A study on the relationship between economic inequality and mobility

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1. Introduction

In recent years, increasing interest has been displayed in the determinants of the demand for redistribution i.e. the variables which explain individual and (as a result) social preferences regarding income distribution. Two principal factors have been considered, namely social mobility and the beliefs held as to whether income differences are due to effort or luck. Benabou and Ok (2001) propose a model in which individuals whose income is currently below average, but who hope to achieve above average incomes in the future, will unite with individuals who already enjoy such income levels, in order to avoid the implementation of redistributive policies. Piketty (1996) employs a theoretical model to study the role of beliefs and social mobility; he finds that greater social mobility and stronger beliefs that income differences are the result of effort increase the opposition to redistribution. Other, more empirical research confirms his results (e.g., Ravallion and Lokshin, 2000; Corneo and Gruner, 2002, and Fong, 2001).

Increased social mobility appears to reduce support for redistribution and, consequently, greater income equality. A necessary condition in order for mobility to reduce the pressure for redistribution is a significant positive correlation between inequality and mobility. If the relationship between income inequality and social mobility was negative or independent, it would then be possible to conclude that the causal chain described above does not function in practice. That is to say, increased social mobility would not diminish the social predilection for redistribution.

The current study analyses that empirical relationship. To this end, indices of social mobility and inequality based on household equivalent income are calculated for 78 regions

of the European Union in the period 1993-2000. The statistical source used is the complete European Community Household Panel (hereafter ECHP).[2]

The indices of social mobility, proposed by Fields and Ok (1999) and those of inequality, constructed by Theil (1967) are calculated by the EU regions. In addition, following Van Kerm (2004), total mobility is decomposed into three distinct terms: mobility due to economic growth (M^G), mobility produced by dispersion (M^D) and exchange mobility (M^E) resulting from reranking. The first of these isolates the increase in the mean income of the distribution produced by economic growth. The dispersion component evaluates the degree to which income convergence occurs, studying the variation in the inequality of distribution without income being reranked. Lastly, the exchange component shows the magnitude of the rerankings among incomes. It is thus possible to determine which type of mobility is the most important. Similarly, an analysis is performed of the robustness of the mobility indices; these are calculated for periods of one, three and five years.

2. Indices of inequality and mobility

Let $X = (x_1,..., x_H)$ be the initial income distribution defined for H households. We shall define X^e as the vector of equivalent incomes. For household i the equivalent income is defined as $x_i^e = \frac{x_i}{e(n_i)}$ where n_i is the number of household members and e is the equivalence scale, where $1 \leq e \leq n_i$. Let us adopt the parametric scale proposed in Buhmann

[2] The ECHP regional division is based on a mix of NUT1 and NUT2 classifications. Observations for several regions do not cover the whole period.

et al. (1988), $e(n_i) = n_i^{\alpha}$, *where* $1 \geq \alpha \geq 0$. In addition, we weight each household by the number of members.

The vector of equivalent incomes X^e is ranked in ascending order, namely, $0 \leq x_1^e \leq x_2^e \leq ... \leq x_H^e$. Consequently, we may evaluate the Theil inequality index, in the initial period as $T(X^e) = \frac{1}{H}\sum_{i=1}^{H} \frac{x_i^e}{\mu_X} \ln \frac{x_i^e}{\mu_X}$ where μ_X is the mean of equivalent incomes in the initial period.

The final distribution of equivalent income is $Y^e = (y_1^e, y_2^e, ..., y_H^e)$ and the final distribution of equivalent income, ranked according to X^e is $Z^e = (z_1^e, z_2^e, ..., z_H^e)$. Mobility is measured using the proposal made by Fields and Ok (1999), namely to change from $X^e \rightarrow Y^e$:

$$M(Y^e, X^e) = \frac{1}{H}\sum_{i=1}^{H} \left| \log(y_i^e) - \log(x_i^e) \right|. \quad (1)$$

Total mobility is decomposed into mobility due to growth, mobility resulting from dispersion and exchange mobility. To this end, we calculate the mobility index by employing the following procedure: $X^e \rightarrow \mu X^e \rightarrow Z^e \rightarrow Y^e$, where μ is 1+ the average rate of growth between Y^e and X^e, $\mu = \frac{\mu_Y}{\mu_X}$. Thus, we obtain the three components of total mobility:

$$M^G = M(\mu X^e, X^e) = \frac{1}{H}\sum_{i=1}^{H} \left| \log(\mu x_i^e) - \log(x_i^e) \right| \quad (2)$$

$$M^D = M(Z^e, X^e) - M(\mu X^e, X^e) = \frac{1}{H}\sum_{i=1}^{H}\left|\log(z_i^e) - \log(x_i^e)\right| - \frac{1}{H}\sum_{i=1}^{H}\left|\log(\mu x_i^e) - \log(x_i^e)\right| \quad (3)$$

$$M^E = M(Y^e, X^e) - M(Z^e, X^e) = \frac{1}{H}\sum_{i=1}^{H}\left|\log(y_i^e) - \log(x_i^e)\right| - \frac{1}{H}\sum_{i=1}^{H}\left|\log(z_i^e) - \log(x_i^e)\right| \quad (4)$$

It is simple to demonstrate that $M(Y^e, X^e) = M^G + M^D + M^E$.

