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INTERGENERATIONAL INCOME MOBILITY IN CYPRUS

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Intergenerational Income Mobility in Cyprus

Louis N. Christofides, Andros Kourtellos, Anna Theologou and Kostantinos Vrachimis

Abstract

In this paper we take up G.Solon's (1992) suggestions to investigate intergenerational mobility using non-monetary measures. We use Cyprus Survey of household Expenditure and Income (CSHEI) to investigate the contemporary intergenerational mobility of income in Cyprus. Our results indicate significant evidence of intergenerational linkage in income between parents' and their children.

CONTENTS

ΠΕΡΙΛΗΨΗ

Η σχέση μεταξύ των κοινωνικοοικονομικών επιτευγμάτων των γονέων και των παιδιών τους πάντα γοήτευε τους κοινωνικούς επιστήμονες. Η δημιουργική εργασία του Solon (1992) έχει επιστήσει την προσοχή των οικονομολόγων με αποτέλεσμα να γίνουν πολλές μελέτες που εξετάζουν τη διαγενεακή κινητικότητα του εισοδήματος σε διάφορες χώρες. Ωστόσο, σύμφωνα με όσα γνωρίζουμε αυτή είναι η πρώτη προσπάθεια για να γίνουν ορισμένες εκτιμήσεις της κινητικότητας του εισοδήματος μεταξύ γονέων και παιδιών στην Κύπρο. Αυτή η μελέτη διερευνά τη σχέση του εισοδήματος μεταξύ των δύο γενεών στις οικογένειες της Κύπρου και την ικανότητα των ατόμων να μετακινούνται μεταξύ των κατηγοριών εισοδήματος από γενιά σε γενιά, χρησιμοποιώντας δεδομένα από την Έρευνα των Οικιακών Δαπανών και Εσόδων (CSHEI). Οι διαθέσιμες έρευνες καλύπτουν τα έτη 1985/86, 1991/92, 1996/97 και 2002/03. Από αυτές τις έρευνες είμαστε σε θέση να συγκεντρώσουμε πληροφορίες για κάθε ζεύγος γονέα-παιδιού συμπεριλαμβανομένων των χαρακτηριστικών τους (εκπαίδευση, ηλικία κλπ) καθώς και το εισόδημα. Η μεθοδολογία που χρησιμοποιείται ακολουθεί το έργο του Solon (1992).

Το ζήτημα της διαγενεακής κινητικότητας εισοδήματος είναι σημαντικό για δύο λόγους. Πρώτον, αναλύει την ανισότητα των εισοδημάτων στην Κύπρο, κάτι που παραβιάζει τις ίσες ευκαιρίες σε μια κοινωνία. Δεύτερο, δίνει τη δυνατότητα σύγκρισης της κινητικότητας μεταξύ γενεών ανάμεσα στην Κύπρο και άλλες χώρες, καθώς επίσης και τη διερεύνηση της ικανότητας των ατόμων να βελτιώσουν την οικονομική τους κατάσταση.

Τα ευρήματά μας δείχνουν ότι ο συντελεστής της κινητικότητας του εισοδήματος μεταξύ των γενεών στην Κύπρο είναι περίπου 0,34, όταν χρησιμοποιούνται όλες οι διαθέσιμες έρευνες. Αυτό το αποτέλεσμα είναι σε γενικές γραμμές σύμφωνο με την κινητικότητα που βρέθηκε σε άλλες χώρες της Ευρωπαϊκής Ένωσης. Ο συντελεστής είναι μεγαλύτερος από το συντελεστή των σκανδιναβικών χωρών, αλλά μικρότερος από ότι ο συντελεστής στο Ηνωμένο Βασίλειο και στις Ηνωμένες Πολιτείες οι οποίες θεωρούνται κοινωνίες με χαμηλή κινητικότητα. Είναι ενδιαφέρον ότι ο συντελεστής της κινητικότητας του εισοδήματος παρουσίασε σημάδια ανοδικής τάσης κατά τη διάρκεια του μικρού δείγματός μας (1985 με 2003). Αν και η περιορισμένη διάρκεια των δεδομένων μας δεν επέτρεπε εξαχθούν ισχυρά συμπεράσματα, τα στοιχεία αυτά δείχνουν ότι η κυπριακή κοινωνία γίνεται όλο και λιγότερο κινητική και πιο επιρρεπής στην εισοδηματική ανισότητα. Τα ευρήματά μας υποδηλώνουν επίσης ότι η εκπαίδευση των παιδιών των νοικοκυριών, μπορεί να βελτιώσει σημαντικά την κινητικότητα εισοδήματος των Κυπρίων.

I. INTRODUCTION

The intergenerational association between the socioeconomic achievements of parents and those of their children has always fascinated the social scientists. Since the seminal work of Solon (1992) this topic has drawn the attention of economists and generated a large body of studies that investigated the intergenerational income mobility in several countries. Nevertheless, little is known about the case of Cyprus. To the best of our knowledge this is the first attempt to provide some estimates of income mobility between parents and children in Cyprus.

