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Europe *vs.* The United States:

Is There a Trade-Off Between Mobility and Inequality?

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ABSTRACT

The aim of this paper is to assess the possible relationships between individual income mobility and inequality in both the United States and selected European Union member states. The main hypotheses to be tested are the existence of notable differences in mobility between the USA and the European Union which could offset the observed differences in inequality, and the possible differences within the European Union. To this end, the principal approaches available to assess differences in mobility among countries have been reviewed and a wide range of indicators has been calculated.

Introduction

Comparative static analyses of inequality have raised many questions that can only be answered by means of dynamic studies. The apparent stability in income distribution seen in various countries may have been accompanied by important processes of households rerankings on the income scale that have affected the assessment of their welfare. In addition, efficiency in achieving redistributive objectives or the effectiveness of their design may vary considerably according to the dynamics of household income. Hence, the effectiveness of policies aimed at very low-income households can differ substantially depending on whether they were designed to combat temporary or long-term poverty situations (Jenkins, 1999).

The comparison of alternative social models probably arouses the greatest interest. Countries with a high degree of labour market flexibility, a lower level of social protection and high levels of inequality are contrasted with countries where high degrees of labour market regulation coexist with high levels of unemployment. The latter, however, tend to have a lower degree of dispersion in income distribution. The discussion as to which is the best model leads us to the study of the inequality "softening effect" which income mobility differences among countries may have in the long-term[1]. A dynamic assessment of the various processes appears to be necessary. If inequality tends to increase in one particular country yet mobility remains constant, the possibilities of the latter playing a compensatory role will be reduced, even in countries where greater income dynamics exists. The only way to compensate increases in inequality is to similarly increase mobility[2].

The principal objective of this paper is to assess the scope of income mobility from a comparative perspective and to confirm whether or not there is an observable relationship with inequality. More specifically, the main hypotheses to be tested are the existence of notable differences in mobility between the USA and the European Union which could offset the observed differences in inequality, and the possible differences within the European Union. To this end, a broad range of mobility indicators has been estimated. The sources used include the

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[1] The first comparative analyses have appeared only in the last few years. These shed some light on this question. Gottschalk and Smeeding (2000) concluded that while the United States is the leading country in the growth of economic inequality, it has intermediate values concerning income mobility. This conclusion arises when its basic longitudinal indicators are compared with those of Nordic countries (Aaberge et *al.*, 1996 and Fritzell, 1990), Central European countries (Burkhauser et *al.*, 1998, Fabig, 1998, Schluter, 1998, and Schluter and Trede, 1999) or both groups of countries (McMurrer and Sawhill, 1998).

[2] See Gottschalk and Danziger (1997), as well as Creedy (1997).

first five waves of the *European Community Household Panel* (ECHP) for the European countries and the *Panel Study of Income Dynamics* (PSID) for the USA.

The paper has been structured in the following way. The data are presented in the first section, together with the principal methodological decisions we have taken. A broad range of results regarding inequality and income mobility in the countries selected is offered in the second section, where special attention is paid to alternative approaches to the measurement of mobility. The third section of the paper explores the relationship between both processes in order to test the existence of a trade-off between income mobility and income inequality. The paper ends with a brief list of our principal conclusions.

1. Data and methodological decisions

The results presented in this study for the countries of the European Union are based on microdata from the first five waves of the *European Community Household Panel* (ECHP), while those for the USA have been taken from the *Panel Study of Income Dynamics* (PSID). The first of these sources has been developed by EUROSTAT since 1994. This database contains longitudinal information regarding monetary income and a set of socioeconomic and demographic characteristics of households and individuals, making it an obligatory reference point for the study of questions related to the cross-country comparison of income distribution and income mobility[3]. Of the set of countries which form part of the ECHP we shall concentrate on five: the United Kingdom, Germany, France, Italy and Spain, for which there exist sufficient elements for comparison, supplied by national studies, and which constitute different models both with regard to levels of inequality and mobility, and also to the different institutional characteristics of the labour markets or the unequal scope and design of redistributive policies. The *Panel Study of Income Dynamics* (PSID) has provided information regarding the incomes of a representative sample of households since the end of the 1960s. These data were collected annually until 1997, when the survey became biannual. The study is performed by the Survey Research Center of the University of Michigan and currently contains information for the last 34 years and over 60,000 individuals.

The *concept of income* we shall use is that of disposable household income, which includes income after transfers and the deduction of income tax and social security contributions. In the

case of the ECHP, with the important exception of France, the majority of income sources are received net of taxes and deductions, while income from capital may be stated as net or gross quantities, depending on the interviewee. The fact of not being able to compare mobility with gross and net data and, more concretely, to work with data which have already been corrected by public sector intervention, may mean the introduction of a certain bias in the evaluations which are made regarding mobility. A high level of instability in gross earnings may be compensated by income tax and social security contributions.

The *reference period* for income is the year prior to the interview. The interviews corresponding to the first five waves of the ECHP were performed in the years 1994, 1995, 1996, 1997 and 1998, meaning that the corresponding incomes refer to, respectively, the years 1993, 1994, 1995, 1996 y 1997[4]. The PSID was not performed in 1998, given that, as stated earlier, the survey ceased to be annual in 1997 and became biannual in 1999. In order to reconstruct series with the same longitude as that of the ECHP we shall employ the information for the five years between 1992 and 1996. In both cases, the utilization of annual rather than monthly or quarterly data may affect the possible results[5]. Although the majority of studies use annual income distribution, owing basically to the method of collecting information and the availability of data, there exist significant fluctuations in the income perceived throughout the year. Nevertheless, it is generally recognized that households or individuals may compensate transitory losses of income by the consumption of savings or recourse to borrowing, making it advisable to utilize periods longer than monthly[6].

