Spanish income mobility in the period 2017-2020

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Abstract

Income mobility is a dynamic phenomenon that may pave the way for the establishment of egalitarian societies aimed at enhancing the global welfare of the individuals and dismantling social and economic concerns such as poverty and inequality. This Master's thesis analyses short-term intragenerational income mobility in Spanish households and studies empirically its determinants for the period 2017-2020 by using longitudinal data from EU-SILC that track the incomes and demographic characteristics of a selected sample of the population. Income mobility analysis is examined on the basis of two characterized income mobility measures and the drivers of income mobility are identified by means of several OLS regressions. Results reveal that income dynamics differ notoriously across Autonomous Communities depending on the nature of the indices considered, though all measures agree on Cantabria and Asturias as some of the locations with the greatest and lowest income mobility, respectively, and transfers between individuals as the main component for income mobility in Spain for the period at issue. As for the econometric approach, outcomes suggest that the income level at the first year turns fundamental to define the relationship between the particular circumstances of households at the beginning of the period and their subsequent income change.

Keywords: intragenerational income mobility, income mobility index, income dynamics, EU-SILC.

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CONTENTS

1. INTRODUCTION

Primitively, humans coexisted in modest communities where maintained a similar idiosyncratic. However, throughout history as the number of individuals increased, so did the size of the populations up to the point of the large and complex societies of nowadays that far from exhibiting parity among individuals, highlight their differences giving rise to a social stratification. Though social strata may be established according to different criteria, seems to be a tacit agreement on income as the essential determinant for social class assignation, since individuals choices and opportunities tend to be limited by the resources they count with.

Nevertheless, social strata may not be closed-entry, in such a way that individuals may scale up in the society as long as their income surpasses a certain threshold or, conversely, level down should their income be insufficient to pertain to a given strata. This phenomena is meant as income mobility or social mobility in the literature and is one of the fundamental concerns studied in Welfare Economics.

In the literature, social mobility is usually approached from intergenerational and intragenerational perspectives. The former approach is mainly focused on how individuals' backgrounds and circumstances impact on their present income, so is highly related with the matter of inequality of opportunities. The latter approach, which is the one this thesis is based on, studies the dynamics of individual incomes over a certain period of their life-time, and is thus closely linked to income inequality and poverty issues. Similarly, income mobility fluency may lie on a wide range of aspects such as the regulatory framework individuals are subject to, starting income, genre, age, number of descendants, education level, working status, health issues and other not easily observed factors like the level of social capital as Chetty et al. (2022 A) finds.

In the latest decades, after the welfare system rise in the West, an increasing number of economists and policymakers have addressed different welfare dilemmas, especially income inequality. However, though little research has been carried out on income mobility as such, and much less delving into the Spanish context, its relevance is recalled whenever a welfare matter is tackled, given the glaring impact of income dynamics on social well-being. As a matter of fact, Corak (2013) concludes that "inequality lowers mobility because it shapes opportunity" (p. 98) and Cantó (2000) makes reference to a trade-off between income

inequality and income mobility. Likewise, income mobility may be conceived as a tool for enhancing the living conditions of those who lie at the poorest side of the population, as a path for an egalitarian society or even a mechanism for just contrary situations. All these facts make of income mobility researching therefore a must in Welfare Economics.

Accordingly, the objective of this thesis is twofold. On the one hand it seeks to illustrate the Spanish scenario with respect to the notion of intragenerational income mobility in the period from 2017 to 2020. By the same token, as hinted above, the starting circumstances of the individuals may play a key role on social mobility flows. Thence, on the other hand, this thesis also aims at determining empirically which are the driving forces at the bottom of such per capita income movements through the application of econometric models.

For the sake of such purposes, the rest of this thesis is structured as follows. Second section provides an overview of the current literature on income mobility. Third section exposes the data of reference for this study and the corresponding methodological decisions. Fourth section offers an analytical approach aimed at describing the income mobility paradigm by means of some mobility measures. Fifth section presents an empirical analysis in order to explain per capita income movements on the basis of the particular circumstances of the units of study. Finally, last section states the fundamental conclusions derived from the overall analysis and opens up new routes for further research.

2. LITERATURE REVIEW

Considering the wide range of dimensions that income mobility comprises as well as the multiple social and economic issues to which is related, there is not a defined and uniform framework in the literature that establishes a clear path for income mobility researching as such. In fact, most of the literature approaches income mobility as a complementary study for other phenomena like poverty or inequality.

As for the Spanish context on intragenerational mobility, Cantó (2000) studies income mobility in the period 1985-1992 and finds that though there is a high degree of income movements, specially in the middle deciles, the range of movements is short. Ayala & Sastre (2007) assess differences in the level and structure of income mobility in five European countries, including Spain, and conclude that income mobility ranking relies on the nature of the measures chosen. Fields et al. (2003) analyze households income dynamics in four countries including Spain and determined that the initial level of income as well as activity changes are some of the most important variables to explain income changes and find also that income converges towards the grand mean. Aristei & Perugini (2015) study short-term income dynamics in 25 European countries classified into six capitalistic models and encounter great heterogeneity in the households income dynamics.

With respect to other countries, Bradbury (2022) documents trends in intragenerational household mobility and discovers that the relationships of family characteristics to income mobility differ depending on household's starting income. Amanzadeh & Heydari (2023) reveals that the absolute intragenerational income mobility in Iran is higher for low income households. Woolard & Klasen (2005) find a great degree of income mobility in South Africa compared to other developing countries and demographic changes, and employment changes as the most important determinants for income mobility. Mishra & Kumar (2018) examine the trends and factors of income inequality and income mobility in India and show high and low persistence at the top and at the bottom of the distribution, respectively. Oh & Choi (2017) measure income mobility and its determinants in Korea and found greater income persistence in the lowest and highest income groups, and that factors like the former level of income affect the income distribution. Jolly (2013) shows that work-limiting disabilities increase the probability of downward mobility and being at the bottom of the distribution.

3. DATA & METHODOLOGICAL DECISIONS

This thesis uses the longitudinal datasets for Spain over the years 2018-2021 of the European Union Statistics on Income and Living Conditions (EU-SILC), where the year of reference for income is the prior to the interview. Those datasets collect also information on demographic aspects of the population at individual and household levels and are based on a four-year rotational panel design where, given attrition, each wave the 25% of the observations that were sampled the previous wave are replaced by new observations no interviewed before.

Though the *Instituto Nacional de Estadística* provides microdata files on their website with some of the variables collected for this survey, complete files with a larger variety of variables supplied by Eurostat are more appropriate for the purposes of this thesis. However, as a consequence of several modifications in the collection criteria of several variables from 2021 onward and the adhesion of EU-SILC to such procedure in the longitudinal datasets including the year 2021, a significant set of variables is empty for 2018. Therefore, it is considered necessary the linkage with the same datasets provided by INE that do contain data for the variables at issue for the initial year, with the consequent verification of correspondence and coincidence of observations, by ascertaining that the variables available on both sources match.

Following Ayala & Sastre (2008) as well as other authors, this thesis considers households as units of study. Therefore, in the name of providing reliable estimations, longitudinal weights for households are used, which are computed by the *Instituto Nacional de Estadística* on the basis of Autonomous Communities and household sizes. Likewise, with respect to income mobility measurement, this study assumes that income is equally shared within households, so that the concept of equivalent disposable income is applied, by utilizing the OECD modified scale which assigns a weight of 1 to the first adult, a weight of 0.5 to the second and remaining adults and a weight of 0.3 to any individual under 14 who cohabits within the households. At the same time, all incomes are deflated with the corresponding Consumer Price Index based on 2021 of each Autonomous Community.

The merger of these datasets have been carried out on the basis of Eurostat guidelines, the sample has been cleaned in such a way that missing and negative values for income have been dismissed and a set of variables of interest have been kept and transformed in favor

of the nature of this thesis and the further analysis. Hence, this work is based on a sample made up of 2,012 weighted observations of households that have been tracked over the whole aforementioned period and are then representative of the Spanish population at the respective period. Those weighted observations stand for a population of 5,876,067 households that at the same time, suppose just the 25% of the total households that should be represented, given attrition.

With respect to the variables, turns useful to establish different household profiles attending to the particular circumstances at the starting period. Table 1 shows the proportion of households that belong to each profile by initial level of income, expressed as quintiles where the first quintile comprises the 20% of the poorest households and fifth quintile comprises the 20% of the richest households.

The followings facts should be noted. Most of the households are based on adults purely and there are hardly tri-generational household structures. Proportions of households of elderly individuals or adults with children are higher in the poorest income group while households of only adults or adults with elderly individuals are higher for the richest group.

The majority of households structured on single heads have no children and the proportion is higher for the poorest quintile no matter the sex or the fact of having children, while the amount of households structured on marriages is higher for the richest group. There are more households that have their home in property in the richest quintiles and many of the households that have it on rental regime at market price or rent free rest on the poorest quintile. The number of households in densely-populated areas increases together with starting income while as for thinly-populated areas the pattern is just the opposite. The number of the households where at least one member is either non-native born, in a precarious situation or limited to perform daily activities rely is greater for the low income group.

Unlike the vast majority of papers in the literature that attribute the characteristics of the breadwinner to the whole household, like education level or employment status, in this thesis variables are expressed in terms of the household as such. That is, there are considered the ratios or the number of individuals that satisfy the fact at issue, as shown in Table 2.