In this study we investigate the income relation between two generations in Cyprus families and the ability of individuals to move between the income classes from generation to generation using data from Cyprus Survey of household Expenditure and Income (CSHEI). The available surveys cover the years 1985/86, 1991/92, 1996/97 and 2002/03. From these surveys we are able to gather information about each parent-child pair including their characteristics (education, age etc) and income. The methodology used follows the work of Solon (1992).

The question of intergenerational income mobility is important for two reasons. Firstly, it analyzes the inequality of income in Cyprus, something that violates the equal opportunities in a society. Secondly, it enables as to compare the intergenerational mobility between Cyprus and other countries and investigate the ability of individuals to improve their economic status.

Our findings show that the intergenerational income mobility coefficient in Cyprus is about 0.34 when all the available surveys are used, which is broadly in line with the mobility found in other European Union countries. The coefficient is larger than the coefficient in Scandinavian countries but smaller than the coefficient in United Kingdom or United States which are considered less mobile societies. Interestingly, the income mobility coefficient has exhibited signs of an upward trend over the small span of our sample 1985 to 2003. Although the limited span of our data does not allow us to make strong claims this evidence suggests that the Cyprus society is becoming less mobile and more prone to income inequality. Our findings also suggest that education of households' children can substantially improve the mobility in Cyprus.

The paper is organized as follows: the next section summarizes the available literature, in Section 3 the dataset used is described and the econometric model used is presented. Section 4 describes the results of the various estimations of the intergenerational relation. The last section briefly concludes.

II. LITERATURE REVIEW

The empirical work focus around the estimation of β in the following equation

$$Y_i^{children} = a + \beta Y_i^{parents} + \varepsilon_i \qquad (1)$$

Where $Y_i^{children}$ is the log-income of adult children and $Y_i^{parents}$ is the log income of parents and i identify the household where parents and children belong and ε_i is the error term. In equation (1) β is the elasticity of children's' income with respect to parents income. The intergenerational correlation of income is β, if $\beta = 0$ then the income of parents and children are unrelated and complete mobility between generations exist. If $\beta = 1$ then the two generations income is perfectly related and there is perfect immobility between generations. If β lie between 0 and 1 then income regress to the mean: fathers with income below (above) the mean will have children with income below (above) the mean. A value close to unity indicate a high persistence of income, and a value close to zero indicate that child's income is less related to the parents income and society is more mobile.

Solon (1992) and Zimmerman (1992) were among the first to indicate that estimation of Equation (1) with OLS may be biased due to measurement error or unrepresentative sample used. Prior studies used samples that covered only a section of the population (for example individuals living in one district) and where non-randomly selected. The measurement error may be caused by measurement error in the two generations income variable proxy. In the estimation of Equation (1) the income variable used must reflect the permanent component of annual income. In a single year observation if income is used then the estimation may suffer from measurement error. Two solutions have been proposed to overcome this misspecification. In order to estimate the long-run economic status of each individual in the sample an average value of income and extended period is used instead of a single year based observation. The second is to apply instrumental variables estimation with instrument parents' income with father's

years of equation. A more detailed description of the intergenerational income mobility literature is available in Solon (1999).

Solon (2002), Comi (2004) and Corak (2006) provide a summary in international studies in Intergenerational Income mobility. The Scandinavian countries (Finland, Sweden, Denmark, and Norway) and Canada are the most mobile societies which values range close to 0.15. The United States and United Kingdom are the less mobile societies with coefficient values close to 0.5. France and Germany exhibit values of intergenerational mobility that lies in the middle and range between 0.2 and 0.3.

III. DATA DESCRIPTION AND ECONOMETRIC MODEL

The data used in this study are drawn from the CSHEI. The CSHEI was first conducted in 1966 and, in total, nine surveys have been conducted. Only the last four surveys can be used, those for 1985/86, 1990/91, 1996/97, and 2002/03. These surveys are available in electronic format from Cyprus Statistical Service (CYSTAT) and a unified dataset that contain these four surveys has been created. A more detailed description of this dataset can be found in Georgiou, Komodromou and Polycarpou (2005). These surveys covered both rural and urban households and their purpose extended beyond merely gathering data to update the weights of the items included in the retail price index. An important drawback for the 1985-1986 survey is that education information for each individual is not available for each individual.

The 1985/86 survey provides data for 3759 households and 12818 individuals representing 2.52% of Cyprus population at the time of the survey. The 1990/91 survey provides data for 2708 households and 9062 individuals, or 1.6 percent of the population. The 1996/97 survey provides data for 2644 households and 8637 individuals, or 1.3 percent of the population. Finally, the 2002/03 survey provides data for 2990 households and 8637 individuals, or 1.25 percent of the population. These surveys provide the best available information on the income and expenditure of Cypriot households. Using the variables collected in the survey make it more likely that we will be able to understand the intergenerational income transfer process and hence net out the contribution of characteristics such as personal characteristics and education.