Although the time period employed –five years– makes it more appropriate to talk of medium-term rather than long-term mobility, an interesting question is the presence, even in a relatively brief period, of important changes in the rates of economic growth which, without a doubt, favour the possibility of observing different patterns of mobility in each of the countries studied. This may explain, as shall be seen, the existence of certain notable wave-on-wave changes in the mobility indicators estimated. In order to avoid possible biases in our conclusions

[3] Other studies have analize different questions related to income dynamics with the ECHP. See Maître and Nolan (1999) and Whelan *et al.* (2000).
[4] Starting from the fourth wave, the original interview of the ECHP ceased to be performed in Germany and the United Kingdom. In these countries there exist high-quality national panels which have been used to supply data comparable with those of the ECHP for all the waves. As a result, for the years 1994, 1995 and 1996 there are two databases available for both countries. In our analysis we follow the recommendation of EUROSTAT and use, for longitudinal analyses, standardized files from national sources.
[5] Cantó, Del Río and Gradín (2002) found, using the Continuous Family Budget Survey, that income mobility in Spain is appreciably higher when quarters instead of years are taken.

regarding short-term mobility, the results which refer to the inter-annual movements of income are presented as the average of the results corresponding to the four transitions between waves.

Incomes have been made comparable by using purchasing power parities corresponding to each country and year, supplied by the OECD. Income is expressed in 1996 prices by the use of the harmonized consumer price indices published by EUROSTAT. For the USA we have employed the average consumer price index for a given calendar year, published by the Bureau of Labor Statistics. The indicators refer, therefore, to the *real mobility* of incomes, without the different inflationary context of each country conditioning the results obtained.

Since the standard of living of households depends on both its income and its size and composition, we shall take these factors into account by adjusting income using *equivalence scales*. The scale employed is that known as the "modified OECD scale", which assigns the value of 1 to the first adult in the household, 0.5 to other adults and 0.3 to each child under 16. In order to compare the sensitivity of the results, given the different weight in each country of families of varying size and composition, other scales, such as the traditional OECD one, are also used. The equivalent income of each household is assigned to each member, employing the implicit hypothesis that all individuals belonging to the same household enjoy the same level of welfare.

Following the usual practice in longitudinal studies, the *unit of analysis* is the individual, given the natural restrictions on studying units which may change over time. Choosing the household as the unit of analysis would require the definition of what a longitudinal household really is, a concept which gives rise to numerous problems. Thus, changes in the income assigned to an individual may be due to variations in the income of the household to which he or she belongs or to changes in its composition. In order to construct a balanced panel, a prerequisite for the elaboration of the indices proposed, we shall work with the subsample of individuals (adults and children) present in each of the five waves of the ECHP and the PSID.

With the aim of taking into account the effect of *attrition* or gradual fall in the sample of observations present in the initial year, estimations have been weighted using the ECHP and PSID last wave longitudinal individual weights as recommended by EUROSTAT.

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[6] As Gottschalk and Danziger (1997) argue, the length of the accounting period chosen for incomes may change according to the sociodemographic group under analysis.

One final methodological consideration is that of the need to perform some type of *trimming* of the distributions tails, in order to increase the coherence of the comparison in different countries. The treatment of outliers is even more relevant than in the comparative analysis of inequality, in which it has become a standard element. Cowell and Schluter (1998) demonstrate that the majority of mobility indicators are very sensitive to the presence of data contamination. In order to minimise this problem, we have truncated the samples symmetrically, through the elimination for each wave of those households whose equivalent income (using the modified OECD scale) was situated below the first percentile or above percentile 99[7]. The number of observations eliminated is relatively low, meaning that the gains in robustness justify the loss of information.

Table 1
ECHP and PSID Number of Unweighted Observations[1]

	Number of unweighted observations (individuals)											
	Balanced Panel[2]											
	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Waves 1-2	Waves 1-2-3	Waves 1-2-3-4	Waves 1-5	Attrition[3] (%)	Trimming[4]	%Dropped observations[5]
Germany	16,151	16,542	16,148	15,715	15,024	15,072	14,178	13,312	12,374	23.4	11.906	3.8
France	18,190	17,311	16,861	15,662	14,801	16,196	15,036	13,421	12,232	32.8	11.286	7.7
UK	12,623	12,333	12,454	12,324	12,284	11,465	10,893	10,440	9,978	21.0	9,281	6.6
Italy	21,421	21,426	21,227	19,834	19,077	19,978	18,826	16,954	15,419	28.0	14,331	7.1
Spain	22,834	20,390	19,218	17,865	16,549	19,598	17,448	15,391	13,660	40.2	12,759	6.6
USA	13,646	13,591	13,341	12,933	11,142	12,890	12,434	11,978	8,117	40.5	7,627	6.0

[1] Panel Study of Income Dynamics (PSID) and European Community Household Panel (ECHP). Households with positive income, at least one adult and positive survey weights.
[2] Individuals present in each of the waves considered.
[3] %Attrition with respect to the first wave.
[4] Trimming, for each wave, lower and upper 1% using the "modified OCDE" equivalence scale.
[5] *With respect to individuals present in each of the five waves.*

The characteristics of the data are summarised in Table 1. There are some important differences in the sample size and in the attrition incidence in each country. With regard to the first of these issues, the relatively large sample in Spain is immediately apparent, given its lower level of population. It is also, together with the USA, the country suffering the greatest attrition, losing 40% of the sample between the first and the last wave. The opposite experience is that of Germany and the United Kingdom, with losses limited to a fifth of the initial sample.