Table 1: Weighted sample proportions by starting income group of the different types of households' profiles based on their social and economic characteristics in Spain for the period 2017-2020.

VARIABLES	Total sample	Households starting in the poorest quintile	Households starting in the middle three quintiles	Households starting in the richest quintile
Household format [a]				
A (%)	43.95	42.05	43.15	48.25
A + C (%)	27.28	30.86	26.80	25.13
A + E (%)	10.16	7.29	10.49	12.06
E (%)	17.15	18.54	18.05	13.06
A + C + E (%)	1.46	1.27	1.52	1.50
Household structure [b]				
Single female w/ children (%)	5.15	6.29	5.63	2.54
Single female no children (%)	20.43	22.12	20.99	17.06
Single male w/ children (%)	3.22	5.40	2.74	2.48
Single male no children (%)	15.80	17.00	16.43	12.73
Married couple w/ children (%)	20.37	20.44	19.94	21.61
Married couple no children (%)	35.02	28.76	34.26	43.58
Tenure status				
Owner (%)	45.58	36.63	47.88	47.64
Owner w/outstanding mortgage (%)	29.30	19.18	30.37	36.27
Tenant (%)	15.87	31.29	11.95	12.20
Tenant at reduced price (%)	2.04	1.19	2.54	1.38
Rent free (%)	7.20	11.71	7.26	2.52
Urbanization level				
Densely-populated area (%)	54.17	49.59	50.97	68.41
Intermediate area (%)	19.89	19.58	20.94	17.04
Thinly-populated area (%)	25.94	30.83	28.10	14.55
At least one member in the household [c]				
Non-native born (%)	15.61	35.18	11.02	9.73
Precarious situation (%)	32.72	66.32	30.12	6.80
Limited to perform daily activities (%)	7.53	10.32	7.15	5.90
Observations	2,012	374	1,238	400
No. of households represented	5,876,067	1,777,760	3,525,136	1,173,171

a: "A" stands for a household where only live adults. "E" stands for a household where only live elderly individuals. "C" stands for coexistence of children in he household. Fifth format stands also for households where just children and elderly people live. b: Single comprises also separated, divorced and widowed status. Sex of the head is just specified if non-married. c: An individual is assumed to be in a precarious situation whether cannot afford clothes, cannot replace domestic appliances when these are worn out or receives income for social exclusion. An individual is assumed to be limited when cannot perform their daily tasks properly.

* Weighted sample.

* Own elaboration based on EU-SILC data.

Table 2: Weighted sample means by starting income group of the different households' profiles based on their social and economic characteristics in Spain for the period 2017-2020.

VARIABLES	Total sample	Households starting in the poorest quintile	Households starting in the middle three quintiles	Households starting in the richest quintile
Mean household size	2.547	2.534	2.543	2.572
	(1.183)	(1.263)	(1.186)	(1.09)
Mean number of earners	1.816	1.48	1.86	2.022
	(0.809)	(0.767)	(0.828)	(0.684)
Mean number of children	0.443	0.499	0.429	0.430
	(0.775)	(0.807)	(0.751)	(0.811)
Mean years of experience (adults)	20.284	17.404	20.18	23.272
	(9.431)	(9.051)	(9.014)	(9.994)
Mean age (adults)	42.472	40.956	42.128	44.865
	(9.561)	(10.02)	(9.171)	(9.737)
Mean sex ratios (adults)				
Female	0.512	0.485	0.519	0.518
	(0.298)	(0.315)	(0.302)	(0.271)
Male	0.488	0.515	0.481	0.482
	(0.298)	(0.315)	(0.302)	(0.271)
Mean education level ratios (adults)				
Elementary	0.349	0.549	0.354	0.147
	(0.409)	(0.428)	(0.403)	(0.299)
Intermediate	0.236	0.219	0.264	0.171
	(0.337)	(0.324)	(0.349)	(0.305)
Advanced	0.410	0.223	0.378	0.678
	(0.426)	(0.36)	(0.415)	(0.388)
Mean activity ratios (adults)				
Employment	0.672	0.438	0.706	0.794
	(0.381)	(0.391)	(0.358)	(0.34)
Unemployment	0.133	0.309	0.107	0.042
	(0.278)	(0.371)	(0.245)	(0.175)
Retirement	0.0382	0.0325	0.026	0.078
	(0.16)	(0.137)	(0.125)	(0.240)
Other type of inactivity	0.157	0.220	0.161	0.085
	(0.274)	(0.329)	(0.271)	(0.201)
Observations	2,012	374	1,238	400
No. of households represented	5,876,067	1,777,760	3,525,136	1,173,171

* Standard deviations in parenthesis.
* Weighted sample.
* Own elaboration based on EU-SILC data.

Similarly, some of the ratios are computed taking only into account the number of adults in the households, to avoid the respective bias on age, experience, education and activity levels, though the number of earners considers also children since these may receive income due to orphanage or other reasons.

May be mentioned that average household size is two and a half members no matter the income group, the mean number of children is slighter higher in the richest quintile and the mean sex ratios are quite balanced and barely change across groups. No surprisingly, the number of earners, the years of experience, the mean age, the mean ratio of advanced education ratio, the mean retirement ratio of employment and the mean ratio of unemployment increase with the starting income group while the pattern is just the opposite for the ratio of elementary education, the ratio of unemployment and the ratio of other type of inactivity.

4. ANALYTICAL APPROACH

The *raison d'être* of this thesis rests on several discrepancies in per capita incomes between the years 2017 and 2020. Such income discrepancies may be formally exhibited on the basis of several statistics, indices and regressions. In pursuance of providing a comprehensive though simple picture of the Spanish income mobility and following some remarkable authors in this area of Welfare Economics, this section aims at relating the income dynamics by means of the correlation coefficients, transition matrices and two characterized income mobility indices.

4.1. Correlation coefficients

The Pearson's correlation coefficient turns to be a quick and easy manner of answering the question of whether there has taken place any income movements from one period to another. Considering the equivalent income at the first and last waves of the survey, the coefficient results 0.7527, and 0.7209 in the case of the logarithmic transformation. Should the period from 2017 to 2020 be characterized by an absolute income stability, coefficients would simply turn one. Since this is not the case and both estimations are statistically significant at 95% of confidence, the existence of certain income movements can be assumed.

4.2. Transition matrix

A more exhaustive method to study the persistence of the same level of per capita income in a society across periods is the transitional matrix. Under this technique, households are classified according to their income status with respect to the rest of the society in the initial and final points of time considered. In this way, Table 3 shows the percentage of households that have taken each possible path given their initial income situation where first column and first row work as head for income quintiles in 2017 and 2020, respectively.

In the absence of income mobility, this transitional matrix would materialize the identity matrix where every cell but the ones for the main diagonal would be zero. However, as can be appreciated, this is not the case so that once again can be argued that there have been certain income movements in the current period.

Table 3: Transition matrix for the period 2017-2020 in Spain

2017/2020	1	2	3	4	5
1	**63.12**	23.98	9.64	2.21	1.05
2	24.73	**48.61**	18.70	6.82	1.05
3	9.03	19.80	**46.87**	20.90	3.40
4	1.26	5.31	20.55	**52.48**	20.39
5	1.71	2.31	4.15	17.67	**74.14**

* Own elaboration based on EU-SILC data

These results are consistent with Cantó (2002) findings for the period 1985-1992, since extreme quintiles present more stability than middle quintiles. In fact, the most stable quintile is the richest one where just the 74% of the households remained in the same one at the last wave.

4.3. Income mobility aggregation

This thesis, as stated before, conceives income mobility under an intragenerational perspective as the income per capita changes undergone within a population during a certain period of time. Hence, in pursuance of income mobility measurement within a distribution, turns appropriate to employ indices aimed at aggregating individual income changes in order to establish comparisons between different groups. In particular, this thesis embodies two different indices that though they both fulfill the symmetry and decomposability properties, satisfy different axioms as well and thence may provide a broad image of the scenario of the per capita income mobility in Spain in the period 2017-2020.

4.3.1. Absolute income mobility index

The first measure considered is an absolute mobility index proposed and characterized by Mitra and Ok (1998) which is based on a partial ordering approach aimed at ranking which distribution has undergone a greater degree of income mobility. The index can be formally presented as follows, dividing also by the total amount of members in the population $n \geq 1$ in order to leave out the size of the distribution.

$$D_n(x, y) = \gamma\left(\frac{1}{n}\sum_{i=1}^{n}|x_i - y_i|^{a}\right)^{1/a} \quad \text{for some } \gamma > 0 \text{ and } \alpha \geq 1$$

Then, this measure can be understood as the per capita income mobility observed in the course from the income distribution $x = (x_1,\ldots,x_n) \in R^n_+$ to the income distribution $y = (y_1, \ldots,y_n) \in R^n_+$ in absolute terms.

