

Annex 1: Methodology **SocioEconomics Indicators 2010**

a) Methodology to the Measurement of Social Mobility

The economic literature on intergenerational mobility studies the correlation between father and son socio-economic status, which we estimate following the state of the art of the literature as intergenerational elasticity's between parents and children's income.

The database employed is the European Community Household Panel, to gather data on permanent income (5 years average) of individuals and their children.

<http://www.google.co.uk/search?hl=en&sa=X&ei=1d9NTKvFEYqyogSTooWFCw&ved=oCA8QBSgA&q=european+household+panel+survey&spell=1>

Data from Catalonia has been obtained from the Panell de Desigualtats (PaD) that provides the Foundation Jaume Bofill, for four years at the time of the study.

<http://www.obdesigualtats.cat/index.php?cm=06>

The main advantage of using these databases besides availability lies in cross country comparisons.

Following the economics literature on intergenerational mobility has faced along the years many estimation problems. The equation estimated using OLS is the following:

$$Y_{1i} = \beta Y_{0i} + \epsilon$$

where Y_{1i} is a measure of the permanent economic status of the son and Y_{0i} is the corresponding measure for the father. Given that parents and children are observed at different

points in their life-cycle then the age effect of parents and children should be controlled for. Hence, we have estimated the following expressions:

$$Y_{0is} = y_{0i} + v_{0is}$$

$$y_{1it} = y_{1i} + v_{1it}$$

so that father earnings in year s is composed by a permanent component that reflects the true long-term earnings capacity (y_{0i}), a component that captures both transitory shock that might affect that particular year earnings and error due simply to inaccurate report of earnings (v_{0is}). We use an average of father earnings (typically 4-5 years) because this will reduce (but not eliminate completely) the biases generated by both transitory shock and measurement error. Finally, my results can be affected by sample selection bias because to match children and father in ECHP they should cohabit at least in one wave. Hence, as an

empirical strategy we consider the model introduced and incorporate age profile in equations as follows:

$$Y_{ois} = \gamma_{oi} + \alpha_o + \gamma_o A_{ois} + \phi_o A_{2ois} + v_{ois}$$

$$y_{1it} = \gamma_{1i} + \alpha_1 + \gamma_1 A_{1it} + \phi_1 A_{21it} + v_{1it}$$

where A_{ois} is the age of the father from family i in year s and A_{1it} is the age of son from family i in year t .

b) Methodology to the Synthetic Index of Competitiveness

The synthetic index is a composite index of measure of partial competitiveness indexes of a territory. The indicators have been selected according to its theoretical relevance and its statistical reliability, quality and measurement. The composition of the final indicators draws upon a time series of set of partial indexes and using multivariate techniques explained below.

The competitiveness index of a territory i specific time period t can be reproduced as a weighted average of a set of normalised partial indicators as follows:

$$CI_{it} = \sum_{i=1}^n w_i x_{it}$$

where w_i refers to the weight of a partial indicator i , and x_{it} refers to the value of such an indicator at a specific time t . Weights are obtained using principal component analysis. Principal component analysis is based on the statistical representation of a random variable. Suppose we have a random vector population \mathbf{x} , where

$$\mathbf{x} = (x_1, \dots, x_n)^T$$

and the mean of that population is denoted by

$$\mu_{\mathbf{x}} = E\{\mathbf{x}\}$$

and the covariance matrix of the same data set is

$$\mathbf{C}_{\mathbf{x}} = E\{(\mathbf{x} - \mu_{\mathbf{x}})(\mathbf{x} - \mu_{\mathbf{x}})^T\}$$

The components of $\mathbf{C}_{\mathbf{x}}$, denoted by c_{ij} , represent the covariances between the random variable components x_i and x_j . The component c_{ii} is the variance of the component x_i . The variance of a component indicates the spread of the component values around its mean value. If two components x_i and x_j of the data are

$$(c_{ij} = c_{ji} = 0)$$

uncorrelated, their covariance is zero. The covariance matrix is, by definition, always symmetric.

From a sample of vectors $\mathbf{x}_1, \dots, \mathbf{x}_M$, we can calculate the sample mean and the sample covariance matrix as the estimates of the mean and the covariance matrix.