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[7] A similar procedure is that employed by Schluter and Trede (1999). Schluter (1998) establishes *left-censoring sampling* procedures, to eliminate the most obvious cases of underestimation of declared income.

2. Inequality and mobility: main results

Mobility levels in each country can be measured employing different criteria, which may give rise to different orderings. Such criteria include dimensions of the dynamic process as varied as the reduction of inequality as the accounting period is extended, the origin independence of last period income or the (non-)existence of transitions among different classes within the income distribution. Changes in inequality, in turn, are interpreted as the sharing of incomes among the individuals who comprise a population at different moments in time. This sharing may be measured by highly diverse indicators, which represent different properties and incorporate different normative connotations.

Differences in the distributive processes in the countries selected may give rise to very different combinations of inequality and mobility. There exists a generalized belief that very high levels of inequality in income distribution generally coincide with similarly high mobility indicators. From this viewpoint, it is accepted that greater flexibility in the labour market produces a dual effect: on the one hand, it causes differences in earnings and inequality in income distribution to be accentuated; on the other, it favours a larger number of transitions between situations of employment and unemployment, as well as a greater possibility of rotation within the labour market. In practice, however, there exist various types of economic and institutional factors which mean that this dual effect is neither automatic nor constant; experience shows that this hypothetical trade-off may display many permutations, and we cannot therefore confirm the existence of a linear relationship between inequality and mobility. In this section we estimate various indicators to try to determine the existence of different profiles among the countries chosen. We revise the differences in inequality levels, estimate a wide range of mobility indicators and compare the results of both processes.

2.1. *Differences in inequality*

We consider the most well-known inequality measures to evaluate how the considered countries diverge. Gini index is defined as:

$$G = \left[\frac{1}{2n^2\mu} \right] \sum_{i}^{n} \sum_{j}^{n} |x_i - x_j| \tag{1}$$

where x_i represents the total income received by household i=1...n, x_j represents income of the next household, and μ mean income.

The generalised entropy measures are defined as:

$$GE(c)=(1/c(1-c)) \{[(1/n)\Sigma_i^n(x_i/\mu)^c]-1\} \text{ if } c\neq0 \text{ and } c\neq1, \tag{2}$$

$$GE(1)=(1/n) \Sigma_i^n(x_i/\mu)\log(x_i/\mu) \text{ if } c=1, \tag{3}$$

$$GE(0)=(1/n) \Sigma\log(\mu/x_i) \text{ if } c=0 \tag{4}$$

The Atkinson index is defined as:

$$A(e)=1-[(1/n) \Sigma_i^n(x_i/\mu)^{1-e}]^{1/(1-e)} \text{ if } e\geq0 \text{ and } e\neq1, \tag{5}$$

$$A(1)=1-\exp[(1/n) \Sigma_i^n Ln(x_i/\mu)^e] \text{ if } e=1 \tag{6}$$

where the parameter e represents inequality aversion.

The estimation of inequality indicators helps to clarify the differences existing among the countries studied (Figure 1).

Figure 1
Gini Coefficient
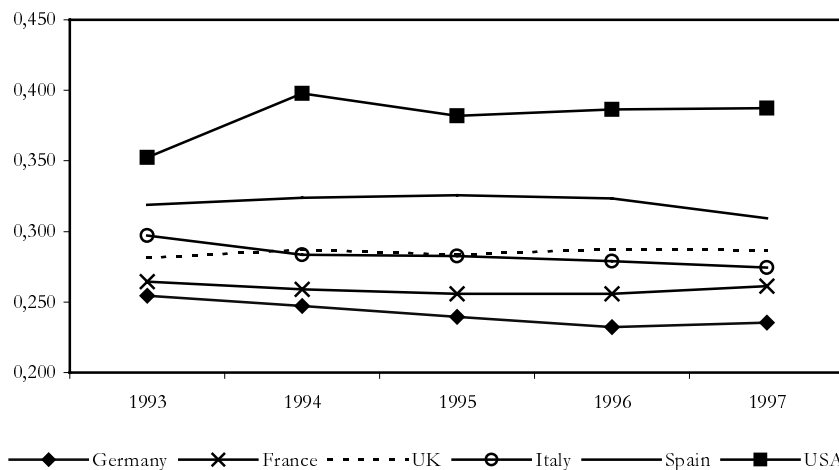
Note: ECHP and PSID five waves balanced panel. Trimming, for each wave, lower and upper 1% using the "modified OCDE" equivalence scale.