Additionally, it is the only measure that fulfills the following axioms:

a) **Scale dependence:** for all $x, y \in R^n_+$ and $\lambda > 0$, $D_n(\lambda x, \lambda y)=\lambda D_n(x, y)$.

b) **Translation invariance:** for all $x, y \in R^n_+$ and $\theta \in R$ / $x + \theta 1_n, y + \theta 1_n \in R^n_+$,

$D_n(x + \theta 1_n, y + \theta 1_n)= D_n(x, y)$.

c) **Population consistency:** for all $x, y \in R^{n-1}_+$, $z, w \in R^{n-2}_+$ and $a, b \geq 0$,

$D_{n-1}(x, y)=D_{n-2}(z, w)$ implies $D_n((x, a), (y, b))=D_{n-1}((z, a), (w,b))$

d) **Symmetry**: for all $x, y \in R^n_+$, $D_n(x, y)=D_n(y, x)$.

e) **Decomposability**: for all $x, y \in R^n_+$ and $n \geq 2$, $D_n(x, y)=G_n(D_1(x_1, y_1),\ldots,D_1(x_n, y_n))$ for some symmetric, strictly increasing and continuous G_n: $R^n_+ \rightarrow R_+$

The former axiom attests that an equal proportional change in every per capita income will lead to that percentage change in the index. Second axiom indicates that if the same amount is added to every unit of a starting and final distribution that maintain the same mobility level, they would still exhibit such mobility level. Third axiom states that two distributions presenting equal results for the index, would yet present the same result if both were added an extra identical member in their initial as well as in their final distribution. Fourth axiom means that the index does not distinguish between positive and negative movements of income. And last axiom postulates that the index simply aggregates the observed changes in the income distribution of the households (Mitra and Ok, 1998).

For the sake of simplicity, over this study γ is assumed to be equal to one. However, α parameter selection may be quite controversial since, like in inequality measures such as the Atkinson and Entropy families, it depends on the aspects of the income mobility process intended to capture. Should this parameter have a value equal to one, the index would exhibit a utilitarian approach, where its result would materialize the mere sum of all the income movements of each unit pertaining to the population. Conversely, if α were assigned a value equal to two, the index would contemplate an inequality dimension where the magnitude of the different income changes would be also weighted by their own

distance, in such a way that longer gaps will contribute more proportionally to the index than shorter gaps. Therefore, this thesis compares the ordering of the index under these two cases.

4.3.2. Relative income mobility index

The second measure addressed in this thesis is a relative index characterized by Fields and Ok (1999) which is based on aggregating the ratios between the starting income distribution $x = (x_1,\ldots,x_n) \in R^n_+$ and final income distributions $y = (y_1,\ldots,y_n) \in R^n_+$ in absolute values by means of the income ratio in logarithmic terms for all members within the distribution. The mobility measure is thus formally expressed as:

$$M_n(x, y) = \gamma\left(\frac{1}{n}\sum_{i=1}^{n}|\log x_i - \log y_i|\right) \quad \text{for some } \gamma > 0 \text{ and } n \geq 1$$

Like the previous measure, this index satisfies the aforementioned properties of symmetry and decomposability but in contrast, is the only measure that fulfills the following axioms:

a) **Scale invariance**: for all $x, y \in R^n_+$ and $\lambda > 0$, $m_n(\lambda x, \lambda y) = m_n(x, y)$.

b) **Multiplicative Path Separability:** for all $x \in R^n_+$ and $\alpha \geq 1$ and $\beta \in [1,\alpha]$,

$$m_n(x, \alpha x) = m_n(x, \beta x) + m_n(\beta x, \alpha x).$$

Scale invariance claims that this index will determine that two distributions will undergo the same mobility as long as their members had undergone the same percentage change. And multiplicative path separability simply argues that the sum of the successive degrees of income happened along certain periods should be the same as the total mobility experienced during the whole interval (Fields and Ok, 1999).

With regard to the decomposability property, there exists also a fairly interesting aspect of this index that allows for disaggregating the measure into the following two members:

$$M_n(x, y) = K(x, y) + T(x, y) = \frac{1}{n}\sum_{i=1}^{n}(\log y_i - \log x_i) + \frac{2}{n}\sum_{i\in L}(\log x_i - \log y_i)$$

The first component can be conceived as the total economic growth while the second one can fathomed as the total income transfers where $L \equiv \{i: x_i > y_i\}$. That is, L is the set of units that faced a negative movement from the starting income distribution x to the final income distribution y. However, such incomes did not disappear but changed of placement

in such a way that those losses twice would epitomize the actual transfers arisen in the population. Hence, should not be any transfer between households, income mobility would uniquely rely on the evolution of the economy, and vice versa. Likewise, if it were the case of negative economic growth, an analogous procedure may be applied in such a way that L would be the set of units whose income increased $L \equiv \{i: y_i > x_i\}$ (Fields and Ok, 1999).

4.3.3. Results for absolute income mobility aggregation

Table 4 exposes the income mobility ranks obtained from the computation of the Mitra and Ok (1998) index by Autonomous Communities with two different values for α parameter, where first position stands for the highest income mobility and last position for the lowest income mobility. Results can be found in Table A1 in the appendix. Given the minor size of Ceuta and Melilla, these Autonomous cities are allocated together with Andalusia.

Table 4: Income mobility ordering based on the Mitra and Ok index by Spanish Autonomous Communities in the period 2017-2020.

Autonomous Community	α = 1	α = 2	Rank difference
Cantabria	1	3	-2
Catalonia	2	2	0
Basque Country	3	1	2
Castile – Leon	4	4	0
La Rioja	5	6	-1
Aragon	**6**	**10**	**-4**
Madrid	7	8	-1
SP [a]	8	5	3
Navarra	9	11	-2
Balearic Islands	10	13	-3
Castile – La Mancha	11	9	2
Galicia	12	15	-3
Canary Islands	13	12	1
Andalusia	14	14	0
Murcia	**15**	**7**	**8**
Valencia	16	18	-2
Extremadura	17	17	0
Asturias	18	16	2

a: "SP" stands for Spanish average.
* Own elaboration based on EU-SILC data.

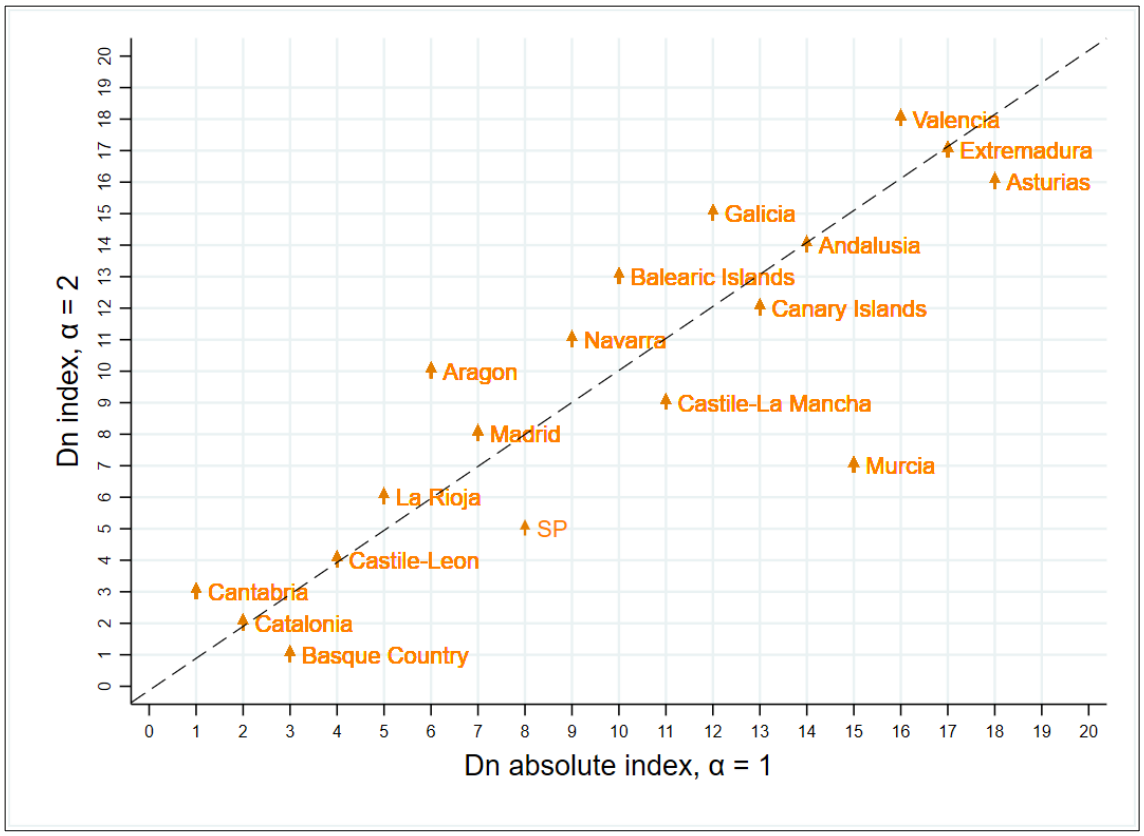
From a utilitarian point of view ($\alpha = 1$), can be observed that Cantabria, Catalonia and the Basque Country are the communities with the highest income mobility whereas Valencia, Extremadura and Asturias are the ones with the lowest income mobility. However, this rank does not provide any knowledge on how such income movements have been distributed. That is, mobility could arise by virtue of slight income changes in the vast majority of the members or due to exorbitant changes in just a few units, for instance.

Then, turns useful to compare the ordering when α parameter is assigned a value of two, as shown in column 3 in Table 4. Under this second approach, the top three greatest and lowest mobile locations still stay at their respective extreme in the list, although in different status. For instance, the Basque Country is the topmost mobile Autonomous Community if inequality in the income change is also taken into account.