3. Empirical results

Social mobility and economic inequality are compared, firstly by a simple graph analysis for the EU countries as a whole. Figure 1 shows the indices of inequality and of total annual mobility for all the panel years. Two features require cautious emphasis; firstly, the mobility data for Sweden are far removed from the corresponding data for the other countries, and thus the Swedish regions are not taken into consideration. This avoids the bias that such data would introduce into the estimations. Secondly, the pooled ordinary least squares estimation (once the Swedish data have been discounted), presents an R^2 = 0.65, the coefficient of the mobility measurement being 0.71. Thus, a preliminary analysis establishes a positive relationship between social mobility and inequality.

[Figure 1]

The above figure also shows that the observations for specific years are apparently grouped by countries, which indicates that there exist individual effects. This result comes as no surprise, as it would seem logical to assume that the influence of institutional factors is sufficiently important in the short term to avoid strong variations in the indices of inequality or of income mobility in the observations for successive years. Consequently, the

Lagrange multiplier test for individual effects, developed by Breusch and Pagan (1980), is evaluated for the regions of the European Union. In our case, the null hypothesis of the non-existence of individual effects may be rejected and, therefore, the parameters estimated must be controlled for the existence of individual effects. At this point three alternative models may be estimated: a fixed effects model, a random effects model and a random coefficients model. The random coefficients model (Hildreth and Houck, 1968) permits not only the intercept coefficient but also the slope parameters to be random. Moreover, the random coefficients model framework provides enough structure to permit estimation by Feasible Generalized Least Squares. As a result, its estimates are more efficient. Consequently, we apply the Swamy (1970) test for the null hypothesis of parameters constancy. The statistic is distributed according to a χ^2 with $k(m\text{-}1)$ degrees of freedom, where k is the number of parameters (two in our case) and m is the number of cross-sectional units (regions). The results are presented in Table 1. We clearly reject the null hypothesis so we estimate a random coefficients model. The Wald's test measures the global significance of the regressions.

The relationship between inequality and total mobility for a year is significantly positive. Greater social mobility within the set of EU regions has given rise to an increase in their degree of dispersion; this correlation remains positive, although somewhat less significant (measured by the standard deviation), when the explanatory variable of mobility is analysed at 3 or 5 years instead of 1.

[Table 1]

There exists no significant relationship between Theil's inequality index and the mobility index when growth is the only factor considered. Growth, therefore, does not explain the significantly positive relationship observed at aggregated level. Moreover, this result is independent of the time period employed. The dispersion component is positively correlated to inequality. Furthermore, the longer the time period of mobility considered, the more this significant correlation increases. Lastly, the degree of correlation existing between inequality and exchange mobility, for periods of 1 and 3 years, is significantly positive; however, this correlation disappears for periods of 5 years.

Therefore, the most important component in explaining total mobility is the dispersion element, not only because its coefficients display the greatest magnitude and significance, but also because it is the only component capable of explaining the positive correlation between inequality and total mobility for 5-year periods. This result is especially important if we take into account the fact that numerous studies of mobility have been based exclusively upon reranking indices. This strategy, as our results show, may cause significant biases in the analysis of social mobility. Furthermore, the individual effects suggest that in each country social preferences (transmitted to the government via the electoral process), together with a set of restrictions of an economic nature, determine the combination of mobility and socially acceptable income inequality.

4. Conclusions

This study provides empirical evidence of the positive relationship between income inequality and social mobility. A necessary condition is thereby confirmed for those models which establish lower demand for redistribution as a result of greater mobility.

Acknowledgements

This research has received financial support from the Spanish Ministry of Science and Technology Projects SEC2003-08397 and MEC-04-SEJ-04065. The usual disclaimer applies.