It is appropriate to talk of different types of experiences; the extremes include, notably, the low inequality levels of Germany and, to a lesser extent, of France, together with higher values for Spain and, especially, the USA, with values far higher than those of the European countries. Such results are maintained, as a general rule, when adopting other indicators (Table 2) and alternative methodological decisions[8]. This ordering is somewhat different from those obtained in other studies which use the first waves of the ECHP (Nolan and Maître, 1999), and also from those elaborated using other databases, such as that of the *Luxembourg Income Study* (Gottschalk and Smeeding, 2000). According to such research, the United Kingdom shows levels of inequality considerably higher than those obtained from our estimations. They are, in any case, different samples, in that the results we present in this study come from a balanced panel of individuals considered for five years, in contrast to the studies cited above, which considered the set of observations for each year.

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[8] Results for alternative equivalence scales are available from the authors upon request.

Table 2
Inequality Indices[1,2]

GE(0)				
	1993	1994	1995	1996	1997
UK	0.137	0.143*	0.138*	0.143*	0.141
Germany	0.119*	0.106**	0.097	0.090	0.093
France	0.115*	0.110**	0.105	0.106	0.111
Italy	0.164	0.146*	0.144*	0.138*	0.132
Spain	0.177	0.180	0.188	0.181	0.169
USA[3]	0.227	0.311	0.287	0.288	0.296
GE(1)				
	1993	1994	1995	1996	1997
UK	0.126	0.132*	0.129*	0.132	0.131
Germany	0.108*	0.101**	0.094**	0.089	0.091
France	0.112*	0.106**	0.103**	0.103	0.108
Italy	0.144	0.131*	0.129*	0.124	0.120
Spain	0.165	0.169	0.173	0.169	0.155
USA[3]	0.204	0.268	0.243	0.248	0.250
GE(2)				
	1993	1994	1995	1996	1997
UK	0.132	0.138*	0.136*	0.139	0.138
Germany	0.114*	0.109**	0.102**	0.097	0.098
France	0.122*	0.112**	0.111**	0.110	0.115
Italy	0.151	0.137*	0.133*	0.128	0.124
Spain	0.181	0.186	0.192	0.185	0.168
USA[3]	0.227	0.317	0.274	0.282	0.284
Gini				
	1993	1994	1995	1996	1997
UK	0.281	0.287*	0.283*	0.287*	0.287
Germany	0.254*	0.247**	0.239	0.232	0.235
France	0.264*	0.259**	0.256	0.256	0.261
Italy	0.297	0.283*	0.282*	0.279*	0.274
Spain	0.319	0.324	0.326	0.323	0.309
USA[3]	0.352	0.398	0.382	0.386	0.388
Atk(1)				
	1993	1994	1995	1996	1997
UK	0.128	0.133*	0.129*	0.133*	0.131
Germany	0.112*	0.101**	0.092	0.086	0.089
France	0.109*	0.104**	0.099	0.101	0.105
Italy	0.151	0.136*	0.134*	0.128*	0.123
Spain	0.163	0.165	0.171	0.166	0.156
USA[3]	0.203	0.267	0.250	0.250	0.256

[1] ECHP and PSID five waves balanced panel. Trimming, for each wave, lower and upper 1% using the "modified OCDE" equivalence scale.
[2] Following Mills y Zandvakili (1997), we have computed 95% bootstrap confidence intervals for each inequality index. When for a given year and inequality index two countries are marked by the same symbol, inequality differences between them are not significant.
[3] 1992/1996

Although the period is excessively brief for the inequality indicators to show great changes, in the time period considered there took place an important change in the business cycle, with a generalized slowing down of economic activity in the first third of the 1990s and a

relatively intense recovery, starting from the middle of that decade and especially in the USA. However, no major changes were evident, although there were variations in the countries studied. Specifically, inequality increased in the UK and USA, while it decreased in the remaining European countries, especially in Germany and Italy.

2.2. *Differences in income mobility*

The starting point for the analysis of mobility is the existence of information regarding the distribution of income for the same individuals in two different periods[9]. Let R_+^n be the set of possible distributions for a population composed of N individuals, with $N \equiv \{1,2,...,n\}$, $\mathbf{x} = (x_1, x_2, ..., x_n) \in R_+^n$ the initial distribution of income in ascending order and $\mathbf{y} = (y_1, y_2, ..., y_n) \in R_+^n$ that corresponding to a second period. Given that the transformation $\mathbf{x} \rightarrow \mathbf{y}$ produces an intertemporal variation in individual incomes, it is possible to assign to any individual $i \in N$ a vector of incomes (x_i, y_i) for the whole period.

The diversity of criteria which may serve as a reference for the analysis of mobility has given rise to different methodological approaches, employing a wide range of indicators which attempt to encapsulate different dimensions of this process. It is possible to group them into distinct interpretations: mobility measured as the extent to which income distribution is equalised as the accounting period is extended, as origin independence or longitudinal income association, or as transitions among income classes.

a) Inequality-based measures of income mobility

The first method of measuring mobility corresponds to the idea of observing the possible relationships between inequality at a specific moment in time (cross-section mobility) and in the whole period observed (longitudinal inequality). If mobility is high, the latter inquality will be lower than the former. The importance which the increase in income differences may have at a given point in time would be limited by the compensatory effect of income changes in the long term. The relationship between these two types of inequality was formulated by Shorrocks (1978a), using a mobility index which compares inequality in distinct sub-periods (t_{k-1}, t_k) within a

