

## Trends and disparities in economic inequality in Cyprus and the EU

Andros Kourtellos<sup>a,\*</sup> and Kyriakos Petrou<sup>b</sup>

<sup>a</sup>*Department of Economics, University of Cyprus*

<sup>b</sup>*Cyprus International Institute of Management*

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### Abstract

The goal of this paper is to examine the recent trends and disparities in economic inequalities for Cyprus and draw comparisons with the other EU countries for the period 1995-2016. We provide new estimates of intergenerational mobility of education, study the relationship between mobility and income inequality, and investigate trends and inequalities in a range of macro-level and micro-level indicators. Our findings show that Cyprus is characterized by a relatively high degree of educational intergenerational persistence and moderate levels of income inequality. Recent trends in income inequality show a spike in top income inequality due to the recent economic crisis. We also find that Cyprus follows similar patterns as the EU average but generally lags behind the Nordic countries, especially for social protection benefits and educational outcomes. Finally, our findings show that the relative female labor force participation in Cyprus is similar to the EU average with small negative deviations from the average value for men's returns to skills and moderate positive deviations for assortative mating. Notably, Cyprus enjoys the second smallest percentage of single-headed households in the EU.

**Keywords:** Intergenerational Mobility, Education, Inequality.

### 1. Introduction

There has been a heated debate in the recent literature about rising economic inequality in many economies in the world. These recent trends appear to contradict the early work of Kuznets (1955) who hypothesized an inverted U-shape between inequality and the process of development. This hypothesis states that poor countries at the early stages of development experience a rising inequality while rich and more developed countries enjoy a declining inequality. A recent notable work by Piketty et al. (2018) employ surveys, tax records, and national accounts to estimate the distribution of national income in the United States since 1913 and show that the pre-tax income inequality in the US has increased substantially in the last 40 years, especially at the top of the distribution. Following a similar methodology, Blanchet et al. (2019) investigate the rising trends in 38 European countries from 1980 to 2017. They document that although income inequalities in Europe are substantially lower, both before and after taxes and transfers than the US, inequalities have increased in almost all European countries, both at the top and at the bottom of the distribution, especially

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\* Corresponding Author Address: Department of Economics, University of Cyprus, P. O. Box 20537 1678 Nicosia, Cyprus. Email: [andros@ucy.ac.cy](mailto:andros@ucy.ac.cy)

between 1980 and 2000. In Cyprus, there have been concerns about the unequal adverse effect of the recent economic crisis and the strict austerity program on the poorer and more disadvantaged people.<sup>1</sup>

In this study, we investigate the recent trends and disparities in economic inequalities for Cyprus and draw comparisons with the other EU countries for the period 1995-2016. Our contribution is three-fold. First, we provide new estimates of intergenerational mobility of education using the European Social Survey (ESS) database, that allow us to study the relationship between mobility and both market inequality (based on pre-tax and pre-transfer income) and net inequality (based on post-tax and post-transfer income). This relationship is known as the Great Gatsby Curve due to Krueger (2012) and Corak (2013) who produced evidence that higher levels of inequality are positively correlated with higher degrees of intergenerational persistence. More recently, Durlauf and Seshadri (2018) argue that this curve is an equilibrium phenomenon with the causality running from inequality to immobility. This is important because the presence of cross-sectional inequality in Europe might have long-run implications beyond the current generation.

Second, we examine trends and inequalities in economic growth and some of its proximate sources including the level of development, redistribution, education, and health. Income inequality can affect economic growth either positively or negatively through various mechanisms. On the one hand, inequality can be growth-promoting through a savings or investment mechanism (Kaldor (1957)). The idea is that an unequal distribution of incomes can provide incentives for savings or investment if rich people save more which will be beneficial for growth. Inequality can also promote growth by providing incentives for innovation and entrepreneurship (Lazear and Rosen (1981)). On the other hand, inequality can have harmful effects for growth if borrowing constraints prevent people to invest in human and physical capital (e.g., Galor and Moav (1981)). Unequal societies are also likely to lead to social and political instability creating uncertainty that reduces investment and curbs growth (e.g., Alesina and Perroti (1996)). The political instability can also be the result of extreme levels of inequality that emerge when the returns on capital exceed the economic growth rate (Piketty (2015)).