The 'working' sample consists of data for 356, 194, 224 and 258 pairs of children with their parents from the four surveys respectively. We include in the sample only individuals aged sixteen to seventy-five, whom reliable data are available. This is because we include only individuals who are allowed to work (individuals aged sixteen and above) and we exclude individuals who are not capable of working. The sample consists of those individuals who had paid employment and a non-zero wage. The reason for selecting this group is that the self-employed are prone to under-report their earnings and, in any case, the intergenerational income mobility process may be different for them.

The surveys report a wealth of information about the personal characteristics of each individual. These characteristics include age, education, place of residence, number of children and marital status. Also, they include information about working status, whether the individual was working in the public sector, the industry of employment and his or her occupation. In addition, information on income and expenditure sources is available. As can be seen from Table 1, the nominal[1] wage rate for both parents and children has steadily increased from 1985 to 2003. The average parent's age is varies range from 51.9 years in 1985 to 53.1 years in 2003. There are no illiterate children and significantly less children with secondary education[2]. The majority of the individuals in the sample for both groups have finished lyceum but the number of individuals with higher education has steadily increased. The education decomposition of our sample is explained by the age structure of the sample. The children in each family are observed on average on the early stages of their life and in this age they are less likely to finish higher education[3]. Our sample is passed in a predominantly urban population (at least 65% of the population across the surveys live in urban areas). In all four surveys the average education level of children is better than their parents.

[1] The variables used throughout the study are in nominal terms. If the study were carried out using real terms the estimation results would not change apart from a change in the value of the constant term.

[2] Appendix A provides an explanation for each variable used in the study.

[3] This especially holds for the male population since the male population in its grade majority after finishing lyceum serve for two years in Cyprus National Guard. In our sample we have 15 female child under the age of 23 that have completed university education and only 2 male children that have completed university education (these two observations are found in the 1991 survey).

Table 1: Sample Characteristics for Basic Variables

	1985		1991		1997		2003	
	Child	Parent	Child	Parent	Child	Parent	Child	Parent
Average Monthly Wage	4.375	4.819	5.194	5.936	5.643	6.106	6.135	6.384
Age	22.5	51.9	23.1	52.5	23.6	52.4	24.7	53.1
Education								
Illiterate	-	-	0.000	0.015	0.000	0.018	0.000	0.007
Elementary	-	-	0.077	0.582	0.022	0.598	0.132	0.500
Lyceum	-	-	0.577	0.335	0.411	0.264	0.442	0.297
College	-	-	0.211	0.041	0.192	0.054	0.182	0.069
University	-	-	0.134	0.026	0.174	0.067	0.244	0.125
Married	0.067	0.966	0.108	0.995	0.076	0.996	0.081	0.968
Urban	0.648		0.732		0.647		0.674	
Province								
Nicosia	0.427		0.381		0.402		0.473	
Limassol	0.287		0.336		0.317		0.213	
Larnaca	0.213		0.180		0.192		0.174	
Paphos	0.048		0.088		0.058		0.085	
Famagusta	0.025		0.015		0.031		0.054	
Pairs of Observations	356		194		224		258	

Note: Average Monthly Wage is the natural logarithm of the nominal monthly wage.

The empirical estimation followed is based on Solon(1992). It is described by the following equation:

$$w_{it}^{c} = \beta_0 + \beta_1 w_{it}^{f} + \beta_1 age_{it}^{c} + \beta_2 \left(age_{it}^{c}\right)^2 + \beta_3 age_{it}^{f} + \beta_4 \left(age_{it}^{f}\right)^2 + \varepsilon_{it} \quad (2)$$

where w is the log wage, and age is the age of each individual i and is the error term. The characteristics of the child's are labeled with (c) and the father with (f), t indicate the time of the survey and *i* the household where parents and children belong. The equation is separately estimated using the four available surveys, at year's 1985/86, 1991/92, 1996/97, 2002/03. The inclusion of father and child education is needed to account for the fact that parents are observed in a later point of their life cycle compared to their children. Because parents have spent a larger part of their life studying and working are expected to be more experienced, progressed the ladder of hierarchy in their occupation and as a consequence a higher wage. The set of age variables works toward the reduction of the effect of the different positions that parents and children have in their life cycle.

The equation is estimated using the Ordinary Least Square Estimator (OLS) and the Instrumental Variable estimator. The use of the later estimator is needed because of the possible endogeneity of father's income status. His income is likely to be related

with other factors not included in the estimation. A usual instrument used in this specification if father education. This variable is highly associated to income. A more (less) educated individual is more (less) likely to find a better compensated job. Father's education usually influences child income only through its association with father's income and not with any other excluded factor from the regression. It can be argued that better educated parents are more able to decide about their children education, understand the need for investment in their education (by providing access to technology like computers etc) which will increase their children education status and finally their income. This may be a smaller problem in Cyprus since the social norm is that parents invest primarily in their children's education and instead in other aspect of their life and as a result the majority of students in Cyprus continue their education beyond the secondary education[4]. For the IV estimation the father's income is instrumented by his educational status[5]. A second reason to use the IV methodology is to account for possible measurement error on parents' income. Because income for each person is based in a single year observation the second methodology proposed by Solon (1992) is used.