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[9] This formulation restricts the analysis to two periods, following the norms established by the majority of previous studies. See Markandya (1982 and 1984), King (1983), Cowell (1985) and Fields and Ok (1996 and 1999a,b).

specific time interval (t_0, t_n) with inequality resulting from the consideration of the aggregated income of each individual in the whole period:

$$R = \frac{I[x(t_0, t_n)]}{\sum_{i=1}^{n} w_k I[x(t_{k-1}, t_k)]} \tag{7}$$

where I is an indicator of inequality, X a distribution of income and w_k a weighting factor of the aggregate income received in each subperiod ($w_k = \mu(\mathbf{x}_{tk-1,tk})/\mu(\mathbf{x}_{t0,tn})$). R may be interpreted as a measure of income rigidity: when mobility is nil, R=1, and when income is completely mobile, R=0. The sensitivity of the possible results to the indicator chosen as reference requires a wide range of inequality indices to be considered. The same indicators as in the previous section have been chosen.

Figure 2
Percentage of inequality reduction based on Shorrocks Rigidity Index, 1993/97
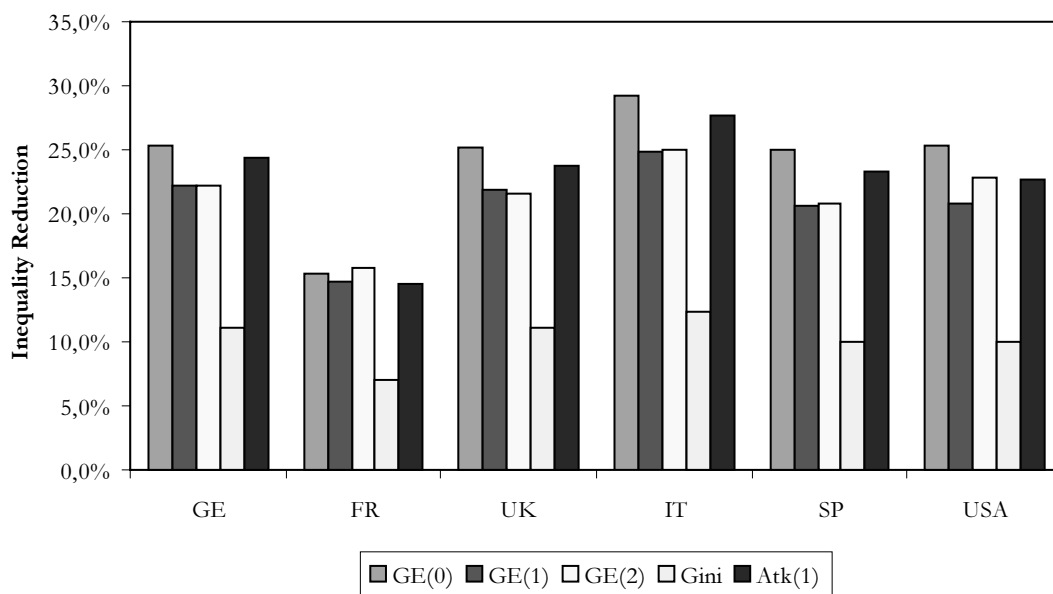
Note: ECHP and PSID five waves balanced panel. Trimming, for each wave, lower and upper 1% using the "modified OCDE" equivalence scale.

The estimation of the various indicators allows us to offer some initial answers to the questions raised in the introduction (Figure 2). The conclusion repeated with all the inequality indicators used for the construction of the Shorrocks index is the characterisation of Italy as the country with greatest mobility, with France occupying the opposite extreme. From the remaining countries, and although there exist reorderings according to the inequality index chosen, we can

immediately see the intermediate position of the USA which, even in the case of certain indicators, such as the Gini or Atkinson (ε=1), would show the greatest income rigidity following France.

b) *Mobility as longitudinal income association*

A second approach for the analysis of mobility is that which takes as its starting point the presence (or absence) of an independency relationship between the individual incomes from the final distribution (**y**) with regard to the initial distribution (**x**). The most appropriate indicators to capture this dimension of mobility are those statistical measures which allow the estimation of the correlation between the incomes of each observation in both the initial and final distribution. Thus, the most basic measure would be the correlation coefficient for the incomes of the two distributions ρ(**x,y**)). This idea is also expressed in the *Hart index*, defined as the complement of the correlation between the incomes (in logarithms) in each period. In the formulation proposed by Shorrocks (1993), it is expressed as:

$$M_{\text{HART}}(\mathbf{x,y}) = 1 - \rho (\log \mathbf{x}, \log \mathbf{y}) \tag{8}$$

where ρ is the correlation coefficient, y the final distribution and x the initial distribution. A similar indicator is that expressed by the slope coefficient in a regression of the logarithm of individual income in the final distribution on individual income in the initial distribution ($\beta \log \mathbf{x}_t$).

