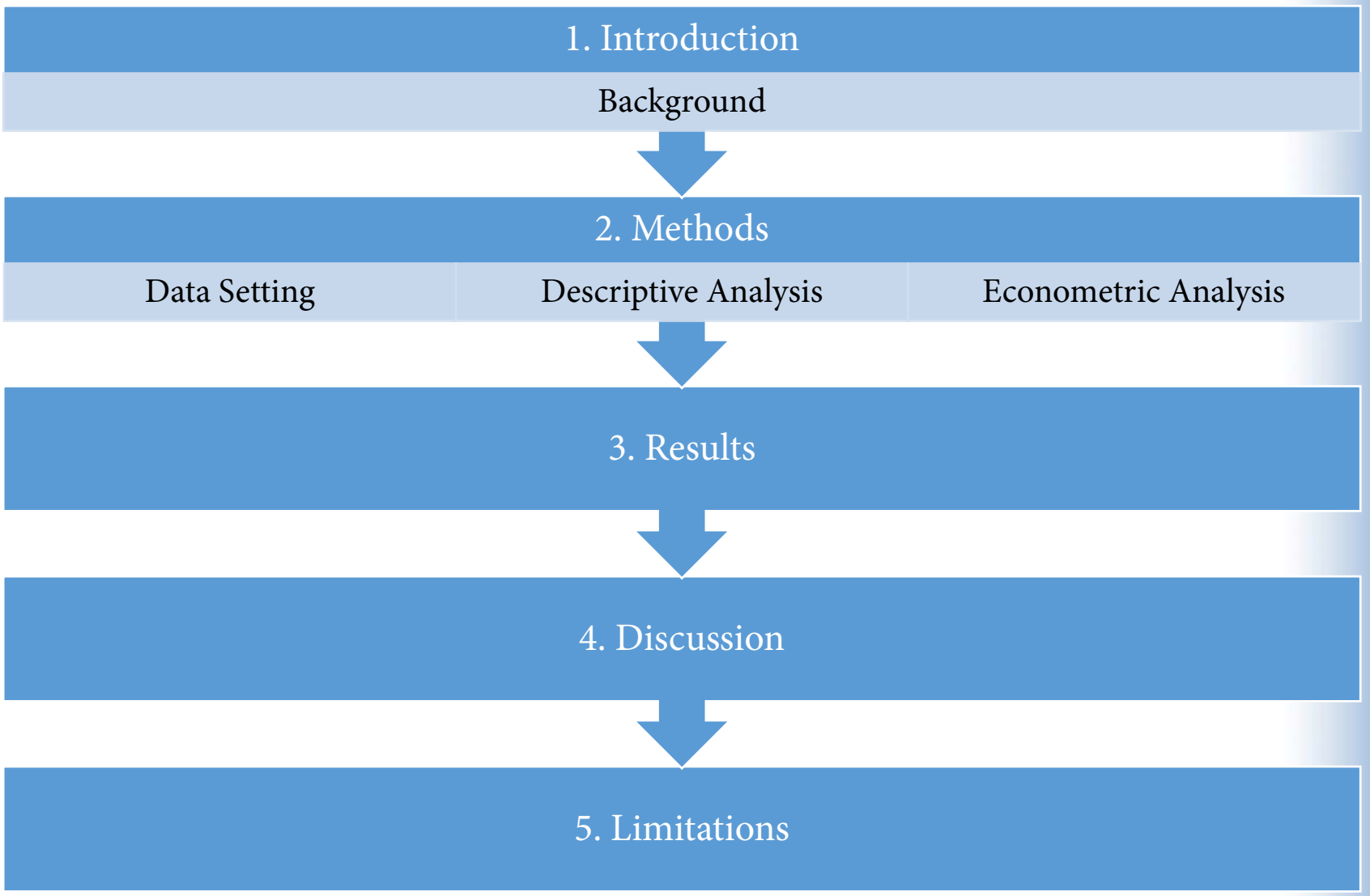
PRESENTATION STRUCTURE



Presentation based on the evidence of the following paper:

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Another Look at the Comparisons of the Health Systems Expenditure Indicators

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1. INTRODUCTION

BACKGROUND

- In the literature of **health system comparisons** (e.g. Anderson et al. 2000; Peterson and Burton 2007; Hopkins 2010; OECD 2010; Squires 2012), it is a standard practice to take the simple average of representative figures, i.e. health care expenditure (HE).

- Obtained from international databases (such as the OECD or EUROSTAT). But with no reference to the size of the countries (population, GDP, etc).

- As a result, *this comparison is attributing equal weights* to, for instance, Cyprus and Germany, or assuming that Mexico contributes to the average in the same manner as UK.

1. INTRODUCTION

BACKGROUND

- Comparisons on health care expenditure (HE) should be done with countries with a similar demographic structure, development level and similar health care systems (e.g. Tax-based or SHI).