Nevertheless, the rank does not differ softly for the locations highlighted in bold, like the case of Murcia, that climbs up eight positions and goes from the bottom of the rank to the middle or Aragon that falls four positions. This phenomena can be visually appreciated in Graph 1 where the two versions of the index are plotted together with the famous straight regression line $x = y$.

Therefore, may be assumed that in Murcia might not have taken place many but a few considerable income changes compared to the rest of Autonomous Communities that, as stated before, contribute to income mobility measurement in a higher magnitude that little changes when $\alpha = 2$. By the same token, as for Aragon seems logic to presume that a wide set of members have undergone slight and more equal income changes in comparison to the rest of the country. Additionally, the cases of Catalonia, Castile-Leon, Andalusia and Extremadura should be pointed out since are the only locations whose arrow matches with the dashed line in Graph 1 because they keep exactly the same status in both situations, denoting that in the first two regions per capita income mobility has been both notorious and unequally distributed while in the latter two locations per capita income changes have been smoother and more equitable with respect to the remaining Autonomous Communities. Also, in relation to the Spanish average can be noted that in the second case it moves up four positions giving rise to the idea that per capita income average movements may have not presented redundant equality in the global distribution of the per capita income movements.

Graph 1: Mitra and Ok income mobility rank comparison for different values of α by Spanish Autonomous Communities in the period 2017-2020.



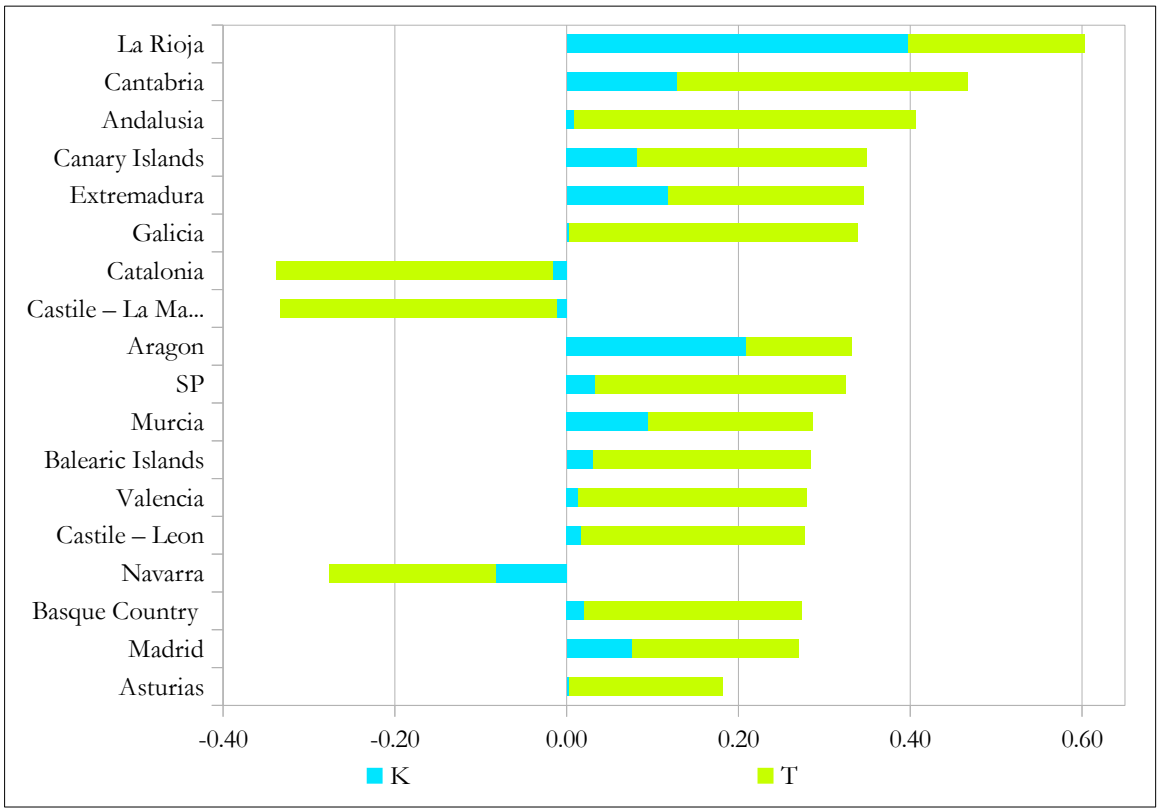
*Own elaboration based on EU-SILC data.

4.3.4. Results for relative income mobility aggregation

Graph 2 exhibits the relative measure of income mobility that Fields and Ok (1998) propose by Autonomous Communities in such a way that locations are ordered from the highest to the lowest income mobility based on ratios, and the aforementioned components of economic growth (K) and transfers (T) are visually expressed as fractions of the own index in blue and green colors, respectively. Results can be found in Table A2 and components as percentage of the index are presented in Table A3 in the appendix.

Given the relative nature of this index, La Rioja, Cantabria and Andalusia may be said to have sustained the highest proportional per capita income changes while Asturias, Madrid and the Basque Country are the locations where income changes may be thought of the least proportional importance out of the whole distribution.

Graph 2: Fields & Ok income mobility index decomposability by Spanish Autonomous Communities in the period 2017-2020.



*Own elaboration based on EU-SILC data.

This decomposability exercise turns fairly useful to epitomize the diverse nature of the relative per capita income movements, since exposes the following facts. All but Catalonian, Manchegan and Navarrese economies grew in the period at issue. Furthermore, if mobility were ranked according to any of its components, the ordering would change significantly since La Rioja, Aragon and Cantabria are the regions with the highest per capita income mobility based on economic growth or economic shrink, while considering the other element Andalusia, Cantabria and Galicia would be the locations with the highest income mobility. Additionally, growth in the economies of Galicia, Asturias and Andalusia are the weakest ones and the lowest transfers between households are given in Aragon, Asturias and Murcia. Even so, should be remarked that Cantabria would still dominate the income mobility ordering and Asturias would still lie at the bottom of the list under any of these focus.

With respect to the income mobility for Spain as country, Ayala & Sastre (2008) find that transfers accounts for the 98.6% of the income mobility in the period 1993-1997 whereas Aristei & Perugini (2015) encounter that Spanish income mobility relies on an 87.8% on transfers in the period 2004-2006. Here, consistent with those findings, it is discovered that one decade later transfers are still the main source of the Spanish income mobility and suppose the 89.8% (see Table A3 in the appendix). Then, although the proportion of transfers decayed from the nineties to the beginning of the 21st century, the proportion has barely change for the period 2017-2020.

Nonetheless, there exist a considerable level of dispersion when income mobility is decomposed and studied by Autonomous Communities since, as seen in Graph 2, though income mobility is mainly driven by transfers between households, the contribution of the average change in per capita income is even higher than the contribution of transfers in the locations of La Rioja and Aragon and, as stated before, some locations presented a negative economic growth as opposed to the Spanish average. On top of that, although transfers are still dominant as a source for income mobility, the percentage contributions of the two components to the income mobility index in some locations like Extremadura, Madrid and Navarra are considerably far from the values for the Spanish case.

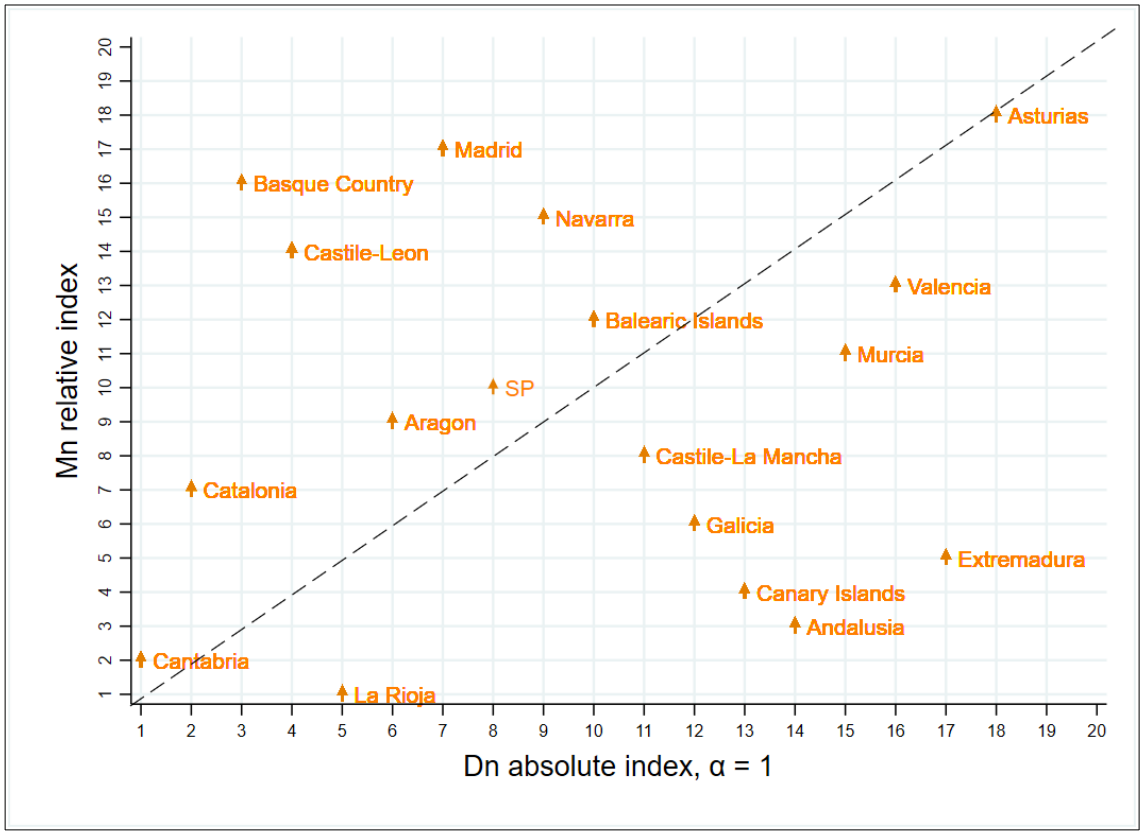
Succinctly, there is an obvious heterogeneity in the income dynamics across regions. Anyone who is familiar with the political Spanish context will be aware of the local identity culture that overflows on some locations of the country and the decentralized political system in which some of the Autonomous institutions have the necessary jurisdiction to manage over certain topics in their respective territories. Hence, it is not surprising that income mobility takes particular patterns according to the Autonomous Community as a reflection of the certain degree of autonomy that each territory posses.