High inequality can also have adverse consequences for growth when it generates demand for fiscal redistribution that leads to distortionary effects since it is financed through taxation (e.g., Persson and Tabellini (1996)). Of course, redistribution can also have direct adverse effects on growth when higher taxes and transfers distort incentives to work and invest. However, when progressive taxation is used to finance public investment or health and education expenditures that target poor and disadvantaged people redistribution can reduce inequality and increase growth (e.g., Saint-Paul and Verdier (1996)).

Income inequality is also closely related to inequalities in education and health. Education plays a key role in the equality of opportunity as it provides free access to schooling to all people and reduces the impact of socioeconomic circumstances. For this reason, education is viewed as the great equalizer of the conditions of people. Higher levels of educational attainment lead to higher productivity, higher wages, and more employment opportunities. There is also a growing literature that focuses on the dynamics of skill formation that demonstrates the importance of parental investments,

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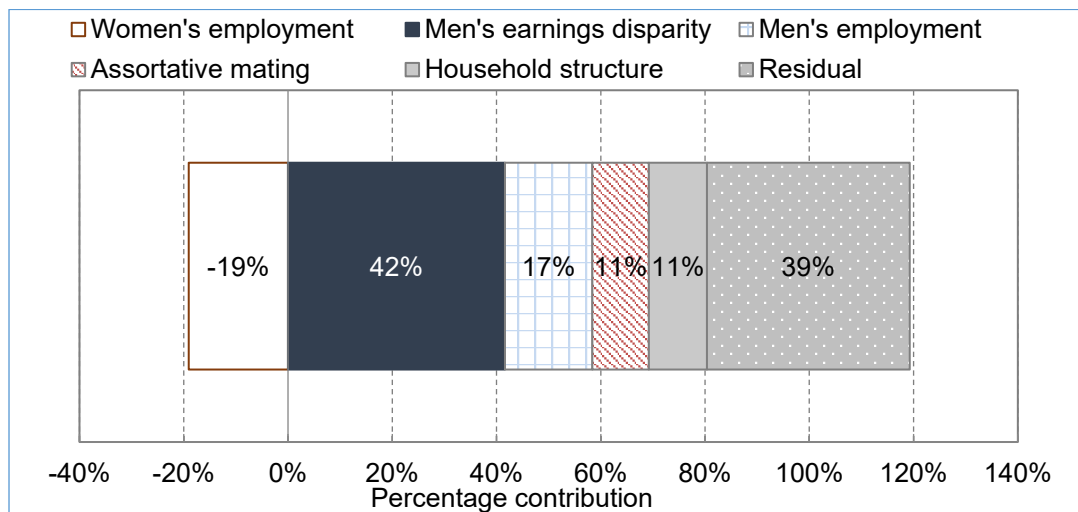
<sup>1</sup>Koutsampelas and Polycarpou (2013) provide an early assessment of the potential distributional consequences of the economic crisis in Cyprus using a microsimulation approach.

social environments, schools, and other environmental factors in producing cognitive and noncognitive (personality) skills. One important finding of this literature is that the gaps in skills open up early in life and persist. Heckman and Mosso (2014) provide a summary of empirical evidence that provides supports to the theory of evolution of skills. Additionally, education can causally affect health as early cognitive and non-cognitive skills determine health behaviors and in turn, labor market outcomes (e.g., Conti et al. (2011)). Health inequalities might also reflect disparities in utero environments as emphasized by the “fetal programming” hypothesis (e.g., Gluckman and Hanson (2006)).

Our final contribution examines disparities among the EU countries in micro-level factors that provide the major explanations of household earnings inequality. The typical factors include men’s earnings disparity (e.g., Daly and Valletta (2006)), assortative mating (e.g., Greenwood (2014)), household structure (e.g., Burtless (1999)), and men’s vis-a-vis women’s employment (e.g., Del Boca and Pasqual (2003), Harkness (2013)). A well-cited 2011 OECD report “Divided we Stand: Why Inequality Keeps Rising” provided a decomposition of the changes household earnings distribution from the mid-1980s to the mid-2000s. Their findings suggest that the increase in men’s earnings disparity was the main source of household earnings inequality with a contribution of 42%. The other factors had a much smaller impact. Changes in men’s employment accounted for 17% and changes assortative mating and household structure accounted for 11% each of the total contribution of all factors. Notably, women’s employment contributes negatively with 19% of the total change in the household earnings inequality. The residual inequality was computed to be 39% suggesting the important role of unobservable factors in determining earnings inequality.