- There is no logic behind the comparison of our country with the OECD countries:

  - *1) Countries with different social protection (US, Spain);*
  - *2) Countries with social health insurance (Germany, Belgium, Austria, Holland);*
  - *3) Countries based on a tax system (Spain, United Kingdom, Portugal).*

1. INTRODUCTION

BACKGROUND

- By attributing equal weights, we do not reached an adequate representation of the health expenditure (HE) of an 'average European citizen' or a member of the OECD in the developed world.

- Samples compared quite often collect together health systems of a very diverse nature (goals and means) such as France and Sweden, or Portugal and Japan.

- *MAIN DIFFERENCES: combination of public and private expenditure, sources of finance, differences in their tax and co-payment configurations and different efficiency and equity goals.*

1. INTRODUCTION

BACKGROUND

- Solutions:

1. Comparisons across similar countries. You can use the simple average figure.

2. Weighting HE by GDP or Population, for example.

The second option can be criticised because you might give too much weighting to US (within OECD countries), but the remedy is not equal weighting.

1. INTRODUCTION

BACKGROUND

IMPORTANT: Need to be clear what we need to answer in order to decide the best comparison method.

1. Comparison: Spanish HE to the corresponding HE of an average EU citizen → use figure weighting by population.

1. Comparison: Spanish and UK figures, the comparison would be a moment of time where UK had a similar number of population as Spain has today.

1. INTRODUCTION

1. Once the topic has been defined, I will show you evidence of these differences across HE comparisons, taking into account:

   - different sub-samples
   - weighted averages as the benchmark of some comparisons, either by adopting GPD per capita or population.

1. Specify an econometric model with the main determinants of HE. Compare between the expected and the observed HE in Spain and the Beveridge countries.

2. METHODS

DATA SETTING

- **Dependent variables:**
  - *total health expenditure per capita (US$ PPP)*
  - *total health expenditure as a percentage of GDP*

2. METHODS

DATA SETTING

- **Countries**

1) **OEDC sample**: Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom, and the United States, for the period 1960–2011.

(source: OECD—OECD Health Data 2012; OECD Factbook 2012- and EUROSTAT— EUROSTAT, 2013)

2. METHODS

DATA SETTING

- **Countries**

2. Sub-samples:

a. Member of the European Union (21 countries)

b. The Bismarck model (15 countries): Austria, Belgium, Chile, the Czech Republic, Estonia, France, Germany, Hungary, Israel, Japan, Luxembourg, Netherlands, the Slovak Republic, Slovenia, Switzerland

c. The Beveridge model (15 countries): Denmark, Finland, Greece, Iceland, Ireland, Italy, Korea, Mexico, New Zealand, Norway, Poland, Portugal, Spain, Sweden, the United Kingdom; the Douglas model (3 countries): Australia, Canada, Turkey.

2. METHODS

DATA SETTING

BEVERIDGE MODEL (tax-based)	BISMARCH MODEL (SHI)
Public Health funding	Government guarantee health care, mandatory fees through sick funds.
Money from all who fall within the tax system (direct and indirect taxation)	Employers and employees in the formal sector
Progressive	Less progressive
No limitations on coverage	Absolute number of beneficiaries. Additional mechanism to cover specific groups.
Payment not direct to health (Tax). Government decision on tax allocation.	Direct link payment and health. However costs on managing the system.

DOUGLAS MODEL (National Health Insurance)
Combination of Beveridge and Bismarch
Private providers
Public funding: government-run insurance programme that citizens fund through insurance or tax (from payroll)

2. METHODS

DESCRIPTIVE ANALYSIS

- Following tables (1, 3) show:
  - Means of the dependent variables for the period 2000–2010 for the OECD (complete) sample and the three sub-samples.
  - The means were initially computed without assigning any weights (the usual practice) and subsequently weighted by GDP per capita and population; depending on the most appropriate denominator of the dependent variable.
  - Spain is taken as example.

2. METHODS

DESCRIPTIVE ANALYSIS

Table 1 Total health care expenditure means, as a percentage of GDP, for the complete OECD sample and three sub-samples

	Spain		OECD sample		EU countries sub-sample		Bismarck model countries		Beveridge—Douglas model countries	
	Expenditure[a]	GDP[b]	Expenditure[a]	Weighted[c]	Expenditure[a]	Weighted[c]	Expenditure[a]	Weighted[c]	Expenditure[a]	Weighted[c]
2000	7.20	21,314.433	7.77	8.20	7.71	7.93	7.91	8.29	7.33	7.65
2001	7.20	22,577.936	8.02	8.45	7.92	8.14	8.04	8.42	7.66	7.98
2002	7.30	24,068.216	8.30	8.77	8.18	8.44	8.26	8.71	7.96	8.30
2003	8.20	24,754.840	8.57	9.01	8.49	8.68	8.63	8.96	8.12	8.48
2004	8.20	25,956.475	8.61	9.04	8.59	8.79	8.69	9.04	8.16	8.49
2005	8.30	27,392.007	8.66	9.05	8.69	8.84	8.66	8.97	8.26	8.54
2006	8.40	30,405.925	8.60	8.95	8.62	8.74	8.51	8.78	8.28	8.54
2007	8.50	32,233.471	8.62	8.93	8.61	8.68	8.51	8.71	8.29	8.54
2008	8.90	33,129.605	8.89	9.16	8.90	8.94	8.73	8.86	8.60	8.84
2009	9.60	32,149.771	9.75	10.03	9.72	9.81	9.54	9.73	9.47	9.68
2010	9.60	31,903.798	9.72	10.15	9.57	9.83	9.64	10.16	9.29	9.49