IV. ESTIMATION RESULTS

IV A. FUNDAMENTAL EQUATION ESTIMATION

The results obtained from the estimation of Equation 1 are presented in Table 2. The equation is estimated for the four different surveys available using the OLS estimator. The IV estimator is estimated only for the last three surveys because as described earlier the education status of the individuals in the 1985/86 survey is not reported and the instrument for father's wage are not available. The results obtained from the OLS estimation of the equation varies from 0.146 in 1997 to 0.249 in 1985 and it is always statistically significant. The age variables for children are significant whereas the age variables for parents are statistically insignificant except for the 1997 survey. The instrumental variable estimator is performed for all three surveys (that the instruments are available) in order to take into account the possible endogeneity of father's wage.

[4] The latest education statistics reveal that 82% of secondary education students in 2006 continued their studies in tertiary education schools in Cyprus and abroad

[5] The instruments include three dummy variables: if the father has completed the lyceum, the college or the university. The excluded categories are: illiterate and elementary education (which include primary education and gymnasium)

The endogeneity test[6] shows that fathers' wage can be treated as exogenous only in the 1996/97 survey, though, the IV estimator from the theory is expected to be endogenous. The results show that the intergenerational elasticity becomes larger and ranges between 0.241 in the 1996/97 survey and 0.405 in 2002/03[7] survey.

The whole sample (1985-2003) can be used to estimate the intergenerational income mobility relationship. The data from the three surveys are pooled together and the relationship described by Equation 1 is estimated using OLS[8]. The elasticity for this united sample is 0.233 and range between the elasticilties obtained when the four surveys are estimated separately[9]. Another approach to use the whole sample and estimate the intergenerational income mobility elasticity is to estimate the relationship using the Seemingly Unrelated Regression (SUR) estimator. Using this estimator the whole sample is pooled together, the four equations are estimated separately but the possible correlation between the take into account the possible correlation between the error terms in each survey. The results obtained from this estimator do not change the statistical significance either of the variables in each survey. The results obtained from this estimation are presented in Appendix B. If only the last three surveys are used to estimate the pooled OLS model the intergenerational income mobility coefficient is 0.213 and the respective IV coefficient is 0.342.

The intergenerational income mobility relationship over the 1985-2003 period compared to other countries is closer to the relationship of the other European continental countries (France and Germany).

IV B. EXTENSIONS TO FUNDAMENTAL ESTIMATION

After the estimation of the fundamental relationship between generations we consider two extensions of the basic equation that may shed more light in this relationship. First we consider the role of the child education and secondly the role of parent economic

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[6] The Durbin-Wu-Hausman endogeneity test is used. The null hypothesis for this test is that father's education can be treated as exogenous.

[7] The test for over identifying restrictions follows Hansen (1982). The null hypothesis is that the instruments used are valid. In the equations estimated, the null hypothesis is accepted for 1991/92 and 2002/03 in the 10% level and in the 1996/97 survey at 1% level.

[8] In the estimation time dummies are included in order to take into account that we take individuals from four different points on time.

[9] The values for the time dummies (not showed in the table) are -0.507 for the 1985/89 survey, 0.389 for the 1996/97 survey and 0.728 for the 2002/03 survey. All the time dummies are statistically significant at the 1% level. The 1991/92 time dummy is used as the base dummy.

status relative to the rest of the population. The first extension is investigated in order to net out the effect of increased education attainment among the young part of the population. As it can be seen from the education status of the children in the sample, they are more educated than their parents. The income relationship between the two groups may be affected by this improvement. The second extension investigates the possible difference in the intergenerational elasticity between parents with different income background. It may be the case that families which are more affluent are more capable to transfer their income to the next generation. Also, children which are raised in families with low income may face obstacles in having an increased income latter in their life.