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Figure 1. Inequality (*Theil index*) vs mobility (*Fields and Ok index*)

(1993-2000)

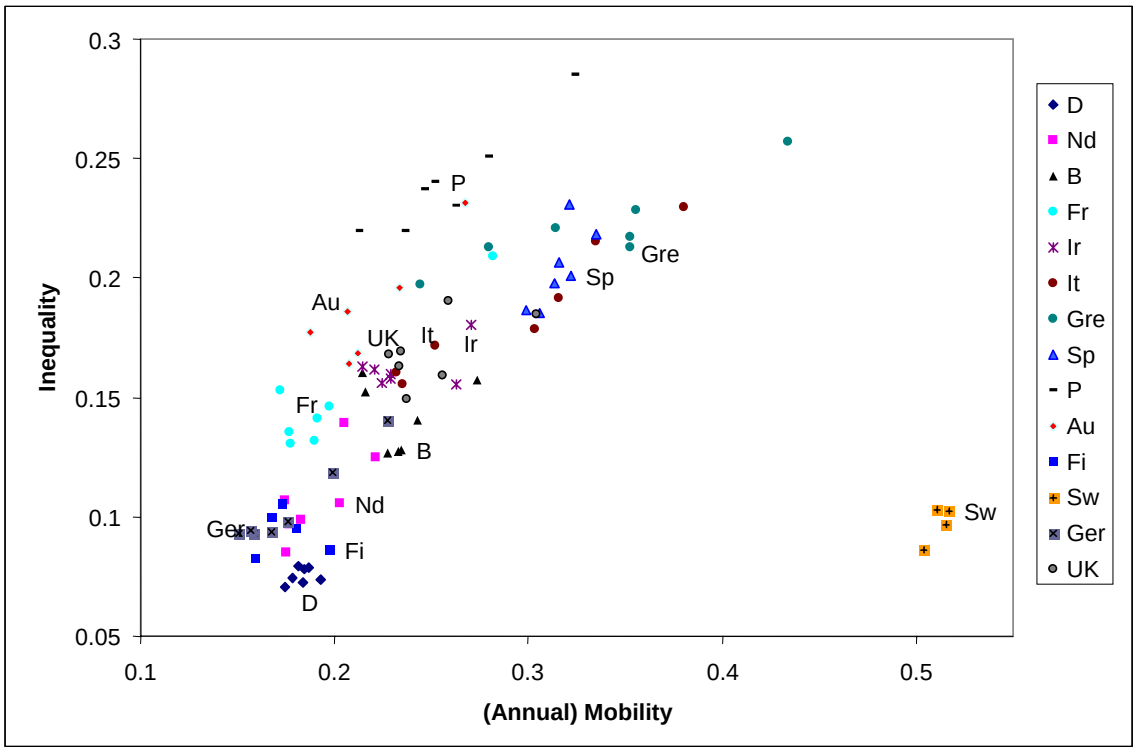

Table 1. Random coefficients models by region

Dependent variable: Theil inequality index	1 year mobility	3 year mobility	5 year mobility
Constant	0.04916***	0.00440	-0.04719
	(0.00961)	(0.01793)	(0.03775)
M	0.41697***	0.44208***	0.51624***
	(0.03997)	(0.05463)	(0.08562)
Wald's Test (χ^2_{k-1})	108.843	65.481	36.357
Test of parameter constancy ($\chi^2_{k(m-1)}$)	5328.203	7090.463	89723.241
Constant	0.14506***	0.14630***	0.17662***
	(0.00597)	(0.01112)	(0.03117)
M^G	0.04244	0.01709	-0.11851
	(0.06862)	(0.07746)	(0.14152)
Wald's Test (χ^2_{k-1})	0.382	0.049	0.701
Test of parameter constancy ($\chi^2_{k(m-1)}$)	5078.064	14100.244	7305.895
Constant	0.13811***	0.14086***	0.15525***
	(0.00548)	(0.00580)	(0.00667)
M^D	0.52713***	0.67332***	0.75189***
	(0.08722)	(0.06407)	(0.09686)
Wald's Test (χ^2_{k-1})	36.527	110.449	60.258
Test of parameter constancy ($\chi^2_{k(m-1)}$)	9171.662	21671.953	45583.899
Constant	0.08619***	0.10042***	0.12896***
	(0.01093)	(0.01719)	(0.03670)
M^E	0.36350***	0.26056***	0.19390
	(0.06069)	(0.09039)	(0.19971)
Wald's Test (χ^2_{k-1})	35.871	8.308	0.943
Test of parameter constancy ($\chi^2_{k(m-1)}$)	4768.435	4118.288	20488.488
N	531	375	204
Number of groups (m)	78	78	68

***: Parameter significance at 1%. Standard deviations are in parenthesis.

M: Total mobility; M^G: Growth mobility; M^D: Dispersion mobility; M^E: Exchange mobility.