[a] Total health expenditure, % GDP; [b] GDP per capita US dollars, PPPs; [c] Weighted by GDP

Without any adjustment, **Spain HE has almost caught up with the unweighted OECD average**, particularly after the start of the crisis (2008). GDP (denominator) dropped more than the numerator (HE).

However, **the weighted average reopened the gap**, as a result of the up-bias caused by the data from the USA, more than fully offsetting Mexico in the OECD sample.

2. METHODS

DESCRIPTIVE ANALYSIS

Table 3 Means of total health care expenditure, per capita, for the complete OECD sample and three sub-samples

	Spain		OECD sample		EU countries sub-sample		Bismarck model countries		Beveridge—Douglas model countries	
	Expenditure[a]	GDP[b]	Expenditure[a]	Weighted[c]	Expenditure[a]	Weighted[c]	Expenditure[a]	Weighted[c]	Expenditure[a]	Weighted[c]
2000	1,537.80	21314.433	1,887.56	2,436.818	1,805.82	1,967.855	1,864.41	2,224.326	1,745.57	1,273.417
2001	1,635.00	22,577.936	2,016.31	2,611.321	1,930.70	2,108.038	1,960.15	2,349.871	1,889.48	1,378.778
2002	1,745.00	24,068.216	2,178.61	2,799.579	2,099.70	2,247.732	2,116.50	2,483.167	2,041.63	1,462.312
2003	2,025.60	24,754.840	2,294.33	2,982.301	2,225.63	2,375.435	2,232.71	2,611.620	2,140.20	1,546.297
2004	2,135.10	25,956.475	2,440.89	3,158.387	2,376.58	2,497.218	2,372.16	2,723.099	2,280.73	1,657.272
2005	2,274.10	27,392.007	2,564.25	3,352.979	2,500.45	2,646.263	2,468.37	2,878.852	2,412.84	1,773.899
2006	2,552.50	30,405.925	2,749.81	3,575.855	2,700.20	2,847.404	2,630.39	3,039.393	2,607.25	1,943.657
2007	2,738.60	32,233.471	2,910.95	3,799.707	2,856.64	2,997.065	2,791.87	3,217.163	2,756.21	2,066.719
2008	2,965.50	33,129.605	3,103.08	3,983.382	3,057.53	3,184.312	2,978.04	3,389.378	2,948.53	2,200.413
2009	3,096.70	32,149.771	3,322.79	4,349.243	3,220.38	3,351.918	3,141.27	3,578.895	3,208.42	2,526.689
2010	3,055.70	31,903.798	3,328.52	4,637.152	3,135.37	3,376.740	3,125.48	3,967.663	3,174.27	2,497.159

[a] Total health expenditure per capita US$ PPP; [b] GDP per capita US dollars PPPs; [c]Weighted by population

The **Spanish total per capita HE remained far from the OECD** reference value. In comparison to the Beveridge type of models, the difference with regard to the GDP weight is even larger.

2. METHODS

DESCRIPTIVE ANALYSIS

- Following table (9) show:
  - (unweighted) the values from 2000 to 2010 of the dependent variables for Spain and for those countries that, **in the year indicated, had a GDP per capita similar to that of Spain.**
  - Only considered those countries operating under the *Beveridge model* as they (for the most part) correspond to the nature of the Spanish NHS.

2. METHODS

DESCRIPTIVE ANALYSIS

Table 9 Comparison of Health care expenditure in Spain compared to other OECD countries (unweighted)