FIGURE 1

*Percentage contributions to changes in household earnings inequality, OECD average, mid-1980s to mid-2000s*



Source: OECD (2011)

The paper is structured as follows. Section 2 discusses the findings of intergenerational mobility and inequality. Section 3 presents the evidence on trends and disparities on economic growth, level of development, redistribution, education, and health. Section

4 shows the findings on the major sources of changes in household earnings inequality and Section 5 provides a discussion and concludes.

## 2. Intergenerational Mobility and Inequality

### 2.1 Intergenerational persistence of education

Intergenerational mobility measures the degree of fluidity between the parental socio-economic status and offspring's socio-economics status as adults. The standard empirical approach in the literature focuses on intergenerational elasticity of income (IGE) using a linear regression model of a child's permanent income on parent's permanent income (e.g., Solon (1992)). Beyond income, the literature has studied other dimensions of intergenerational persistence including occupational status (e.g., Blau and Duncan (1967)), social class (e.g., Erikson and Goldthorpe (1992)), and education (e.g., Van de Werfhorst (2000)).

Given that individual income data are generally not available and comparable across EU countries, we focus on education using a linear regression model between the child's completed education ( $educ_{it}^C$ ) and parental education ( $educ_{it}^P$ ):

$$educ_{it}^C = \alpha + \beta educ_{it}^P + \gamma_t + \varepsilon_{it},$$

where  $\beta$  captures the degree of intergenerational persistence of education, that is the intergenerational immobility of education. When  $\beta$  is close to zero, parents' education is a weaker predictor of a child's education implying greater mobility. In contrast, when  $\beta$  is close to one, the child's educational attainment is more dependent on parental education.  $\alpha$  is an intercept,  $\gamma_t$  denotes time fixed effects, and  $\varepsilon_{it}$  is a stochastic error.

We estimate the above model using 7 waves of cross-sectional data from the European Social Survey.<sup>2</sup> We keep individuals between 25 and 64 years old, who have completed their education. Education level is measured based on the 1997 International Standard Classification of Education (ISCED) with five categories: pre-primary and primary education (ISCED1), lower secondary education (ISCED2), upper secondary education (ISCED3), post-secondary non-tertiary education (ISCED4), and tertiary education (ISCED5).<sup>3</sup>

Table 1 and Figure 2 present the estimates of intergenerational persistence for the European countries. Cyprus is slightly above the EU average with a point estimate of about 0.60 and a 95% confidence interval between 0.56 and 0.65. Generally consistent with the findings on intergenerational mobility of education (e.g., Blanden (2013)), we find that southern European countries, such as Portugal, Spain, and Italy, exhibit higher degrees of intergenerational persistence while Nordic countries, such as Sweden, Denmark, and Finland, have lower persistence.

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<sup>2</sup> For each country the number of waves is different. For more information, see [www.europeansocialsurvey.org/data](http://www.europeansocialsurvey.org/data)

<sup>3</sup> For robustness reasons we also estimate intergenerational persistence using both father and mother education separately and using the 2011 ISCED classification of education with similar results. Results are available upon request.

TABLE 1

*Intergenerational Mobility. Least-squares regressions based on the equation presented in Section 2.1, using robust standard errors (s.e)*