From a symmetric matrix such as the covariance matrix, we can calculate an orthogonal basis by finding its eigenvalues and eigenvectors. The eigenvectors \mathbf{e}_i

and the corresponding eigenvalues λ_i are the solutions of the equation

$$\mathbf{C}_{\mathbf{x}} \mathbf{e}_i = \lambda_i \mathbf{e}_i, i = 1, \dots, n$$

For simplicity we assume that the λ_i are distinct. These values can be found, for example, by finding the solutions of the characteristic equation

$$|\mathbf{C}_x - \lambda \mathbf{I}| = 0$$

where the \mathbf{I} is the identity matrix having the same order than \mathbf{C}_x and the $|\cdot|$ denotes the determinant of the matrix. If the data vector has n components, the characteristic equation becomes of order n . This is easy to solve only if n is small. Solving eigenvalues and corresponding eigenvectors is a non-trivial task, and many methods exist.

Table 1. Underlying variables employed in the principal component analysis.

	Per capit a GDP	Unempl oyment rate	% In te rn et U se	Rail Dens ity	Motor way density	R&D % GDP	Technol ogy Graduat es per 1000 pop	Educati on Expendi ture
German y	26400	7.54	71	0.46	0.15	2.63	11.4	4.4
Denmar k	33200	6.6	82	0.57	0.2	2.72	16.4	8
Netherl ands	28300	3.71	86	0.18	0.52	1.63	8.9	5.5
Spain	16900	18.73	54	0.29	0.3	1.35	11.2	4.3
France	24800	9.68	65	0.49	0.17	2.02	20.7	5.6
Portuga l	12600	10.1	42	0.26	0.25	1.51	18.1	5.3
Italy	20000	8.01	42	0.28	0.11	1.18	12.1	4.7
Catalun ya	26971	16.2	66	0.21	0.17	1.48	11.9	3.6
Ireland	30800	12.64	60	0.42	0.06	1.43	18.7	4.8
United Kingdo m	25000	7.8	76	0.26	0.06	1.88	17.5	5.6

Sources

a) GDP

-Real Gross Domestic Product per capita, 2009 - EUROSTAT. Unit: Euro per inhabitant.

-GDP (nominal) per capita 2009 - EUROSTAT. Unit: Euro per inhabitant.

-GDP per càpita in PPS 2009 - EUROSTAT. GDP per càpita in PPS (Purchasing Power Standards, EU -27). Please be aware that this indicator has been rescaled, i.e. data is expressed in relation to EU-27 = 100.

Sources (Eurostat, Idescat or INE):

http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_aux_gph&lang=en

<http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&plugin=1&language=en&pcode=tsieb010>

<http://www.idescat.cat/economia/inec?tc=3&id=8106>

b) Unemployment Rate

-Unemployment rate 2n semester 2009 - EUROSTAT. Unemployed: those persons age 15 to 74 who are not working, have looked for work in the last four weeks, and ready to start work within two weeks, which conform to ILO standards. Both the actual count and rate of unemployment are reported. The main source used is the European Union Labour Force Survey (EU-LFS). The EU-LFS collects data on all member states each quarter. Unit: %

Sources (Eurostat, Idescat or INE):

<http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&language=en&pcode=teilm020&tableSelection=1&plugin=1>

<http://www.idescat.cat/economia/inec?tc=3&id=5704>

c) TICs, digital fracture

-Individuals regularly using the Internet 2009 - EUROSTAT. Unit: % of individuals aged 16 to 74.

-Households who have Internet access at home 2009 - EUROSTAT. Unit: Percentage of households with at least one member aged 16 to 74 who have Internet access at home.

Sources (Eurostat, Idescat or INE):

http://epp.eurostat.ec.europa.eu/portal/page/portal/product_details/dataset?product_code=TIN00061

http://epp.eurostat.ec.europa.eu/portal/page/portal/product_details/dataset?product_code=TIN00088

<http://www.idescat.cat/economia/inec?tc=3&id=6201>

<http://www.idescat.cat/economia/inec?tc=3&id=6202>

d) Transports Network

-Length of road network 2005 (most recent data not available) - EUROSTAT. Unit: Motorways km/1000km²

-Total length of railway lines (km) 2008 - EUROSTAT. Unit: total km.

-Railway Density (km/1000inhabitants) 2008. Source: Observatory (Total length of railways 2008 EUROSTAT / (Total Population 2008 EUROSTAT/1000)). Unit: km/1000inhabitants.