Table 3
Income Mobility as Longitudinal Income Association[1]

	Correlation Coefficient		β (log x_t)[2]		Hart Index	
	Short Term[3]	93/97	Short Term[3]	93/97	Short Term[3]	93/97
UK	0.797	0.608	0.758	0.559	0.233	0.436
Germany	0.790	0.575	0.732	0.481	0.246	0.463
France	0.843	0.724	0.812	0.681	0.155	0.263
Italy	0.737	0.625	0.647	0.460	0.316	0.413
Spain	0.791	0.663	0.711	0.572	0.268	0.403
USA[4]	0.759	0.642	0.788	0.723	0.249	0.396

[1] ECHP and PSID five waves balanced panel. Trimming, for each wave, lower and upper 1% using the "modified OCDE" equivalence scale.
[2] Slope coefficient in log (income) regression.
[3] Computed as the average of the four inter-annual transitions.
[4] 1992/1996

The majority of these measures coincide in presenting the same ordering of countries that is provided by the Shorrocks indicator (Table 3). If wave-on-wave income mobility is considered, both the correlation coefficient and the regression coefficient, and similarly the Hart index, whose results should be interpreted inversely to those of the other two indicators, allow the characterisation of France as the country with the lowest mobility of the countries selected, and of Italy as the country with greatest mobility. The USA would once more occupy an intermediate position. If the relationship between the initial and the final distribution is estimated for a longer period –five years–, the results change slightly . Germany and the UK join Italy as countries of high mobility, while the USA moves from its previous intermediate situation to one of low mobility in the comparative context.

c) *Mobility as transitions among income classes*

A third perspective for the analysis of mobility is that which conceives it as transitions between states within income distribution. The important question in this case is not so much the movement of individual incomes between two points in time, but rather whether this change causes modifications in the relative position of each individual in the income distribution. The most common way of measuring this dimension of mobility is by the construction of matrices of transitions among the various percentiles of the income distribution. These transitions may consist of movements towards higher positions on the income scale or downward movements in the relative position.

It is possible to construct, from these matrices, different indicators of the set of transitions. Since the pioneering approximation of Prais (1955) to the analysis of the probabilities of change in the diagonal of the transition matrix and in the respective rows, various indices which summarise the possible movements have been constructed. The best known is that proposed by Shorrocks (1978b) [10]:

$$M(P) = \frac{n - tr(P)}{n - 1} \qquad (9)$$

where tr is the trace of the transition matrix and n the number of percentiles and, therefore, of rows and columns of the matrix. The greater is the probability of permanence in the same

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[10] Shorrocks (1978b) shows that if we require a mobility index whose value increases as the values of the principal diagonal decrease, and which assigns the maximum mobility to matrices with identical rows, then the analysis must be restricted to the subset of matrices with quasi-maximum diagonals (i.e. those in which the probability of remaining in the same percentile is equal to or greater than that of leaving it). See Ramos (1999a).

income strata, the greater would be the value of the trace and the lesser the value of the index. Another index, complementary to the previous one, is that proposed by Bartholomew (1973). This index averages the movements outside the diagonal:

$$BI = \sum_{l=1}^{n} \sum_{j=1}^{n} p_{lj} |l - j| \tag{10}$$

where p_{lj} represents the transitions towards percentiles different from the initial one. The greater the value of the index, the greater is mobility. In contrast to the Shorrocks index, there is no predetermined upper limit[11].

Table 4
Mobility Measures based on Transition Matrices[1]

| | Bartholomew Index | | | | Shorrocks Mobility Index | | | |
| | Relative Matrices[2] | | Absolute Matrices[3] | | Relative Matrices[2] | | Absolute Matrices[3] | |
	Short term[4]	93/97	Short term[4]	93/97	Short term[4]	93/97	Short term[4]	93/97
UK	1.186	1.852	0.689	1.080	0.693	0.857	1.098	1.127
Germany	1.133	1.760	0.557	0.910	0.657	0.803	1.084	1.118
France	0.906	1.347	0.505	0.747	0.609	0.776	1.080	1.106
Italy	1.293	1.729	0.720	0.975	0.696	0.831	1.097	1.124
Spain	1.255	1.775	0.691	0.998	0.706	0.845	1.096	1.120
USA[5]	1.158	1.667	0.685	0.988	0.668	0.818	1.088	1.115

[1] ECHP and PSID five waves balanced panel. Trimming, for each wave, lower and upper 1% using the "modified OCDE" equivalence scale.
[2] Decile groups.
[3] Absolute income groups defined using cut-offs equal to 0.5, 0.75, 1, 1.25 and 1.5 times mean wave 1 income.
[4] Computed as the average of the four inter-annual transitions.
[5] 1992/1996

The results corresponding to these indices coincide in an ordering of the countries which once again coincide in characterising France as the country having the least mobility and the United Kingdom, Spain and Italy –the latter in the short term– as those with greatest mobility (Table 4). The USA again occupies an intermediate position[12]. Such results are repeated, in general, both with the construction of relative matrices and when fixed thresholds in the definition of income strata are determined (absolute matrices).

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[11] All the indices revised so far interpret mobility from a relative perspective, ignoring the absolute dimension of possible transitions. Absolute mobility matrices can be defined using cut-offs as a proportion of initial mean or median income. We use 0.5, 0.75, 1, 1.25 and 1.5 times wave 1 income as fixed cut-offs.
[12] The estimation of confidence intervals by *bootstrapping* shows that in many cases differences are not significant. Only France maintains systematically its position.

The construction of transition matrices may also clarify to what extent we may talk of homogeneity in the transitions between states. As stated earlier, the movements among income classes may affect most unequally the distribution tails. Are the transitions between high income groups greater in all countries? What degree of mobility is there in the lower tail of the distribution in each case? Can we talk of homogeneous processes? These are questions which refer to the comparison of percentile movements in different parts of the distribution in each country.