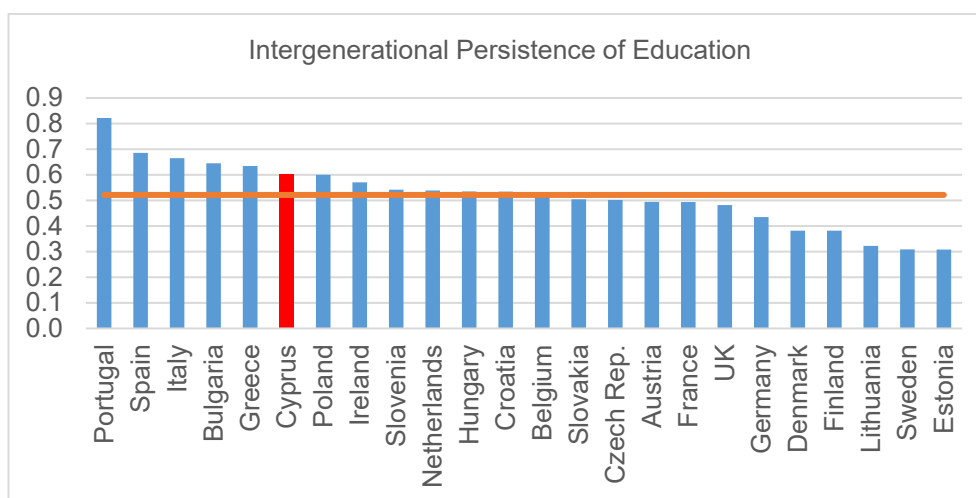
<b>Country</b>	$\hat{\beta}$	<b>s.e</b>
<b>Austria</b>	0.494	0.015***
<b>Belgium</b>	0.523	0.010***
<b>Bulgaria</b>	0.645	0.012***
<b>Croatia</b>	0.534	0.022***
<b>Cyprus</b>	0.604	0.021***
<b>Czech Republic</b>	0.502	0.012***
<b>Denmark</b>	0.382	0.012***
<b>Estonia</b>	0.308	0.011***
<b>Finland</b>	0.382	0.010***
<b>France</b>	0.494	0.011***
<b>Germany</b>	0.435	0.010***
<b>Greece</b>	0.634	0.017***
<b>Hungary</b>	0.535	0.012***
<b>Ireland</b>	0.571	0.011***
<b>Italy</b>	0.665	0.023***
<b>Lithuania</b>	0.323	0.014***
<b>Netherlands</b>	0.538	0.012***
<b>Poland</b>	0.600	0.012***
<b>Portugal</b>	0.822	0.019***
<b>Slovakia</b>	0.504	0.014***
<b>Slovenia</b>	0.542	0.014***
<b>Spain</b>	0.685	0.015***
<b>Sweden</b>	0.309	0.011***
<b>United Kingdom</b>	0.482	0.012***

*Note:* \*\*\* denotes significance at 1%.

*Source:* The European Social Survey

FIGURE 2

*Intergenerational persistence of Education across the European Union.*



Note: The orange line represents the European average.

Source: the European Social Survey

## 2.2 Income inequality

In this section, we summarize the state of income inequality in Cyprus for the years 1995 to 2016 and comparing it with Denmark and the European Union (EU) as a whole.<sup>4</sup> We choose to benchmark our analysis against Denmark because it is perceived as an exemplar of a welfare state. Denmark has one of the highest GDP per capita, the lowest income inequality after taxes and transfers, and the highest social protection expenditure.

We measure income inequality using four indicators: the Gini index, the top 1% and the top 10% national income shares, and the share of people at risk of poverty or social exclusion (AROPE). For the first three indicators, we show results for two types of income inequality: market (pre-tax and pre-transfer household income) and net (post-tax and post-transfer household income).

The Gini index or coefficient is the typical measure of income inequality and is based on the comparison of values of the frequency distribution of household income. A zero value of the Gini coefficient indicates perfect equality while a Gini coefficient of 100% implies maximal inequality. These variables are drawn from the Standardized World Income Inequality Database (SWID) by Solt (2016) who uses a systematic method to address the non-comparability of the various surveys that underlie the cross-country income data. The top 1% and top 10% of income shares have attracted a lot of discussions recently since the work of Piketty (2015) and measure the corresponding income shares held by a given percentile group.<sup>5</sup> These variables are obtained from the World Inequality Database.<sup>6</sup>

<sup>4</sup> Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, UK.

<sup>5</sup> The population is comprised of individuals over age 20 and the base unit is the individual rather than the household.

<sup>6</sup> For more information, <https://wid.world/>.

AROPE is one of the key objective of the Europe 2020 strategy. It is computed as the percentage of persons with an equivalized disposable income lower than 60% of the national median (based on the equivalized disposable income after social transfers) and those living in a household with a very low work intensity (the members of the household work less than 20% of their total potential for one year). This variable is drawn from Eurostat.

Figure 3 presents the t-plots for Cyprus, Denmark, and EU.<sup>7</sup> The figures on the left panel correspond to the market inequality and those on the right refer to the net inequality. On average between 1995 and 2016, Cyprus is ranked 15<sup>th</sup> with about 30% in terms of net Gini inequality while Denmark is ranked first with about 22%. In general, with the exception for the top 1% inequality, the time-series of Cyprus lies just above the corresponding EU average while Denmark's time-series is well below for most of the period. In the case of the top 1%, income inequality Cyprus hovers around the EU average and Denmark until 2010 when the series of Cyprus exhibits a temporary upward spike as a result of the economic crisis.

In the case of market Gini inequality, we observe an upward trend for all countries, between 1995 and 2016. Interestingly, the time-series of Denmark exhibits an upward change in trend in 2007 that results in convergence with the series of the EU average and Cyprus.