4.3.5. Comparison of the indices

Graph 3 shows clearly how the different notions of income mobility may redefine the ordering for some locations just like Ayala & Sastre (2008) find. While in the prior scatter graph the Autonomous Communities wander around the line $x = y$, in this case locations are more disperse. In particular, arrows for Andalusia, the Canary Islands, Extremadura, Castile-Leon, the Basque Country and Madrid are the furthest ones from the line $x = y$ since all of these Communities switch their extreme in the income mobility rank from one

index to another one. Conversely, Asturias and Cantabria still fall behind and lead the list, respectively, and the Balearic Islands and the Spanish average stay also around the middle.

Graph 3: Comparison of Mitra & Ok and Fields & Ok income mobility indices by Spanish Autonomous Communities in the period 2017-2020.



*Own elaboration based on EU-SILC data.

Hence, though in the three former locations mentioned in the previous paragraph the aggregations of per capita distances between initial and final income may be some of the largest ones compared to the rest of Spain, the relative gap is not that significant. Shortly, the proportional change experienced is relatively weak. In contrast, for the other three locations, proportional changes in the income have been some of the most notorious ones whereas their distances as such were not precisely the most remarkable ones.

In a nutshell, Fields and Ok (1999) make income mobility hinge on the proportional changes of per capita incomes while Mitra and Ok (1998) do not account for the magnitude of the starting income but of the own distance of the income change. Even so, both roughly come to terms on the ranks for Asturias, Cantabria, the Balearic Islands and the Spanish average.

5. ECONOMETRIC APPROACH

5.1. Empirical framework

This section is aimed at identifying empirically which are the main drivers for income movements by means of regression methods. Just like Aristei & Perugini (2015), Bradbury (2022), Oh & Choi (2017) and other authors in the literature and in line with the aforementioned relative index characterized by Fields & Ok (1999), the dependent variable will be the income change in logarithmic terms denoted as ΔY_i such that:

$$\Delta Yi = \ln Y_{i,2020} - \ln Y_{i,2017}$$

Where $Y_{i,2020}$ is the equivalent income for household *i* at the last wave, in 2020 and $Y_{i,2017}$ is the equivalent income for household *i* at the first wave in 2017. Note that it corresponds to the economic growth component in the decomposability exercise of the relative index. Therefore, this variable not only exhibits the degree of income mobility but its direction, in such a way that the further empirical analysis will contribute to explain the orientation as well as the extent of the income movements attending to the different profiles of households and their particular initial level of income.

As for the independent variables, Fields et al. (2003) derive a model of the factors that cause income changes on the basis of Duncan's (1983) model, where those factors may be either time-invariant characteristics or time-varying characteristics (Aristei & Perugini, 2015). This model is consistent with a standard household utility maximization model where household income is a function of physical and human assets and a set of demographic and economic characteristics of the households (Woolard & Klasen, 2005). Therefore, log income changes may be estimated throughout an empirical model of the form:

$$\Delta Yi = \ln Y_{i,2020} - \ln Y_{i,2017} = f(\ln Y_{i,2017}, X_{i,2017}, Z_{i,2017}, \Delta Z_i)$$

where $X_{i,2017}$ is a vector of time-invariant physical and human assets and demographic and economic characteristics of household *i* at the initial wave in 2017, $Z_{i,2017}$ is a vector of time-varying physical and human assets and demographic and economic characteristics of household *i* at the initial wave, in 2017, and ΔZ_i are the changes undergone by household *i* on time-varying characteristics from 2017 to 2020.

Table 5 shows the mean log income change of some household profiles by starting income level. At a first glance, one may takes heed of the fact that households starting in the middle income quintiles have barely incremented their income. However, all households that started in the richest income group have decreased their income, especially those who have at least one non-native born member or limited member. Conversely, all households that were at the poorest side of the distribution in the first wave have increased their income except for those based on mixed structures and those who have at least one member who is fairly limited to perform daily activities. More precisely, households based on single females with children is the household profile that have increased its income the most. Besides, the highest log income increase for the poorest households is twice the highest log income decrease for the richest households.

Table 5: Log income change in different household profiles by starting income level in Spain for the period 2017-2020.

VARIABLES	Total sample	Households starting in the poorest quintile	Households starting in the middle three quintiles	Households starting in the richest quintile
Log income change	.332	.274	.002	-.115
	(.572)	(.986)	(.353)	(.457)
Household format				
A	.017	.290	-.009	-.155
	(.603)	(.963)	(.405)	(.559)
A + C	.082	.407	.003	-.068
	(.627)	(1.078)	(.359)	(.344)
A + E	.004	.365	-.036	-.113
	(.357)	(.437)	(.305)	(.285)
E	.024	.014	.049	-.067
	(.491)	(.949)	(.205)	(.345)
A + C + E	-.054	-.219	-.014	-.038
	(.605)	(1.304)	(.286)	(.265)
Household structure				
Single female w/ children	.123	.64	-.014	-.243
	(.578)	(.811)	(.317)	(.414)
Single female no children	.008	.195	-.012	-.159
	(.538)	(.86)	(.374)	(.429)
Single male w/ children	.073	.288	-.039	-.023
	(.566)	(.766)	(.432)	(.172)
Single male no children	.043	.449	-.037	-.192
	(.587)	(.88)	(.399)	(.425)
Married couple w/ children	.063	.328	.012	-.050
	(.646)	(1.224)	(.353)	(.339)
Married couple no children	.009	.110	.029	-.105
	(.536)	(.976)	(.308)	(.528)

Table 5 (Continued)

VARIABLES	Total sample	Households starting in the poorest quintile	Households starting in the middle three quintiles	Households starting in the richest quintile
Tenure status				
Owner	.016	.16	.028	-.134
	(.492)	(.852)	(.296)	(.545)
Owner w/outstanding mortgage	.029	.268	.003	-.033
	(.433)	(.818)	(.341)	(.274)
Tenant	.092	.457	-.097	-.295
	(.922)	(1.227)	(.525)	(.506)
Tenant at reduced price	-.041	.064	-.033	-.180
	(.411)	(.777)	(.341)	(.234)
Rent free	.054	.173	-.003	-.006
	(.567)	(.839)	(.368)	(.215)
Urbanization level				
Densely-populated area	.024	.215	.016	-.098
	(.508)	(.814)	(.348)	(.478)
Intermediate area	.004	.198	-.016	-.149
	(.604)	(1.156)	(.306)	(.417)
Thinly-populated area	.076	.417	-.01	-.154
	(.665)	(1.099)	(.39)	(.39)
At least one member in the household				
Non-native born	-.021	.218	-.193	-.305
	(.957)	(1.262)	(.511)	(.542)
Precarious situation	.123	.337	-.017	-.11
	(.722)	(1.009)	(.356)	(.39)
Limited to perform daily activities	-.112	-.125	-.058	-.286
	(.583)	(.912)	(.299)	(.59)
Observations	2,012	374	1,238	400
No. of households represented	5,876,067	1,777,760	3,525,136	1,173,171

*Own elaboration based on EU-SILC data.

These findings are not surprising bearing in mind that this analysis is based on a social country with a powerful welfare state where a batch of social policies have been launched aimed at the poorest sectors of the population in the current periods. Still, should be recalled that the fact that poorest households had increased their income does not mean that they have stopped taking part in the poorest side of the distribution, just as the fact that richest families had decreased their income does not imply that they have stopped leading.

5.2. Regression models

Having investigated on different income change patterns among some household profiles, turns opportune to define the set of independent time-varying and time-invariant variables. In this modern and dynamic world, any feature of the households may change. However, taking into account that this is a short-term analysis, following Aristei & Perugini (2015) and for the sake of simplicity, variables assumed to be time-varying are the number of children, household size, ratio of earners, employment ratio, unemployment ratio and retirement ratio. Thence, the model addressed in this thesis includes these variables at the first wave as well as the change from the initial wave to the last one.