Spain						Only Beveridge countries					
Year	GDP[a]	ExpGDP[b]	ExpPC[c]	PubGDP[d]	PubPC[e]	Country and year	GDP[a]	ExpGDP[b]	ExpPC[c]	PubGDP[d]	PubPC[e]
2001	22,577.936	7.20	1,635.00	5.13	1,164.10						
2002	24,068.216	7.30	1,745.00	5.20	1,244.10	United Kingdom 1999	24,252.645	6.90	1,676.90	5.56	1,352.00
						Italy 1999	24,344.720	7.70	1,884.70	5.45	1,333.40
2003	24,754.840	8.20	2,025.60	5.77	1,425.70	Finland 2000	25,674.229	7.20	1,853.50	5.13	1,320.80
						Italy 2000	25,757.549	8.00	2,064.40	5.80	1,496.90
2004	25,956.475	8.20	2,135.10	5.79	1,506.70	Sweden 1999	25,976.341	8.20	2,129.50	7.03	1,825.50
						United Kingdom 2000	26,072.442	7.00	1,834.40	5.52	1,445.90
2005	27,392.007	8.30	2,274.10	5.89	1,613.90	Italy 2004	27,528.238	8.60	2,371.70	6.53	1,801.50
						Finland 2002	27,531.343	7.80	2,149.60	5.65	1,557.50
						United Kingdom 2001	27,567.772	7.30	2,001.60	5.81	1,591.90
2006	30,405.925	8.40	2,552.50	6.02	1,828.60						
						Italy 2006	30,399.033	9.00	2,727.00	6.89	2,088.40
						Sweden 2003	30,420.160	9.30	2,832.10	7.63	2,322.50
						Denmark 2003	30,429.631	9.50	2,893.40	8.03	2,446.30
2007	32,233.471	8.50	2,738.60	6.11	1,968.90	Italy 2009	32,250.027	9.30	3,004.70	7.40	2,391.70
						Denmark 2004	32,289.640	9.70	3,123.10	8.17	2,631.80
2008	33,129.605	8.90	2,965.50	6.51	2,169.40	Finland 2006	33,140.167	8.30	2,765.50	6.21	2,069.80
						Denmark 2005	33,195.883	9.80	3,243.00	8.28	2,739.50
						Ireland 2002	33,273.542	7.00	2,335.60	5.34	1,781.60
2009	32,149.771	9.60	3,096.70	7.06	2,314.10	Italy 2009	32,250.027	9.30	3,004.70	7.40	2,391.70
						Denmark 2004	32,289.640	9.70	3,123.10	8.17	2,631.80
2010	31,903.798	9.60	3,055.70	6.99	2,266.80						
						Italy 2007	32,056.400	8.60	2,769.00	6.58	2,119.70

[a] GDP per capita US dollars, PPPs; [b] Total health expenditure, % GDP; [c] Total health expenditure per capita US$ PPP; [d] Public health expenditure, % GDP; [e] Public health expenditure, per capita US$ PPP

2. METHODS

ECONOMETRIC ANALYSIS

- In order to explain the variation in the dependent variables we specified a mixed model (i.e. panel data models), including as explanatory variables those that are most likely to affect HE.
- Review of Gerdtham and Jönsson (2000), on HE determinants in OECD.

- GDP per capita US dollars PPPs
- Public health expenditure, percentage of total health expenditure
- Population
- Percentage of females
- Percentage of population less than 15 years
- Percentage of population 75 years old or over
- Tobacco consumption, percentage of population who are daily smokers
- 15 years and older
- Alcohol consumption, Litres per capita (age 15?)
- Obesity in population (self-reported), % of total population
- Mental and behavioural disorders (ICD10: F00-F99), Standardised death rate (per 100,000 inhabitants)
- Unemployment

2. METHODS

ECONOMETRIC ANALYSIS

- For total health expenditure as a percentage of GDP, the model specification is the following:

$$Y_{it} = \beta_{0it} + \beta_{1ij}\log(gdp\_pc) + \beta_2 pub\_\exp_{it} + \beta_3 females_{it} + \beta_4 pless15_{it} + \beta_5 pover75_{it} + \beta_6 tobacco_{it} + \beta_7 alcohol_{it} + \beta_8 obesity_{it} + \beta_9 hlthcdasr_{it} + \beta_{10} unemp_{it} + \beta_{11}\log(pop_{it}) + u_{it}$$

- For total health expenditure per capita, the model specification is the following:

$$\log(Y_{it}) = \beta_{0it} + \beta_{1ij}\log(gdp\_pc) + \beta_2 pub\_\exp_{it} + \beta_3 females_{it} + \beta_4 pless15_{it} + \beta_5 pover75_{it} + \beta_6 tobacco_{it} + \beta_7 alcohol_{it} + \beta_8 obesity_{it} + \beta_9 hlthcdasr_{it} + \beta_{10} unemp_{it} + u_{it}$$

i denotes country, t denotes time (2000-2010), j denotes the different sub-samples. There are random coefficients (intercept and β_1). Temporal dependency and heteroskedasticity is controlled.