Table 1: Estimation of Intergenerational Income Mobility Relation

	1985	1991		1997		2003		1985-2003	1991-2003	
	OLS	OLS	IV	OLS	IV	OLS	IV	OLS	OLS	IV
Father Wage	0.249***	0.212***	0.343***	0.146***	0.241***	0.241***	0.405***	0.233***	0.213***	0.342***
	(0.040)	(0.056)	(0.073)	(0.048)	(0.081)	(0.043)	(0.081)	(0.022)	(0.027)	(0.048)
Child Age	0.327***	0.349**	0.305*	0.530***	0.539***	0.181**	0.183**	0.342***	0.341***	0.307***
	(0.089)	(0.153)	(0.157)	(0.105)	(0.103)	(0.084)	(0.086)	(0.049)	(0.061)	(0.060)
$(\text{Child Age})^2$	-0.005***	-0.006*	-0.005*	-0.009***	-0.010***	-0.003*	-0.003*	-0.006***	-0.006***	-0.005***
	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Father Age	-0.020	-0.048	-0.018	-0.190***	-0.198***	0.117	0.059	-0.068	-0.077	-0.077
	(0.071)	(0.104)	(0.102)	(0.071)	(0.070)	(0.138)	(0.151)	(0.043)	(0.056)	(0.058)
$(\text{Father Age})^2$	0.000	0.001	0.000	0.002***	0.002***	-0.001	-0.000	0.001*	0.001*	0.001*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)
Constant	-1.021	-0.031	-0.957	2.316	1.940	-2.081	-1.542	0.476	0.723	1.100
	(1.759)	(2.279)	(2.255)	(1.761)	(1.760)	(3.305)	(3.554)	(1.058)	(1.329)	(1.376)
Observations	356	194		224		258		1032	676	
R^2-Adjusted	0.268	0.201	0.181	0.367	0.355	0.244	0.203	0.580	0.400	0.382
<u>Mispesification Tests:</u>										
Heteroskedasticity	[0.000]	[0.895]	[0.763]	[0.000]	[0.000]	[0.742]	[0.510]	[0.001]	[0.078]	[0.050]
Linearity	[0.976]	[0.906]	[0.910]	[0.168]	[0.270]	[0.057]	[0.505]	[0.803]	[0.914]	[0.977]
Normality	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Endogeneity Test	-	-	[0.061]	-	[0.138]	-	[0.009]	-	-	[0.001]
Over-Identifying Restrictions Test	-	-	[0.278]	-	[0.034]	-	[0.323]	-	-	[0.078]

Notes: (1) The dependent variable in all estimations is child's log wage. (2) Instrumental Variable for the father's wage is education (Because the education status is not available for the 1988 survey can not be estimated using the IV specification). (3) Standard errors in parentheses, p-values in brackets: *** p<0.01, ** p<0.05, * p<0.1 (4) The null hypothesis for the heteroskedasticity test is that the variance is constant (ie variance is homoskedastic). For the linearity test the null hypothesis is that the specification is linear on the depended variables. The null hypothesis for the normality test is that the error term is normally distributed.

To investigate the possible effect of child education to the intergenerational income elasticity two different exercises are conducted. Firstly, the sample is constrained to the families where the children have attained a higher level of education (i.e. college or university). Secondly, the whole sample is used also into Equation 1 where child's education is added as an explanatory variable.

Table 2 reports the estimation of the basic specification constrained to the families' with children who have finished the university. The intergenerational elasticity is lower in all cases compared to the results obtained when the whole population is considered. In Table 3 we add as explanatory variables the educational status of the child using a set of three dummy variables. The first category is elementary education (which include primary education and gymnasium), college and university education[10]. The inter-generational income elasticity is again lower compared to the results obtained when we do not control for children education. The inclusion of education variables reduces the elasticity almost by half in all cases. The child education dummy variables are almost significant in all specifications. Education plays a crucial role in explaining social outcomes and in accounting for long-term mobility. Educated children are less depended with their parent's income and are more possible to earn more (or less) compared to them.

The second extension that is investigated is the effect of parent's income class to the intergenerational elasticity. Parents which relative to the rest population have higher (lower) earnings may be more (less) able to invest in their children education and as a result their children earn a higher (lower) income. The sample is divided in three categories. Based on the father's wage we create three sub-samples: poor, middle and rich. For each year a father is classified as poor if he belongs to the 10% lower part of the wage distribution, rich if he belongs to the 10% higher part of the distribution and middle if he belongs to the part between the 10% and 90% of the distribution. Using these subsamples three dummy variables are created and are included as explanatory variables in the estimation of the baseline equation. The results from the estimation are reported in Table 4. The intergenerational income elasticity is still statistically significant but its size is now larger (except for the 2002/03 survey). This may indicate that when the effect of the parent class is net out the true elasticity is larger.

[10] The excluded category is individuals who have finished lyceum.