Table 5
Percentage of Persons Remaining in the same Income Group[1]

	UK	Germany	France	Italy	Spain	USA
Relative Matrices[2]						
Short Term						
Low Income	40.8	44.4	48.3	39.5	35.8	42.9
Middle Income	28.5	30.4	35.8	30.4	27.9	31.7
High Income	46.8	51.1	54.7	44.4	48.5	47.7
TOTAL	37.7	40.8	45.2	37.3	36.5	39.9
Medium Term						
Low Income	26.6	32.1	31.6	29.7	26.5	27.4
Middle Income	15.4	19.3	23.5	17.3	16.1	18.0
High Income	29.2	34.5	37.5	31.3	32.0	36.6
TOTAL	22.9	27.7	30.1	25.2	24.0	26.4
Absolute Matrices[3]						
Short Term						
Low Income	53.2	55.7	64.4	56.6	55.8	64.8
Middle Income	42.4	57.8	53.8	44.1	40.2	41.5
High Income	58.8	62.1	63.7	53.8	60.4	56.2
TOTAL	50.8	58.2	60.1	51.4	51.9	56.2
Medium Term						
Low Income	37.6	38.3	48.7	45.3	46.4	52.3
Middle Income	27.8	42.2	38.7	29.9	29.3	25.4
High Income	47.3	43.5	57.0	38.5	43.5	46.2
TOTAL	36.6	41.2	46.9	38.1	40.0	42.6

[1]ECHP and PSID five waves balanced panel. Trimming, for each wave, lower and upper 1% using the "modified OCDE" equivalence scale.
[2]Low income: Individuals with equivalent income within the first three deciles of wave 1 income distribution. Middle Income: Individuals with equivalent income belonging to deciles 4,5 and 6 of wave 1 income distribution. High Income: Individuals with equivalent income within the last three deciles of wave 1 income distribution.
[3]Low income: Individuals with equivalent income below 0.75 times mean wave 1 income. Middle Income: Individuals with equivalent income between 0.75 and 1.25 times mean wave 1 income. High Income: Individuals with equivalent income greater than 1.5 times mean wave 1.

Table 5 reflects the diversity of the internal structure of mobility in the five countries studied. One initial important feature is the repetition in all countries of a pattern of characteristic movements, shown in the majority of national studies, in which the movements to

other deciles are lower for higher-income individuals and households than the flows of individuals with low and, above all, mean incomes. What differentiates the experience of each country, within this common pattern, is the magnitude of the difference existing between the transitions which are produced in the high and low parts of the distribution. Spain, for example, appears to be unusual in the context of the countries studies, as it shows greater mobility for average and low income individuals, while rigidity is extremely apparent for individuals located in the other extreme of the initial distribution. This process is also repeated, in the medium term, in the USA.

These results are somewhat different when absolute transition matrices are computed. The extreme cases are the USA and Italy that show greater mobility for high income groups.

3. Inequality and mobility: an overall view

The set of results obtained regarding the differences in mobility match relatively well with those of other comparative studies. Maître and Nolan (1999), who estimate mobility between the first two waves of the ECHP, using as a basis the construction of relative transition matrices, obtain a similar picture, with Italy, together with the United Kingdom, as the countries with highest mobility and France as the country with the lowest mobility. The pattern of mobility by income groups is very similar to that obtained in this study. Furthermore, and despite the fact that the results are not directly comparable, Antolín *et al.* (1999), in a study which analyses the dynamics of poverty in four OECD countries –Germany, the United Kingdom, the USA and Canada– show Germany to be the country with the highest exit rates from poverty, together with low probabilities of re-entry, while the opposite occurs in the United Kingdom. Schluter (1998) also shows that, contrary to widespread belief, Germany is a more mobile society than the USA, and that this result is determined by the high mobility of the low-income group. Furthermore, the work of Cantó (2000) with the Continuous Family Budget Survey also finds a greater stability in Spain in upper-income groups, compared to lower-income deciles. Comparing her results with those obtained by Jarvis and Jenkins (1998), using data from the BHPS (British Panel Household Survey), and despite the caution with which we must interpret the results, owing to the methodological differences which exist between the two analyses, a similar mobility in both countries can be observed. Our results regarding *short-term* mobility are slightly different, although they also indicate a greater mobility in Spain, according to the transition matrices.

The estimations performed in the previous sections offer, therefore, a wide and coherent range of indicators which attempt to answer the questions formulated at the beginning of this study. In concrete, and in the light of the revised data we can once more pose the questions regarding the relationship between the two processes analysed, namely: Are the countries with greater levels of inequality those which show higher indicators of mobility? Can we talk of an inverse relationship between inequality and mobility? What type of combinations predominate among the countries selected? The results obtained do not permit us to talk of a clear relationship between inequality and mobility, without any type of dominant pattern among the countries studied. In order to confirm this absence of clear links we have estimated normalised indicators which take as reference the USA results.