With respect to the time-invariant variables which are supposed to be collected just once at the first wave in 2017, attending to Aristei & Perugini (2015) and Fields et al. (2003) and considering the results for the relative index characterized by Fields & Ok (1999), the model contemplates categorical variables for household structures, tenure statuses, urbanization levels, Autonomous Communities, non-native born members, members in precarious situations and members limited to perform daily activities. Additionally, the model also contains continuous variables standing for the mean age of the adults, the ratio of female adults and the ratios of the education levels of the adults.

In accordance with Bradbury (2022) and in the light of the heterogeneity in the income dynamics exhibited in the results in Table 5, where households starting in the poorest quintile have moved up and those that started the richest quintile have leveled down on average, a separate weighted equation by Ordinary Least Squares of the log income change from 2017 to 2020 for each starting income group is estimated as well as another one for the whole sample, as shown in Table 6.

For the sake of avoiding multicollinearity issues, some of the variables presented before in Table 5 have been excluded, like household format and other type of inactivity ratios. Should be also recalled that the R squared denotes little power to the explain the variance of the income change when the whole sample is considered. Even so, when a separate regression is computed for each starting income group, the R squared increases considerably.

Table 6: Regressions of the income log income change by starting income for Spanish households in the period 2017-2020

VARIABLES	Total sample	Households starting in the poorest quintile	Households starting in the middle three quintiles	Households starting in the richest quintile
AT WAVE 1				
Time-invariant variables				
Structure				
(Single female w/ children)				
Single female no children	-0.182***	-1.055***	0.000373	0.218***
	(0.00182)	(0.00728)	(0.00134)	(0.00395)
Single male w/ children	-0.0453***	-0.801***	-0.0109***	0.219***
	(0.00187)	(0.00559)	(0.00174)	(0.00395)
Single male no children	-0.129***	-1.211***	0.0803***	0.176***
	(0.00195)	(0.00786)	(0.00147)	(0.00460)
Married couple w/ children	0.00627***	-0.630***	0.0413***	0.293***
	(0.00146)	(0.00511)	(0.00103)	(0.00348)
Married couple no children	-0.148***	-1.235***	0.116***	0.190***
	(0.00178)	(0.00745)	(0.00134)	(0.00386)
Tenure status				
(Owner)				
Owner w/outstanding mortgage	0.000428	0.0445***	-0.0202***	0.0896***
	(0.000600)	(0.00292)	(0.000519)	(0.00109)
Tenant	0.0836***	0.146***	-0.0748***	-0.195***
	(0.000990)	(0.00314)	(0.000902)	(0.00161)
Tenant at reduced price	-0.00668***	-0.102***	0.0429***	-0.185***
	(0.00140)	(0.00845)	(0.00116)	(0.00450)
Rent free	0.0822***	-0.0321***	0.0494***	0.110***
	(0.00102)	(0.00338)	(0.000800)	(0.00194)
Urbanization level				
(Densely-populated area)				
Intermediate area	5.72e-05	0.0260***	-0.0119***	0.0970***
	(0.000758)	(0.00308)	(0.000541)	(0.00126)
Thinly-populated area	0.138***	0.490***	0.0368***	-0.0307***
	(0.000847)	(0.00332)	(0.000580)	(0.00137)
Mean age (adults)	0.0137***	-0.0155***	0.0143***	-0.0650***
	(0.000324)	(0.000898)	(0.000281)	(0.000566)
Mean age squared (adults)	-0.000205***	0.000268***	-0.000219***	0.000650***
	(3.80e-06)	(1.12e-05)	(3.33e-06)	(6.46e-06)
Female_ratio (adults)	-0.00334**	-0.499***	0.0992***	-0.0646***
	(0.00143)	(0.00492)	(0.00134)	(0.00267)

Table 6 (Continued)

VARIABLES	Total sample	Households starting in the poorest quintile	Households starting in the middle three quintiles	Households starting in the richest quintile
At least one member in the household				
Non-native born	-0.0562***	0.0423***	-0.157***	-0.279***
	(0.00104)	(0.00291)	(0.000906)	(0.00175)
Precarious situation	0.186***	0.301***	0.0373***	0.241***
	(0.000656)	(0.00231)	(0.000529)	(0.00219)
Limited to perform daily activities	-0.0475***	0.156***	-0.0324***	-0.0568***
	(0.00122)	(0.00426)	(0.00104)	(0.00253)
Autonomous Community				
Andalusia	-0.0510***	-0.459***	-0.0317***	0.204***
	(0.00128)	(0.00624)	(0.00126)	(0.00205)
Aragon	0.147***	-0.302***	0.210***	0.276***
	(0.00166)	(0.00599)	(0.00204)	(0.00337)
Asturias	0.0342***	-0.190***	0.0484***	0.103***
	(0.00147)	(0.00757)	(0.00155)	(0.00285)
Balearic Islands	0.0530***	-0.176***	0.0121***	0.261***
	(0.00144)	(0.00723)	(0.00140)	(0.00403)
(Basque Country)				
Canary Islands	0.0814***	0.211***	0.00354**	0.379***
	(0.00167)	(0.00835)	(0.00144)	(0.00293)
Cantabria	0.217***	0.900***	-0.0908***	-0.0385***
	(0.00361)	(0.00921)	(0.00249)	(0.00420)
Castile La-Mancha	-0.0695***	-0.483***	-0.0299***	0.0510***
	(0.00168)	(0.00722)	(0.00149)	(0.00356)
Castile-Leon	-0.0630***	-0.606***	0.0263***	-0.00216
	(0.00130)	(0.00790)	(0.00141)	(0.00222)
Catalonia	-0.0249***	0.309***	-0.0297***	-0.0413***
	(0.00114)	(0.00626)	(0.00118)	(0.00184)
Extremadura	0.00330	-0.433***	0.0172***	0.173***
	(0.00244)	(0.00888)	(0.00156)	(0.00260)
Galicia	-0.0362***	-0.409***	-0.0456***	0.170***
	(0.00151)	(0.00688)	(0.00169)	(0.00201)
La Rioja	0.417***	0.689***	-0.0428***	0.0888***
	(0.00525)	(0.0113)	(0.00334)	(0.00342)
Madrid	0.0698***	-0.187***	0.0644***	0.171***
	(0.00110)	(0.00655)	(0.00121)	(0.00158)
Murcia	0.114***	-0.104***	0.0783***	-0.00401
	(0.00163)	(0.00732)	(0.00153)	(0.00378)
Navarra	-0.127***	0.268***	-0.170***	0.112***
	(0.00328)	(0.00742)	(0.00433)	(0.00219)
Valencia	0.0841***	0.00379	-0.0140***	0.0561***
	(0.00112)	(0.00620)	(0.00119)	(0.00205)
Education level ratios (adults)				
(Elementary)				
Intermediate	-0.00761***	-0.0478***	0.0729***	0.0148***
	(0.00106)	(0.00352)	(0.000812)	(0.00229)
Advanced	0.167***	0.617***	0.148***	0.108***
	(0.000949)	(0.00345)	(0.000653)	(0.00208)

Table 6 (Continued)

VARIABLES	Total sample	Households starting in the poorest quintile	Households starting in the middle three quintiles	Households starting in the richest quintile
Time-varying variables				
Household size	0.0882***	0.144***	-0.0191***	0.0347***
	(0.000813)	(0.00229)	(0.000732)	(0.00165)
Number of earners	-0.0758***	0.00434**	0.0869***	0.0385***
	(0.000781)	(0.00198)	(0.000731)	(0.00174)
Number of children	-0.157***	-0.426***	0.0302***	-0.0864***
	(0.00111)	(0.00301)	(0.00107)	(0.00197)
Activity ratios (adults)				
Employed	-0.0235***	-0.261***	0.0333***	0.279***
	(0.00164)	(0.00425)	(0.00151)	(0.00357)
Unemployed	0.00806***	-0.104***	-0.238***	-0.168***
	(0.00196)	(0.00388)	(0.00189)	(0.00479)
Retired	0.325***	0.283***	0.313***	0.174***
	(0.00279)	(0.00758)	(0.00282)	(0.00402)
Δ CHANGE VARIABLES				
Δ Children				
(Same number of children)				
More children	-0.278***	-0.0592***	-0.213***	-0.327***
	(0.00118)	(0.00441)	(0.00116)	(0.00261)
Less children	-0.0988***	-0.369***	-0.0608***	-0.0753***
	(0.00108)	(0.00424)	(0.000955)	(0.00248)
Δ Household size	0.171***	0.227***	0.0888***	0.273***
	(0.000676)	(0.00157)	(0.000619)	(0.00170)
Δ Earner ratio	0.730***	1.436***	0.620***	0.513***
	(0.00214)	(0.00595)	(0.00177)	(0.00336)
Δ Activity ratios (adults)				
Employment	0.185***	0.0704***	-0.0130***	0.631***
	(0.00215)	(0.00516)	(0.00130)	(0.00589)
Unemployment	0.145***	-0.146***	0.0660***	0.499***
	(0.00208)	(0.00439)	(0.00162)	(0.00535)
Retired	0.537***	0.339***	0.304***	0.757***
	(0.00225)	(0.00783)	(0.00149)	(0.00571)
Constant	-0.218***	1.279***	-0.493***	0.782***
	(0.00731)	(0.0201)	(0.00628)	(0.0140)
Observations	2,012	374	1,238	400
No. of households represented	5,876,067	1,777,760	3,525,136	1,173,171
R-squared	0.164	0.338	0.253	0.315

* Robust standard errors in parenthesis
* Significance levels: *** p<0.01, ** p<0.05, * p<0.1
* Own elaboration based on EU-SILC data.