Table 3: Estimation of Equation 1 controlling for children education

	Estimation of Equation (1) including only highly educated children						Estimation of Equation (1) controlling with children education					
	1991		1997		2003		1991		1997		2003	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(13)
Father Wage	0.221*	0.117	0.050	0.021	0.104*	0.258**	0.082	0.198**	0.074	0.107	0.125***	0.217**
	(0.132)	(0.134)	(0.058)	(0.117)	(0.062)	(0.121)	(0.064)	(0.086)	(0.048)	(0.091)	(0.042)	(0.103)
Child Age	0.069	0.048	0.296*	0.312**	0.047	0.019	0.266*	0.235	0.357***	0.383***	0.022	0.038
	(0.282)	(0.218)	(0.153)	(0.151)	(0.147)	(0.143)	(0.150)	(0.151)	(0.103)	(0.101)	(0.088)	(0.092)
$(\text{Child Age})^2$	-0.000	0.000	-0.005*	-0.005*	0.000	0.001	-0.004	-0.004	-0.006***	-0.007***	-0.000	-0.000
	(0.005)	(0.004)	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
Father Age	0.044	0.053	-0.247**	-0.270**	0.563**	0.585***	-0.054	-0.035	-0.173**	-0.183***	0.170	0.143
	(0.234)	(0.186)	(0.111)	(0.114)	(0.238)	(0.219)	(0.089)	(0.089)	(0.067)	(0.066)	(0.134)	(0.144)
$(\text{Father Age})^2$	-0.000	-0.000	0.002**	0.003**	-0.005**	-0.005***	0.001	0.000	0.002***	0.002***	-0.001	-0.001
	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Child's Education:												
Primary							-0.696***	-0.615***	-0.512***	-0.549***	-0.341**	-0.376**
							(0.202)	(0.214)	(0.123)	(0.120)	(0.158)	(0.148)
College							0.339***	0.287**	0.195**	0.171*	0.354***	0.294***
							(0.124)	(0.122)	(0.090)	(0.095)	(0.119)	(0.112)
University							0.501*	0.384*	0.215**	0.185	0.508***	0.421***
							(0.267)	(0.233)	(0.106)	(0.123)	(0.102)	(0.141)
Constant	1.034	1.804	7.965**	8.587***	-11.261*	-12.605**	1.390	0.642	4.200***	3.985**	-0.843	-0.920
	(5.118)	(4.246)	(3.201)	(3.192)	(5.724)	(5.253)	(1.887)	(1.965)	(1.609)	(1.557)	(3.181)	(3.244)
Observations	67		82		110		194		224		258	
R^2-Adj.	0.113	0.102	0.202	0.197	0.215	0.178	0.279	0.266	0.448	0.445	0.326	0.315
Misspecification Tests:												
Heteroskedasticity	[0.938]	[0.743]	[0.427]	[0.311]	[0.050]	[0.871]	[0.000]	[0.330]	[0.008]	[0.005]	[0.338]	[0.263]
Linearity	[0.464]	[0.654]	[0.532]	[0.359]	[0.001]	[0.677]	[0.544]	[0.446]	[0.210]	[0.127]	[0.591]	[0.833]
Normality	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Endogeneity Test	-	[0.835]	-	[0.694]	-	[0.203]	-	[0.142]	-	[0.629]	-	[0.275]
Over-Identifying Restrictions Test	-	[0.241]	-	[0.019]	-	[0.311]	-	[0.362]	-	[0.023]	-	[0.515]

Notes: (1) The dependent variable in all estimations is child's log wage. (2) Instrumental Variable for the father's wage is education (Because the education status is not available for the 1988 survey can not be estimated using the IV specification). (3) Standard errors in parentheses, p-values in brackets: *** p<0.01, ** p<0.05, * p<0.1 (4) the null hypothesis for the heteroskedasticity test is that the variance is constant (i.e. variance is homoskedastic). For the linearity test the null hypothesis is that the specification is linear on the depended variables. The null hypothesis for the normality test is that the error term is normally distributed.

Table 5: Estimation of Equation (1) taking into account parents' income class

	1985	1991		1997		2003	
	OLS	OLS	IV	OLS	IV	OLS	IV
Father Wage	0.279***	0.321***	0.551***	0.178**	0.349**	0.221***	0.619***
	(0.053)	(0.089)	(0.184)	(0.069)	(0.140)	(0.066)	(0.158)
Child Age	0.320***	0.336**	0.303*	0.532***	0.543***	0.182**	0.166*
	(0.090)	(0.154)	(0.155)	(0.105)	(0.103)	(0.085)	(0.087)
$(\text{Child Age})^2$	-0.005**	-0.006*	-0.005	-0.009***	-0.010***	-0.003*	-0.002
	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
Father Age	-0.018	-0.084	-0.110	-0.193***	-0.209***	0.116	0.035
	(0.071)	(0.101)	(0.105)	(0.071)	(0.071)	(0.137)	(0.159)
$(\text{Father Age})^2$	0.000	0.001	0.001	0.002***	0.002***	-0.001	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Parent's Class:							
Poor	0.228	0.464**	0.838**	0.124	0.360	-0.165	0.422
	(0.155)	(0.233)	(0.347)	(0.164)	(0.239)	(0.162)	(0.264)
Rich	-0.007	-0.048	-0.338	-0.050	-0.292	-0.067	-0.681**
	(0.141)	(0.174)	(0.281)	(0.127)	(0.185)	(0.164)	(0.280)
Constant	-1.135	0.401	0.229	2.171	1.487	-1.902	-2.002
	(1.747)	(2.268)	(2.314)	(1.799)	(1.792)	(3.283)	(3.790)
Observations	356	194	194	224	224	258	258
R^2-Adj.	0.269	0.210	0.181	0.363	0.343	0.242	0.130
Misspecification Tests:							
Heteroskedasticity	[0.000]	[0.992]	[0.915]	[0.001]	[0.001]	[0.549]	[0.641]
Linearity	[0.992]	[0.867]	[0.897]	[0.209]	[0.281]	[0.127]	[0.662]
Normality	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Endogeneity Test	-	-	[0.189]	-	[0.150]	-	[0.002]
Over-Identifying Restrictions Test	-	-	[0.174]	-	[0.048]	-	[0.696]

Notes: (1) The dependent variable in all estimations is child's log wage. (2) Standard errors in parentheses, p-values in brackets: *** p<0.01, ** p<0.05, * p<0.1 (3) the null hypothesis for the heteroskedasticity test is that the variance is constant (i.e. variance is homoskedastic). For the linearity test the null hypothesis is that the specification is linear on the depended variables. The null hypothesis for the normality test is that the error term is normally distributed.