Table 6
Income mobility and inequality measures[1] (USA=100)

	UK	Germany	France	Italy	Spain
INEQUALITY (Average 93/97)					
GE(0)	49.9	35.8	38.8	51.3	63.6
GE(1)	53.6	39.8	43.9	53.4	68.6
GE(2)	49.5	37.6	41.2	48.8	66.0
Gini	74.8	63.4	68.0	74.3	84.0
Atkinson(1)	53.4	39.1	42.3	54.9	66.9
MOBILITY (Short term)					
Correlation Coefficient	105.1	104.1	111.1	97.1	104.3
Coef.Log	96.3	92.9	103.1	82.2	90.3
Hart Index	93.6	98.7	62.0	126.5	107.5
Shorrocks GE(0)	101.8	101.3	106.9	96.7	100.0
Shorrocks GE(1)	100.5	100.2	103.9	97.2	100.1
Shorrocks GE(2)	102.4	102.0	105.0	99.0	102.0
Shorrocks Gini	99.9	99.9	101.5	98.5	99.8
Shorrocks Atk(1)	100.7	100.0	105.3	95.9	99.3
Bartholomew (Relative Matrices)	102.4	97.8	78.2	111.6	108.3
Bartholomew (Absolute Matrices)	100.6	81.3	73.7	105.2	100.9
Prais-Shorrocks (Relative Matrices)	103.7	98.4	91.1	104.2	105.6
Prais-Shorrocks (Absolute Matrices)	101.0	99.6	99.3	100.9	100.8
MOBILITY (Medium term)					
Correlation Coefficient	94.6	89.6	112.7	97.3	123.2
Coef.Log	77.3	66.5	94.2	63.6	98.4
Hart Index	110.1	116.8	66.5	104.2	67.7
Shorrocks GE(0)	100.3	100.0	113.4	94.8	100.5
Shorrocks GE(1)	98.5	98.1	107.7	94.8	100.1
Shorrocks GE(2)	101.5	100.8	109.1	97.1	102.5
Shorrocks Gini	98.8	98.7	103.3	97.3	99.9
Shorrocks Atk(1)	98.5	97.8	110.4	93.5	99.1
Bartholomew (Relative Matrices)	111.1	105.6	80.8	103.7	106.5
Bartholomew (Absolute Matrices)	109.3	92.1	75.6	98.7	101.0
Prais-Shorrocks (Relative Matrices)	104.8	98.3	95.0	101.6	103.3
Prais-Shorrocks (Absolute Matrices)	101.1	100.2	99.2	100.8	100.5

[1] ECHP and PSID five waves balanced panel. Trimming, for each wave, lower and upper 1% using the "modified OCDE" equivalence scale.

The analysis of the indicators regarding inequality and mobility reveal, essentially, the existence of highly diverse combinations of both types of processes (Table 6). In the case, for example, of the countries with inequality greater than the average, according to the majority of the indices considered –Italy, Spain and, above all, the USA–, we can talk of a very different dynamic for individual incomes. Thus, Italy is characterised by presenting, in the majority of the estimated measurements, above average levels of mobility. The longitudinal distribution of income seems to be more stable in the Spanish case, except for indicators derived from transition matrices. The USA, while systematically registering higher indicators of inequality, is

characterised by presenting levels of mobility which are only intermediate in the context of the countries under comparison.

Similar differences can be observed among the countries where individual income inequalities are more moderate. The German experience, where there coincides a lower relative inequality and higher than average levels of mobility, may be considered as having the greatest relative welfare. This conclusion is very different to that reached in the case of France, where relatively low levels of inequality are accompanied by mobility indicators which are systematically lower than the rest. Lastly, the United Kingdom presents close to average values in both areas, although in general income mobility is slightly lower than that of Italy, Germany and, in some cases, Spain.

It is appropriate, therefore, to conclude this section by confirming the absence of linear relationships or a sole process which is repeated uniformly in all the countries studied. However, the existence of certain variations in the results, according to the indicator selected, prevents us from forming definitive conclusions. While the top and bottom positions (France and Italy, respectively), are clear, there exist reorderings in the remaining countries.

4. Conclusions

The analysis of income dynamics has become an essential reference point for the understanding of distributive processes. Its relevance is particularly notable when comparing income distribution in different countries. The aim of this paper has been to assess the possible relationships between individual income mobility and inequality in both the United States and selected European Union member states. To this end, the principal approaches available to assess differences in mobility among countries have been reviewed and a wide range of indicators has been calculated.

The work undertaken out has allowed us to reach different conclusions Concerning the empirical matters, the plurality of approaches is notable. This causes results to be highly sensitive, depending on the theoretical premises employed in the definition of various indicators. The approaches considered are not completely interchangeable due to the different properties each indicator possesses and the different interpretation arising from each result. As in the case of inequality analyses, the use of a specific approach is implicitly associated with value judgements.

With regard to empirical aspects, the elaboration of different indicators has allowed us to answer one of the questions that has dominated the debate regarding social models and equity. There are important differences among the countries selected. Most of the indicators present Italy and France as the countries with the highest and lowest mobility, respectively. Contrary to general belief, the USA is shown to have intermediate levels of mobility within an international context. Whatever the case, the most significant result is the absence of any clear relationship between inequality and mobility. Examples of greater than average inequality and mobility have been seen, as have examples of low inequality and high mobility.

The use of homogeneous databases to measure inequality and mobility allows us to question the trade-off hypothesis. However, there is much that remains to be done to gain a full understanding of these processes. More work in order to understand the differences in income mobility across countries is needed. In this sense, the study of the determinants and the structure of mobility appears necessary.

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