3. RESULTS

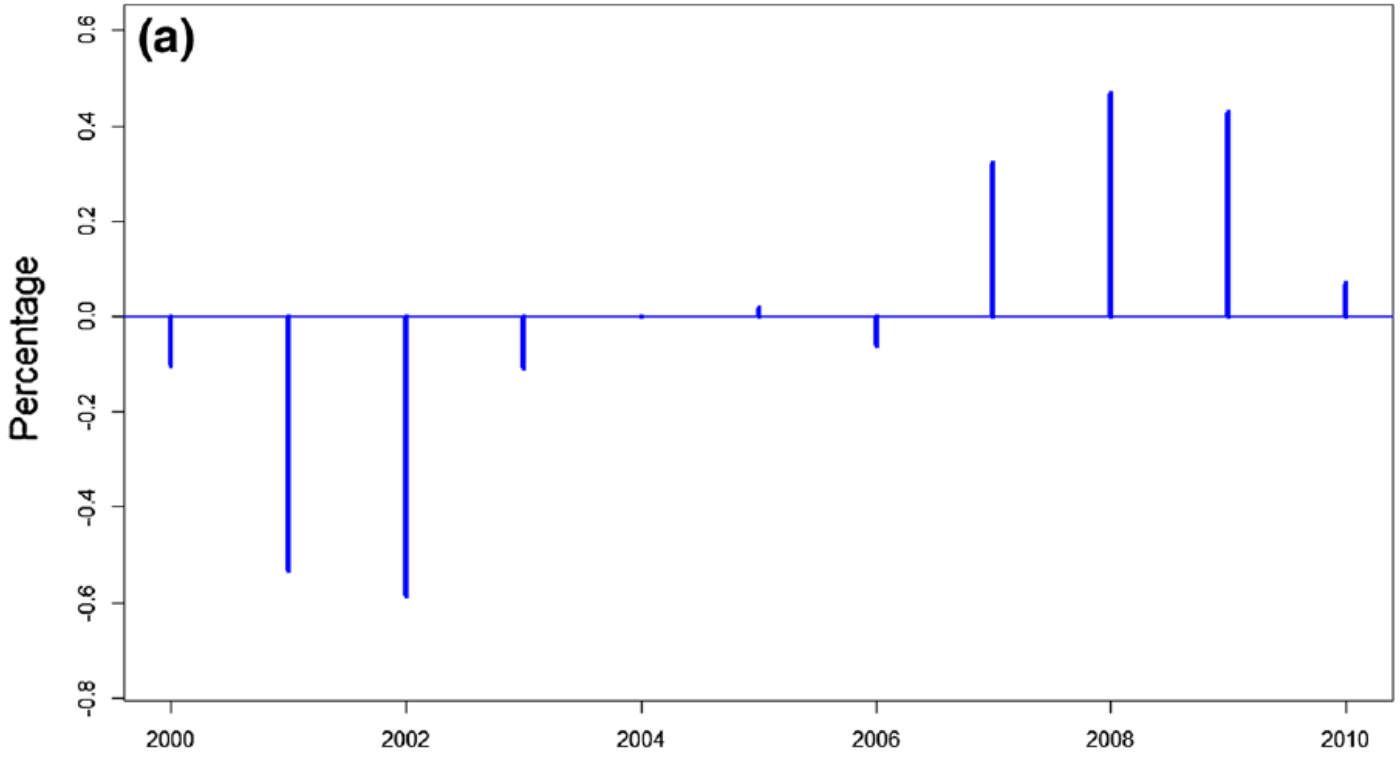
- The interest is in the **residuals of the models** for the different dependent variables (i.e. the differences between the observed and the expected value of the dependent variables) which were adjusted for all explanatory factors, for time dependency and for non-constant variance.

- Not interested in the variation of health expenditure but whether **the observed health expenditure corresponded to the expected**.

- Controlling these factors, can undertake international comparisons of health care expenditure across countries.