5.1.1. Time-invariant variables

a) **Structure**

With respect to the starting poorest quintile all structures are expected to experiment a fairly lower income increase than single female with children while for the starting richest quintile is just the other way around. For the middle group, single female with no children is not significant and single male with children is the only structure expected to undergo a lower income increase with respect to single females with children. However, coefficients are considerably larger in the poorest income group and smoother in the average income group since, for instance, a single male with children in the poorest group is expected to undergo 80% lower income than a single female with children whereas if it were the case of the average group, a single male with children is just expected to face 1% higher income change than single females with children.

One may deduct that a single female with children may be the most vulnerable structure in terms of economic survival. However, it might be possible that these households had increased their income due to the current social policies aimed at low-income single females with children. Conversely, should these individuals count with more financial resources they would be unlikely to receive public funds and then it makes sense that other structures present more income mobility, especially upwards mobility as estimates suggest.

b) **Tenure status**

For the poorest quintile, those who are under tenancy at reduced price or have their home provided freely, are expected to experience 10% and 3%, respectively, lower income change than those who have their home in property, while for the average income group these are the kind of households expected to increase their income in roughly 4% more than owners without pending mortgages. As for the richest group, mortgaged households and rent free households are the ones expected to increment their income by 9% and 11% more than owners, respectively. Still, the tenure status have a larger explanatory impact on income mobility in the starting richest group since these coefficients are the highest in every category.

Justification for this estimates may turn intricate since ownership may be due to a high purchasing power or inheritance, tenancy at reduced price may be due to social grants or mere regulations and rent free regimes may be due to low-salary jobs or extremely

appreciated job positions. At the same time, tenure status tend to impact notoriously on taxes and fiscal deductions, conditioning in this way the disposable income for the household. Therefore, it turns difficult to conjecture because unobserved factors seem to impact as well.

c) **Urbanization level**

The most remarkable impact here relies on the poorest group where those households which are in thinly-populated areas are expected to increment their income 49% more than those who are in crowded areas. Starting middle quintile households located at intermediate-populated areas are expected to present 1% lower income change than those in densely-populated areas. Starting richest households that live in intermediate-densely areas are also expected to increase their income in 10% but household based on rural zones are expected to decrease their income in 3% with respect to households located in densely-populated areas. This diversity in the income dynamics is also addressed by Woolard & Klasen (2005) that run separate regressions for urban and rural areas and find that some variables like the composition of the household affect differently depending of the population density.

d) **Age**

Though age does not have one of the highest coefficients precisely, impacts negatively on households starting in extreme income groups and positively on households on average quintiles. Besides, as tested by authors like Fields et al. (2003), Aristei & Perugini and Oh & Choi (2017) there seems to be non-linear effects in such a way that the relationship between income movements and the mean age of the adults that belong to the same household is increasing and concave for households that come from average quintiles.

Nevertheless, the relationship between age and income change for households starting in the poorest and richest quintiles is decreasing and convex, that is, decaying. This, may be due to the fact that younger individuals are prone to switching jobs more fluently or even still study whereas as individuals get older they tend to remain more stable financially (Aristei & Perugini, 2015).

e) **Female ratio**

The amount of adult females in the household has a considerable negative impact on the income change for the poorest group, since if the ratio increases in one unit, income is expected to decrease by 50%. However, though the effect is also negative in the starting richest group, coefficients for this and starting average income are smoother. Succinctly, the amount of women in the households affects negatively income change particularly when households lie at the bottom of the distribution but has fewer importance when households count on certain level of income.

The actual effect of the genre of the adults in income change is a complex variable to interpret taking into account that most of the empirical studies on income mobility examine genre of the basis of the head of the household and that literature is not decisive on this matter. For instance, Aristei & Perugini (2015) and Albornoz & Menéndez (2007) find larger and positive income mobility if the breadwinner is a female but Woolard & Klasen (2005) find a negative relationship between income increase and the ratio of females in rural households.

f) **Households with at least one non-native born member, one member in a precarious situation or one member limited to perform daily activities.**

With respect to households where there is at least one individual who is not born in Spain, their income is assumed to raise in 4% if starting in the poorest quintile. However, if they came from average and highest quintiles, they would be assumed to shrink their income in 16% and 28%, respectively.

As for those households in a precarious situation, they all are supposed to increase their income, no matter what quintil group they come from. Nevertheless, the impact of the variables is considerably higher for households belonging to extreme income groups whereas the income increase is assumed to be fairly slighter for average income households.

Households that have a limited person are expected to dwindle their income as long as they do not come from the poorest quintile, and that reduction is higher for the richest group. This decrease is consistent with Jolly (2013) that finds that disabled individuals have much larger probabilities of being at the bottom in the income distribution compared to the non-disabled individuals. Nonetheless, income is predicted to increase in 16% for those who are in the poorest starting income group.

These results on the one hand suggest that households where there is at least one non-native born member, will struggle to move their social class up once they are set in average class. However, nationality is a wide characteristic likely to impact differently depending on the origin. Authors tend to consider race rather than country of origin, like Bradbury (2022) that find that households where the head is non-white experience less upwards mobility.

On the other hand, if anyone is in a precarious situation, which in this thesis is conceived as the circumstance given by receiving income for being socially excluded or being financially unable of affording proper clothes for every season or replacing domestic appliances when these are worn out, it makes sense to assume that those individuals will be granted some kind of social support resulting into a positive income change. What is uncertain here, is the reason why the coefficient for average income group is so low compared to the coefficient for the other starting income groups.

And regarding those households with limited individuals to perform daily activities, once again, should be recalled the fact that this analysis is focused on a social country where there is a considerable range of social resources aimed at those individuals who are found under vulnerable circumstances. However, it is usual to charge a public price on those who require this kind of services that will rely on the economic resources the person at issue counts on. Therefore, if this kind of households lack of financial resources, the fact of having a limited individual may even increase their income as estimates suggest. Conversely, if households reckon on a certain income level, they will be unlikely to large receive social aids and therefore be obligated to increase their expenditures and lower their income from one period to another.

g) **Autonomous Communities**

As expected, based on Table 5 descriptions, coefficients in the average income group are softer whereas larger coefficients rely on the starting poorest income group where Cantabria, La Rioja, Catalonia, Navarra and the Canary Islands are the only locations in which income increase is meant to be 90, 69, 31, 27 and 21 per cent higher than in the Basque Country, respectively. Concerning the richest quintile, Catalonia and Cantabria are the only Autonomous Communities where income increase is supposed to be lower than in the Basque Country since Castile-Leon and Murcia coefficients are not significant.

Cantabria and La Rioja, Aragon and Navarra and the Canary Islands and Aragon are the two locations with larger coefficients for each starting income group, respectively. This is not surprising taking into account that all these locations are over the Spanish average in the rank for the economic growth rank of the decomposability exercise of the relative income mobility index by Fields & Ok (1999). Therefore, the heterogeneity in the income dynamics drawn from the previous analytical approach seems to be reflected in the estimates of these regressions.

h) **Education level**

The effect of advanced education in the poorest group for income increase is four and six times higher than in the average and richest group, respectively. That is, if the ratio of adults with advanced education increases by one unit, income is expected to increase by 62%, 15% and 11% in the poorest, average and richest income groups.

Conversely, coefficients for intermediate education are smoother. If the ratio of adults with intermediate education who come from the poorest group were one unit higher, income change would be supposed to be 5% lower, and if they came from the average group, income change would be supposed to be 7% higher.

Concerning the advanced education, estimates are accordant with previous literature like Aristei & Perugini (2015) and Bradbury (2022). Indeed, it makes sense that college education enhances the prospects for a positive income change, especially for those who come from the poorest side of the population. What turns arduous to grasp is the effect of the intermediate education which seems to present a foggy pattern on income change prediction.

5.1.1. Time-varying variables and changes

i) **Household size**

An additional individual in the household at the initial wave is expected to raise the household income in 14% and 3%, for starting poorest and richest households, respectively, whereas a decrease of by 2% is expected for an additional member in the starting average income group. Consistent with Aristei & Perugini (2015), if size of the household increments in one unit in the final period with respect to the initial wave, income is expected to increase as well, especially for side income groups.

j) **Number of earners**

Unsurprisingly, the number of earners impacts positively on the income change especially for the average social class. However, if the ratio of earners in the households increased in one unit from 2017 to 2020 income would be supposed to increase by 144% in the poorest income group, while the effect decreases when starting average and richest income groups are considered.

k) **Number of children**

In accordance with Woolard & Klasen (2005), the number of children seems to be a powerful variable to explain income decreases, particularly for the poorest income group where an additional minor in the household in 2017 is assumed to decrease the income of the household in 43%.

As for changes in the number children, results are fairly impacting considering that both increasing and decreasing the number of children in the households lowers the income change with respect to those that keep the same number. Particularly, the highest coefficient goes for those who come from the poorest quintile and have less children in the last wave that are expected to smooth their income in 37% with respect to those that maintain the same number of children. Likewise, those who have more children in the last wave and stay in the average and high income groups are expected to decrease in 21 and 33% their income with respect to those that keep the same number of children.