V. CONCLUSION

The purpose of this study is to examine the intergenerational income mobility relationship for Cyprus using the Cyprus Survey of household Expenditure and Income (CSHEI) which cover the following periods: 1985/86, 1991/92, 1996/97 and 2002/03. The econometric methodology used is based on Solon (1992).

The estimations performed reveal that the intergenerational income mobility coefficient is around 0.343 when all the available surveys are used. This result shows that income mobility is comparable with the mobility in other European Union countries. The coefficient is larger than the coefficient in Scandinavian countries (which are

considered as highly mobile societies) but smaller than the coefficient in United Kingdom or United States which are considered less mobile societies. The income mobility coefficient increased from 1985 to 2003. The coefficient increased from 0.249 in 1985[11] to 0.405 in 2003, while in 1991 and 1997 the coefficient was 0.343 and 0.241 respectively.

When the education of households' children is accounted in the estimation the intergenerational income coefficient drops. This indicate that educated children are more able to improve their income status (compared to their parents income) when they acquire a high level of education.

Finally, the relationship is estimated controlling for parents economic status as it is expressed by its position on the respective income distribution. The exercise reveals that in the majority of cases the parents economic status doesn't enter significant in the majority of the specifications.

[11] This coefficient is based on the OLS estimation for 1985, since the IV estimation couldn't be performed for this survey.

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APPENDIX A: VARIABLE DESCRIPTION

Variable Name	Description
Average monthly wage	Gross monthly wage, includes first and secondary job when applicable.
Age	Age for each individual: in the sample we have included individuals between 16 and 75 years old. In regression equations, the excluded category is individuals aged 36-45.
Education	Education level attained from each individual. There are five levels of education: illiteracy, elementary (including primary education and gymnasium), lyceum, college, university (all levels of university graduates). In regression equations, the excluded category is elementary education.
Public	Dummy variable indicating if individual works in the public sector.
Urban	Dummy variable indicating if the individual lives in an urban area.
Married	Dummy variable indicating if the individual is married.
Children	Dummy variable indicating if the individual has at least one child.
Province	Province in which each individual lives.

APPENDIX B: AUXILIARY REGRESSION RESULTS

Table B1: Estimation of Equation (1) using SUR estimator

	1985	1991	1997	2003
Father Wage	0.249***	0.212***	0.146***	0.241***
	(0.042)	(0.061)	(0.048)	(0.044)
Child Age	0.327***	0.349***	0.530***	0.181**
	(0.074)	(0.119)	(0.078)	(0.083)
$(\text{Child Age})^2$	-0.005***	-0.006***	-0.009***	-0.003*
	(0.001)	(0.002)	(0.002)	(0.002)
Father Age	-0.020	-0.048	-0.190***	0.117
	(0.073)	(0.116)	(0.0738)	(0.121)
$(\text{Father Age})^2$	0.000	0.001	0.002***	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Constant	-1.021	-0.031	2.316	-2.081
	(1.718)	(2.770)	(1.920)	(2.909)
Observations	356	194	224	258

Notes: (1) Dependent Variable is child's log wage. (2) Standard errors in parentheses, p-values in brackets: *** p<0.01, ** p<0.05, * p<0.1

APPENDIX C: QUANTILE REGRESSION APPROACH TO INTERGENERATIONAL INCOME MOBILITY

The decompositions until now have relied on the Ordinary Least Squares (OLS) estimator, which examines how parents' income is related to children income, at the mean of the distribution. It is possible that the relationship between the two generations income change across the children income distribution. By contrast, quantile regression examines the relation between the depended variable and the covariates at various points of the distribution (see Koenker and Bassett (1978)). Thus, it is possible to estimate the relation of the two generations income at the bottom of the children ln wage distribution (e.g., at the fifth percentile), at the median, and at the top of the distribution (e.g., at the ninety-fifth percentile). Based on Equation 2 the following equation is defined:

$$w_{it}^{c} = \beta w_{it}^{f} + \gamma X + \varepsilon_{it} \tag{3}$$

where *i* refers to each household, w^c is the ln children wage, w^f is the ln parent wage and *X* is a vector which contains children age and age square, parent age and age square and a constant term, and ε is the residual term. The quantile regression coefficients can be estimated as the solution to:

$$\min_{(\beta(\theta),\gamma(\theta))} \left\{ \sum_{i:w_{it}^{c} \geq \beta w_{it}^{f} + \gamma X} \theta \left| w_{it}^{c} - \beta w_{it}^{f} - \gamma X \right| + \sum_{i:w_{it}^{c} < \beta w_{it}^{f} + \gamma X} (1-\theta) \left| w_{it}^{c} - \beta w_{it}^{f} - \gamma X \right| \right\}$$

The coefficient β captures the intergenerational income mobility. This difference is obtained for each of the three survey years and at different points θ of the wage distribution.