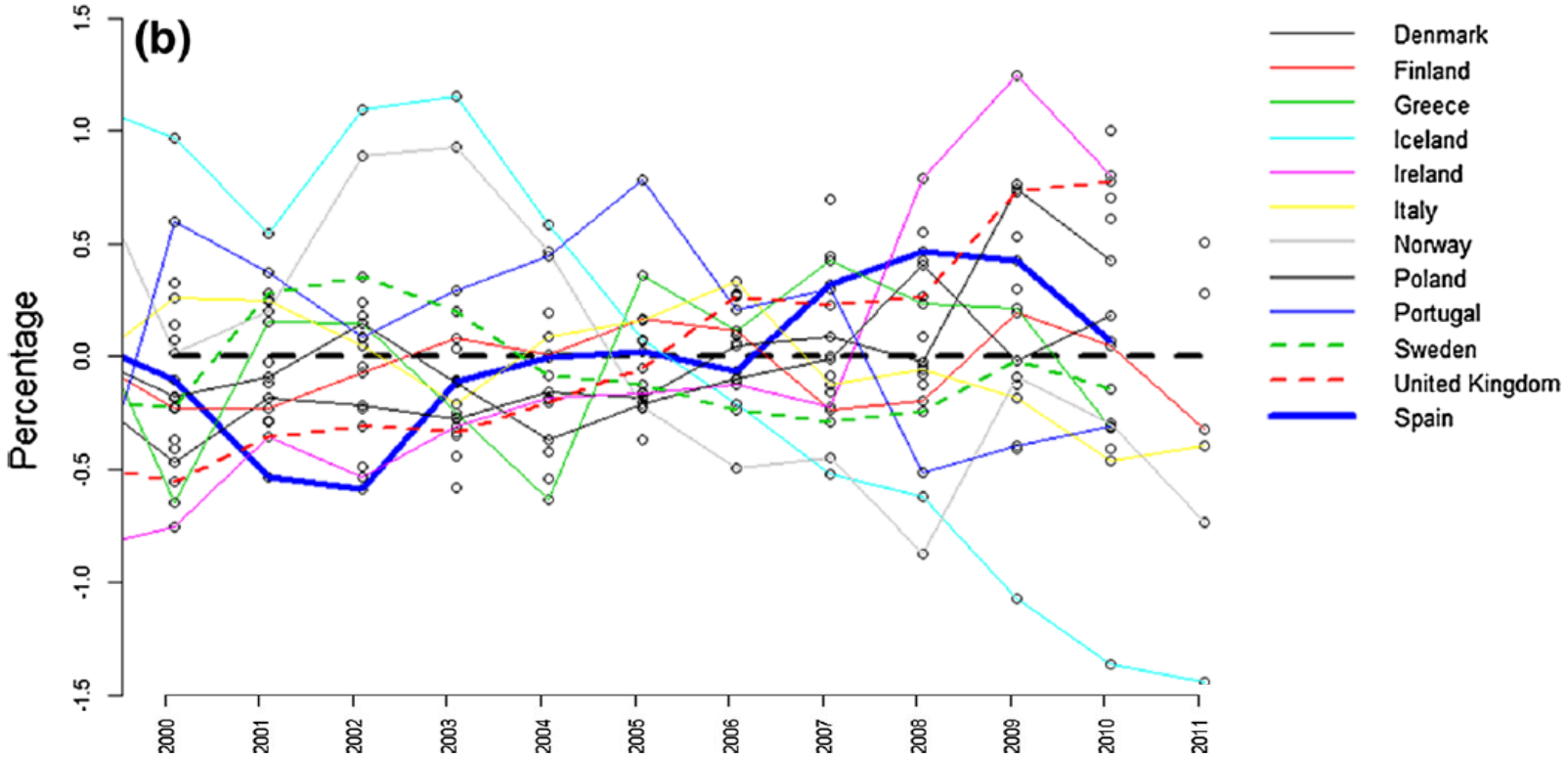
The main result is that the Spanish ratios were generally well above the expected ratios from 2007 and below the expected until 2004.

3. RESULTS



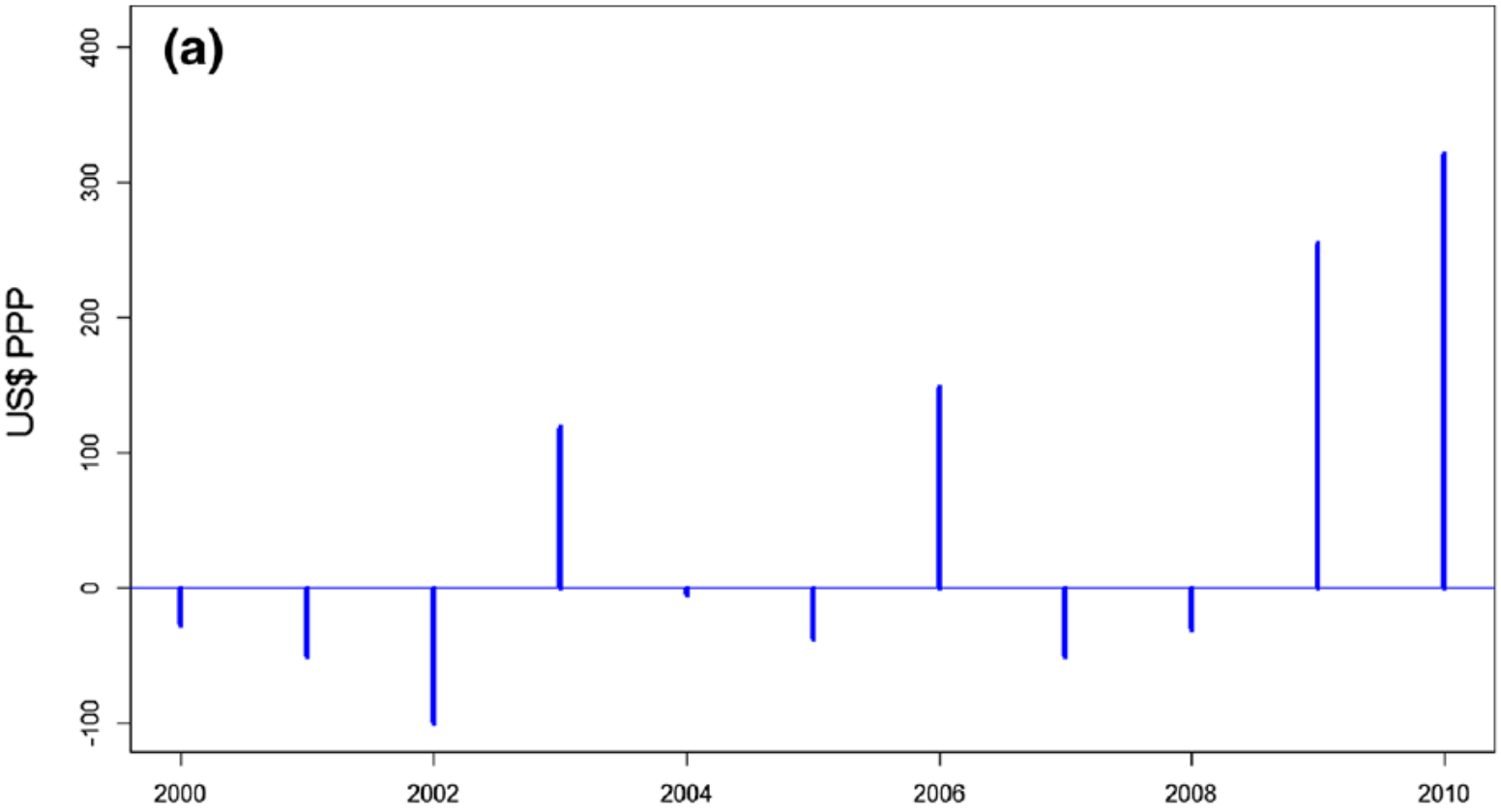
Spain. Difference with respect to that expected (positive, above; negative below standard). **Total expenditure, % of GDP**, as results from model. Beveridge-Douglas sample. **Weighted by GDP per capita**.