-Total length of motorways (km) 2008 - EUROSTAT. Unit: Total km

-Motorway Density (km/1000inhabitants). Source: Observatory (Total length of railways 2008 EUROSTAT / (Total Population 2008 EUROSTAT/1000)). Unit: km/1000inhabitants

Sources (Eurostat, Idescat or INE):

http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-SF-08-028/EN/KS-SF-08-028-EN.PDF

http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Transport_infrastructure_at_regional_level

<http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=en&pcode=ttro0003&plugin=1>

<http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=en&pcode=ttro0002&plugin=1>

<http://www.idescat.cat/dequavi/?TC=444&Vo=1&V1=1>

http://www10.gencat.cat/ptop/binaris/Carreteres_tcm32-42608.pdf

http://www10.gencat.cat/ptop/AppJava/cat/estadistica/sintesi/sistema_transport_s.jsp

***Nota sobre les dades de Catalunya :**

-‘Total length of railway’: s’inclouen en el càlcul de la variable les següents línies: xarxa de via ampla a Catalunya, Tren d’Alta Velocitat (longitud en funcionament en el període de l’exercici comparatiu -2008-), Ferrocarrils de la Generalitat de Catalunya (i Ferrocarrils de la Generalitat de Catalunya de Muntanya). Dades consultables a <http://www.trenscat.cat/>

-‘Total length of motorways’: s’inclouen en el càlcul de la variable els següents tipus de via: autopistes i carreteres de doble calçada, incloses les autopistes i carreteres que són de peatge o depenen de les empreses concessionàries. Període 2008. S’exclouen les vies de calçada única.

e) R+D

-Research and development expenditure (% of GDP) 2008 - EUROSTAT. Research and experimental development (R&D) comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications. R&D expenditures include all expenditures for R&D performed within the business enterprise sector (BERD) on the national territory during a given period, regardless of the source of funds. R&D expenditure in BERD are shown as a percentage of GDP (R&D intensity).

-Government - Gross domestic expenditure on R&D (GERD) by source of funds 2008 - EUROSTAT. The following columns present the relative shares of the different sources of funds in R&D. More specifically the indicators provided are percentage of GERD (Gross domestic expenditure on R&D) financed respectively by government, the business Enterprise Sector and finally GERD financed from abroad. GER, HOL, SP, POR, IT, IR data only available for 2007. Unit: Percentage of total GERD.

-Business Enterprise Sector - GER, HOL, SP, POR, IT, IR data only available for 2007. Unit: Percentage of total GERD.

-Abroad - GER, HOL, SP, POR, IT, IR data only available for 2007. Unit: Percentage of total GERD.

-Science and technology graduates 2007 - EUROSTAT. Tertiary graduates in science and technology per 1 000 of population aged 20-29 years.

-Total researchers 2008 - EUROSTAT. Researchers are professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems, and in the management of the projects concerned. Head count (HC) data measure the total number of researchers who are mainly or partly employed on R&D.

Sources (Eurostat, Idescat or INE):

<http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&plugin=1&language=en&pcode=tsiir050>

<http://www.idescat.cat/economia/inec?tc=3&id=6110>

<http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=en&pcode=tsc00003&plugin=1>

<http://www.idescat.cat/economia/inec?tc=3&id=8303>

<http://www.idescat.cat/economia/inec?tc=3&id=6107>

f) Education

-Public spending on education, total (% of GDP) 2007 - United Nations Educational, Scientific, and Cultural Organization (UNESCO) Institute for Statistics. Public expenditure on education consists of current and capital public expenditure on education includes government spending on educational institutions (both public and private), education administration as well as subsidies for private entities (students/households and other private entities). Unit: %

Sources (Eurostat, Idescat or INE):

Education and GDP: <http://www.idescat.cat/economia/inec?tc=3&id=8308>

c) Methodology to the Measurement of Globalisation Index

This index contains a measure of all the dimensions that influence economic globalisation, that is, interdependence or openness of trade, investment and incomes. Following other indexes available we use the following variables and we employ the same methodology as for the competitiveness index.

Economic Globalisation	Trade	Exports plus imports of goods and services as a proportion of GDP
	Foreign Direct Investment (FDI)	Inflows plus outflows of foreign direct investment as a proportion of GDP
	Portfolio Investment	Inflows plus outflows of portfolio investments as a proportion of GDP

	Income	Employee compensation paid to non-resident workers and investment income from foreign assets owned by domestic residents plus employee compensation paid to resident workers working abroad and investment income from domestic assets owned by foreign residents, as a proportion of GDP.
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