The results from the estimation of Equation 3 for the 5th, 25th, 50th, 75th and 90th quantile are presented in Table C1. The effect of father's earnings on son earnings is greater at the bottom of the distribution than in the top for the last three years of the survey. This indicates that individuals at the bottom of the distribution are less likely to improve their income status compared to individuals at the middle or the top end of the distribution. The distribution of the intergenerational income mobility coefficient has compressed from 1985 to 2003, as shown in Figure C1. The maximum value of the coefficient is 0.45 in the 45th percentile and the minimum value was 0.12 at the 5th percentile. The values of the coefficient where lower at the bottom and the top end of the distribution compared to the middle of the distribution. In 2003, the distribution of β was more compact. The maximum value was 0.35 in the 5th percentile and the minimum value was 0.14 in the 60th percentile. In 2003 the distribution of the

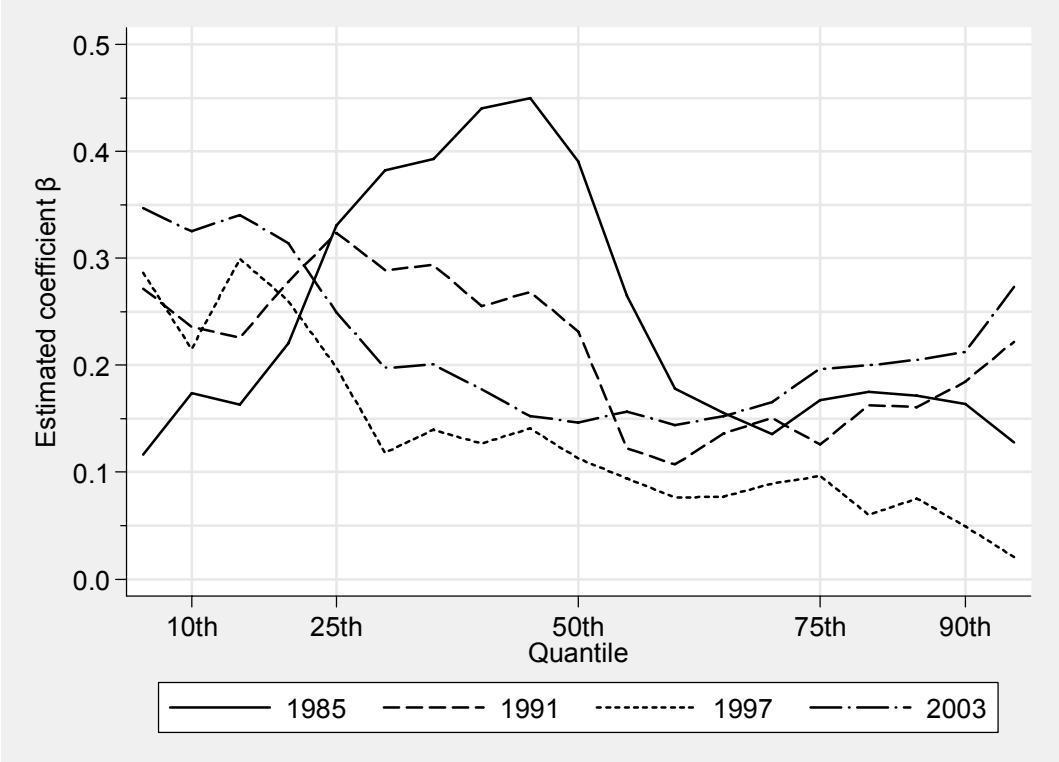
intergenerational income mobility index follows a reversed U-shape, i.e children with very low or very high income are more likely to belong to the same income category of their parents.

Table C1: Quantile Regression Estimation of Coefficient β

Year	OLS	Quantile						
		0.05	0.10	0.25	0.50	0.75	0.90	0.95
1985	0.249***	0.117**	0.174***	0.331***	0.391***	0.167***	0.164***	0.128**
	(0.040)	(0.54)	(0.045)	(0.092)	(0.081)	(0.039)	(0.041)	(0.051)
1991	0.212***	0.272*	0.236**	0.324***	0.231**	0.126**	0.185***	0.222***
	(0.056)	(0.162)	(0.107)	(0.111)	(0.092)	(0.55)	(0.058)	(0.079)
1997	0.146***	0.287**	0.215**	0.198*	0.113*	0.096**	0.049	0.021
	(0.048)	(0.112)	(0.094)	(0.101)	(0.061)	(0.048)	(0.051)	(0.062)
2003	0.241***	0.347***	0.325***	0.249**	0.147***	0.197***	0.212***	0.273**
	(0.043)	(0.132)	(0.069)	(0.101)	(0.040)	(0.047)	(0.081)	(0.135)

Note: In parenthesis the standard errors for quantile regression are reported (100 replications). The standard errors for the OLS estimation are heteroskedasticity robust. In all regressions is included a constant term, children age and age squared and parents age and age squared.

Figure C1: Quantile Regression Estimation of Coefficient β



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