3. RESULTS



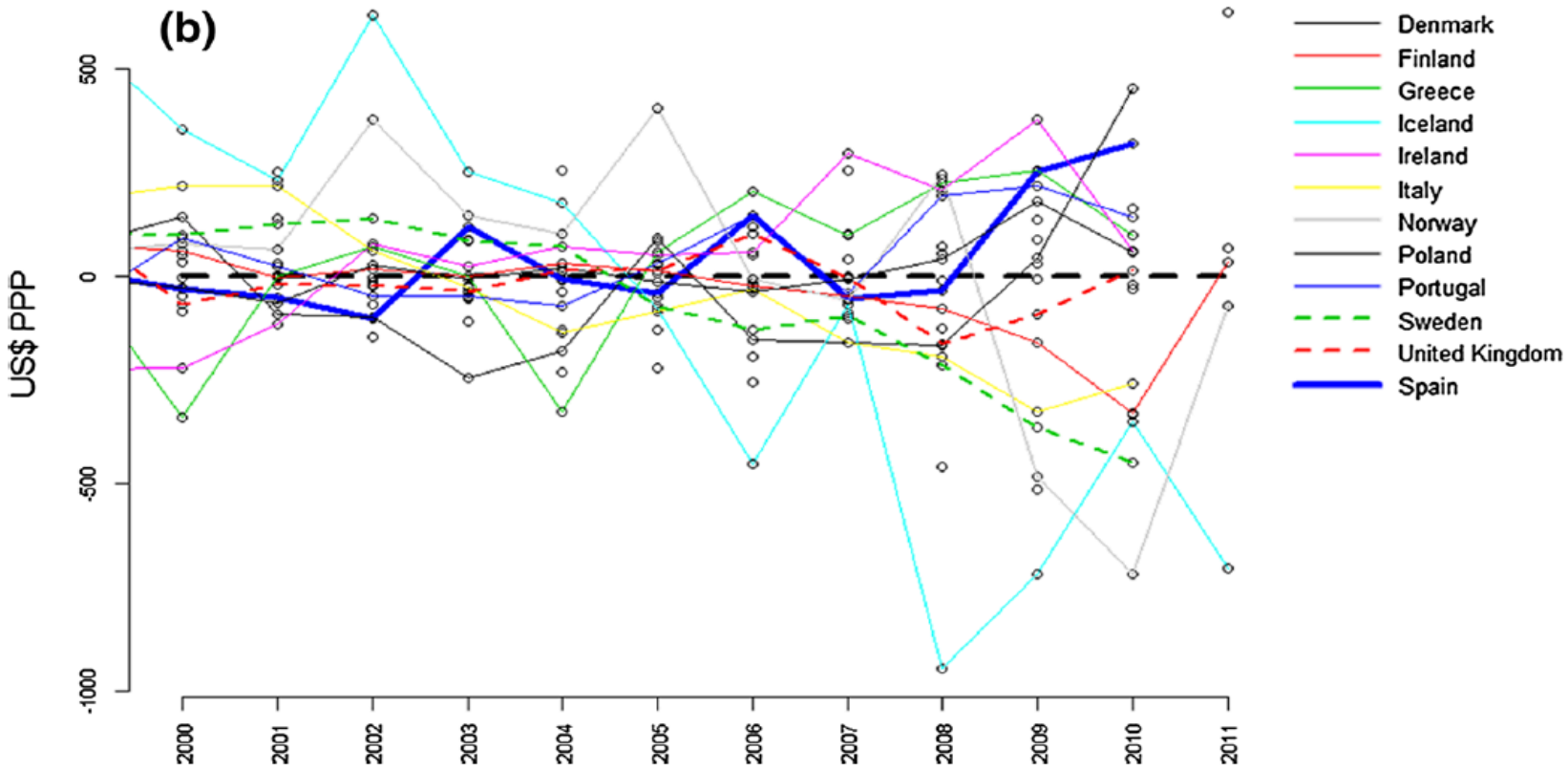
All countries in relation to the Beveridge-Douglas standard. Difference with respect to that expected. Total health expenditure in percentage of GDP as results from model, weighted by GDP per capita. **Portugal was losing ground as a result of the crisis, but not Spain**. Sweden on the predicted line and Iceland a clear outlier. UK from below the standard to above it.