Though it might jolt at a first glance, these estimates might make sense taking into account that in this analysis children stop being considered as children when they turn 16. However, an individual becoming adult does not imply that this person stops cohabiting in the same household or that begins to contribute to the total income of the household. Rather, they usually still study and even expand the household expenses. In fact, the own OECD modified scale of equivalences increments the weight of each individual from 0.3 to 0.5 when they turn 14.

Equally, if a new non-adult member is added into a household, a reduced income in the last wave seems logic due to a new set of expenses derived from someone who apparently does not contribute to the household income, just like Aristei & Perugini (2015), Woolard & Klasen (2005) and Bradbury (2022) estimate.

l) **Activity ratios**

As one may expect, being unemployed has a negative effect in income increases, especially for households in the average and richest quintiles that are expected to decrease their income in 24% and 17% for an additional point in the unemployment ratio. What it is surprising is the fact that for the poorest quintile a high employment ratio in 2017 seems to lower income increases and that a high ratio of retirement increases the income in important manners.

Concerning the changes on the activity ratios from 2017 to 2020, the highest influence of these ones seem to rely on the richest starting income group the most. Just like Aristei & Perugini (2015) solve as for Mediterranean countries, if retirement ratio increases from one period to another, income is expected to increase. Particularly for the richest group which is expected to increase their income in 76%. The positive linkage between the change of the retirement ratio and income raise may be explained by the fact that this is a short-term analysis and some individuals may receive an extra income by virtue of their retirement, giving rise to this positive relationship.

However, once again, some shocking results seem to appear, like the fact that if the unemployment ratio increases one point from the first period to the last one, income is expected to increase in 50% for richest income group. In the light of these results, a non unfamiliar matter should be mentioned. The latter year considered in this thesis, 2020, was characterized by a set of social and economic shocks originated by the Covid-19 pandemic that somehow are likely to have altered the income dynamics for the vast majority of the population. Between all the occurrences happened along that year, may be opportune to remark here the big halts in plenty of economic sectors and the consequent layoffs and labor force adjustment plans suffered by a large part of the population that despite of being employed, their income might have decreased notoriously. This pandemic may be a far-reaching variable, not considered in this empirical model for obvious reasons, that have led to some atypical conclusions like a positive relationship the between unemployment ratio and income increases.

6. CONCLUSIONS AND FURTHER RESEARCH

One of the main contributions of this thesis to the literature lies on providing a wider picture of the short term income dynamics in Spain and illustrating the income mobility heterogeneity in the different Autonomous Communities for the current period.

The Pearson correlation coefficients and the transition matrix attempted epitomize certain disparity on the households' social classes from one period to another. Such disparities were more evident in average quintiles, denoting higher income stability for the highest and lowest income strata.

Since the income mobility indices abridge different quirks of what can be grasped as income mobility, the ordering of the Autonomous Communities differs considerably. From an absolute point of view, Cantabria, Catalonia and the Basque Country are the places with highest income mobility, respectively, although the ordering changes to some degree if inequality in the income change is also into account. On the other hand, La Rioja, Cantabria and Andalusia are the Autonomous Communities with highest income mobility from a relative perspective where the magnitude of the income change is considered on the basis of the previous level of income.

With respect to the sources for income mobility, in the whole country as well as in all locations except La Rioja and Aragon income mobility is mostly motivated by transfers among the households. Similarly, the average of the per capita income change turns to be positive for the whole country but it results negative for the locations of Catalonia, Castile-La Mancha and Navarra. Hence, the analytical approach of the Spanish income mobility seems to reveal a notorious level of diverseness in the income mobility dynamics across the different Autonomous Communities.

The other main aspiration of this thesis lies on identifying the drivers at the bottom of per capita income movements. To do so, separate equations have been estimated attending to the income level that households count on in 2017. As expected, the signs and values of the coefficients differed notoriously from one regression to another, denoting in this way an obvious degree of heterogeneity in the impact of household circumstances on their income change patterns and highlighting the importance of the initial level of income to predict further income changes. Furthermore, the amount of earners, advanced education

and activity ratios seem to be also some of the most remarkable variables for income change on every group.

As indicated before, while most of the estimates are consistent with previous literature, other results may appear faintly controversial. Then, the limitations and particularities to which this thesis is subject to should be remarked. First, this is a short-term analysis which is clearly affected by great shocks as a consequence of the Covid-19 pandemic and thus there may be a set of unobserved factors not included in the model so that it may mislay power to explain the nature of income changes at the period at issue. Second, though this study if merely focused in Spain, unlike other centralized country, each Autonomous Community have a particular degree of power to define its own policy giving rise to the aforementioned diversity in the income dynamics across locations. Third, this is a social country where several social policies are aimed at the vulnerable sectors of the population, making easier for poorest households to increase their income, considering as well the level of fiscal pressure and that minimum wage may be slightly above universal basic income. Lastly, the survey through which data are collected is designed for all Europe, so that some variables may not adhere to the Spanish context properly and household weights are calibrated just on the basis of Autonomous Communities and household size, hindering in this way the performance of consistent empirical applications with respect to other variables.

Hence, as the vast majority of researching studies conclude, further research is needed. Apart from the mobility measures attempted here, other indices intended to capture further quirks of the income dynamics or even the own absolute index by Mitra & Ok (1996) with other values for α parameter, may be also computed in pursuance of boarding the notions of the Spanish income mobility drawn from this analysis.

In relation to the econometric approach addressed in this thesis, it might be interesting to compare the results by estimating the income change throughout instrumental variables to predict the initial level of income and leave out measurement errors and endogeneity issues. Another possibilities may be to choose another kind of dependent variable, like quintile change and consider other models such as ordered logistic, multinomial logit or multinomial probit regressions. Additionally, other variables like equivalent expenditures apart from income as dependent variable may be also studied as an additional symbol for living conditions.

Finally, as for the two major approaches attempted, may be also engrossing to consider previous periods to rule out the effect of the pandemic and compare if income change presents similar patterns or take individuals as units of study rather than households and examine income dynamics under additional perspectives in the empirical analysis since in this case personal weights would be computed on the basis of age, sex and nationality.

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APPENDIX

Table A1: Results from the Mitra and Ok's absolute income mobility index by Spanish Autonomous Communities in the period 2017-2020 for $\alpha = 1$ and $\alpha = 2$.

Autonomous Community	$\alpha = 1$	$\alpha = 2$
Andalusia	4060,48	6025,44
Aragon	4906,7	7016,06
Asturias	3230,35	5617,88
Balearic Islands	4521,11	6399,19
Canary Islands	4065,89	6443,2
Cantabria	7511,15	14471,97
Catalonia	6785,59	14499,93
Extremadura	3430,36	5595,6
Galicia	4235,55	5864,5
Castile - La Mancha	4330,41	7492,63
Castile - Leon	5411,67	10223,88
Madrid	4819,6	7994,13
Murcia	3832,86	7997,24
Navarra	4560,73	6773,84
Basque Country	6082,22	15161,26
La Rioja	5263,75	8018,88
Valencia	3466,05	5428,05
SP [a]	4799,13	9279,67

a: "SP" stands for Spanish average.
* Own elaboration based on EU-SILC data.

Table A2: Results from the Fields and Ok relative income mobility index decomposed into economic growth and transfers components by Spanish Autonomous Communities in the period 2017-2020.

Autonomous Community	Economic Growth	Transfers	Mobility
Andalusia	0.010	0.399	0.409
Aragon	0.209	0.123	0.332
Asturias	0.003	0.178	0.181
Balearic Islands	0.031	0.253	0.284
Basque Country	0.020	0.254	0.274
Canary Islands	0.082	0.267	0.349
Cantabria	0.129	0.338	0.467
Castile – La Mancha [b]	0.012	0.322	0.334
Castile – Leon	0.017	0.260	0.277
Catalonia [b]	0.016	0.322	0.338
Extremadura	0.118	0.228	0.346
Galicia	0.003	0.336	0.339
La Rioja	0.398	0.206	0.603
Madrid	0.077	0.194	0.270
Murcia	0.095	0.192	0.287
Navarra [b]	0.083	0.194	0.277
Valencia	0.013	0.266	0.279
SP [a]	0.033	0.291	0.325

a: "SP" stands for Spanish average.
b: These Autonomous Communities have presented a negative economic growth.
* Own elaboration based on EU-SILC data.

Table A3: Decomposition in percentage terms of economic growth and transfer components of the Fields and Ok relative income mobility index by Spanish Autonomous Communities in the period 2017-2020.

Autonomous Community	Economic Growth (%)	Transfers (%)
Andalusia	2,42	97,59
Aragon	63,03	36,97
Asturias	1,8	98,2
Balearic Islands	11	89
Basque Country	7,44	92,56
Canary Islands	23,52	76,48
Cantabria	27,64	72,36
Castile – La Mancha [b]	3,55	96,45
Castile – Leon	6,19	93,81
Catalonia [b]	4,63	95,37
Extremadura	34,23	65,77
Galicia	0,95	99,05
La Rioja	65,93	34,07
Madrid	28,3	71,7
Murcia	33,11	66,89
Navarra [b]	29,89	70,11
Valencia	4,84	95,16
SP [a]	10,22	89,79

a: "SP" stands for Spanish average.
b: These Autonomous Communities have presented a negative economic growth.
* Own elaboration based on EU-SILC data.