3. RESULTS



Spain. Difference with respect to that expected. **Total expenditure per capita US$ PPP** as results from model. Beveridge-Douglas sample, **weighted by population**

3. RESULTS



All countries in relation to the Beveridge-Douglas standard. Difference with respect to that expected. **Total expenditure per capita US$ PPP** as results from model. **Weighted by population.**

Iceland's population (rather than Ireland's) was clearly suffering most because of the economic crisis, as did Sweden's in per capita terms, although to at a lesser extent.

4. DISCUSSION

- In general, the Spanish indicators reflecting the **difference between the observed and the expected values show positive residuals (from 2007).**

- This goes against the common claim that Spanish levels of expenditure and finance are well below most of the conventional standards.

- Moreover, that result increases when the benchmark for the comparison is a population weighted mean (when searching for a type of 'representative' citizen of our sample being considered).

- If GDP is the weight results are rather similar (in identifying a sort of median income citizen), however, with a distinct contrast in the years of the crisis.

4. DISCUSSION

- **Both measures may be disputed but they are more adequate than the simple 'average income'.**

- Subsampling according to the political nature of the health systems is important because benchmark should be derive from similar health systems.

- Controversial arena: which adjustment factors?

- **Conclusion:** there is a need for a better understanding of the settings of any comparison, a more appropriate sub-sampling, according to the 'political' nature of the health systems, in order to align any demand to the financial capabilities of the health care sector.

5. LIMITATIONS

- Important to define what you want to compare. Then, we can use weights, simple average taking into account the year…
- However, it is very important to reference the data you are using. Because, updates in the data sources can change the results.
- In this paper, data from **OECD—OECD Health Data 2012**
- However, a replication done by (table):

Lopez-Casasnovas, G. and González Lopez-Valcarcel, B. "EL SISTEMA SANITARIO EN ESPAÑA, ENTRE LO QUE NO ACABA DE MORIR Y LO QUE NO TERMINA DE NACER" Encuentro REDES, Santiago de Compostela Mayo 2015

- Showed differences in the data. The main reason was the OECD updated the figures and the averages changed. They used data **OECD Health Data 2015.**

5. LIMITATIONS

	Spain		OCDE		EUR		Model Beveridge-Douglas	
	Total HE/GDP OECD 2012	Total HE/GDP OECD 2015	Total HE/GDP OECD 2012	Total HE/GDP OECD 2015	Total HE/GDP OECD 2012	Total HE/GDP OECD 2015	Total HE/GDP OECD 2012	Total HE/GDP OECD 2015
2000	7,2	7,2	7,7	7,7	7,7	7,6	7,3	7,3
2001	7,2	7,2	8	7,9	7,9	7,9	7,7	7,6
2002	7,3	7,3	8,3	8,2	8,2	8,1	8	7,9
2003	8,2	8,2	8,6	8,5	8,5	8,4	8,1	8,1
2004	8,2	8,2	8,6	8,5	8,6	8,5	8,2	8,1
2005	8,3	8,3	8,6	8,6	8,7	8,6	8,3	8,2
2006	8,4	8,4	8,6	8,5	8,6	8,6	8,3	8,2
2007	8,5	8,5	8,6	8,5	8,6	8,5	8,3	8,3
2008	8,9	8,9	8,9	8,8	8,9	8,9	8,6	8,6
2009	9,6	9,6	9,8	9,5	9,7	9,6	9,5	9,2
2010	9,6	9,6	9,7	9,3	9,6	9,4	9,3	9,0
2011		9,4		9,2		9,2		8,8
2012		9,3		9,3		9,3		8,8

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