For net Gini inequality, the top 1%, the top 10%, and AROPE the t-plots demonstrate a constant behavior on average for all three series with two important differences. First, for both the top 1% and the top 10% inequalities, we observe that Cyprus has an upward trend from about 2005, especially for market inequality, which was further exacerbated by the spike during the economic crisis. This upward trend is also present in AROPE starting in 2012. Second, we observe an upward trend in net Gini inequality for Denmark for the whole period and a modest spike (as compared to that of Cyprus) in net top 1% and 10% inequalities from about 2010.

FIGURE 3

*Trends in inequality for Cyprus, Denmark, and the European Union average*

FIGURE 3A

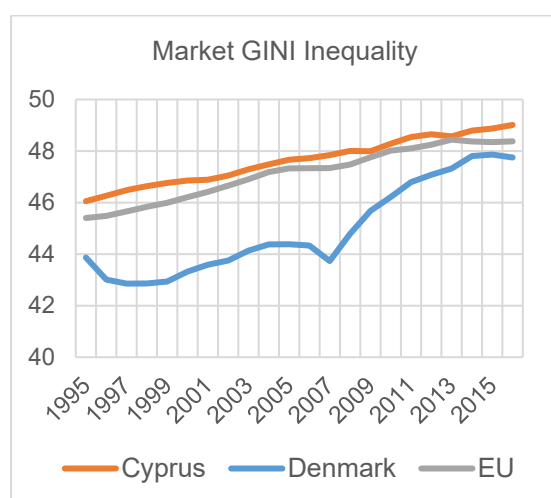
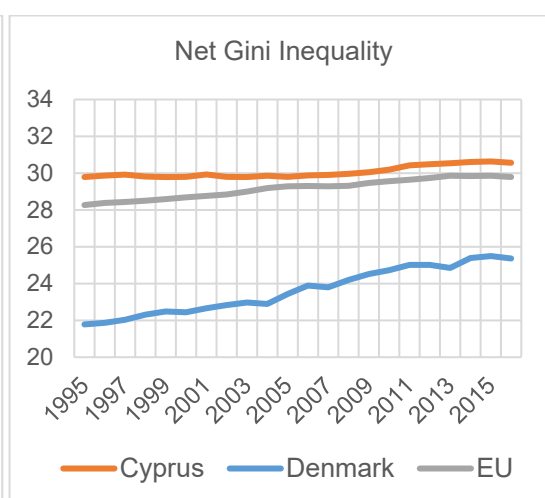


FIGURE 3B



<sup>7</sup> While our analysis is based on t-plots and bar charts, we only present the former for brevity.

FIGURE 3C

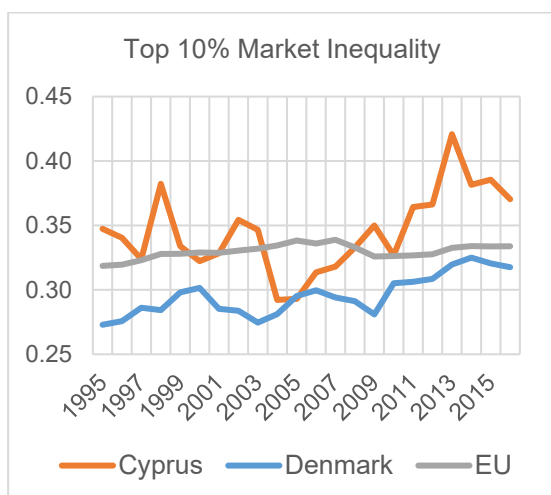


FIGURE 3D

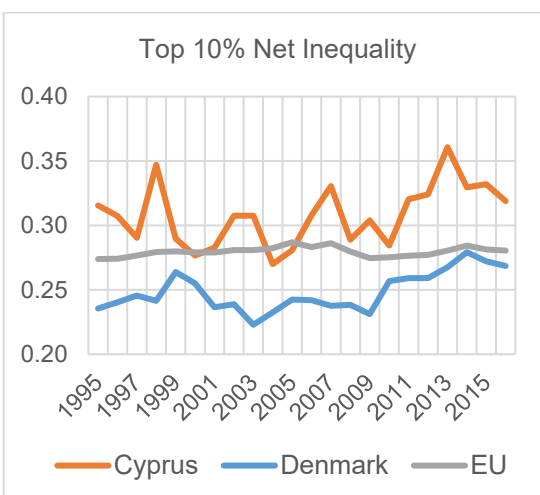


FIGURE 3E

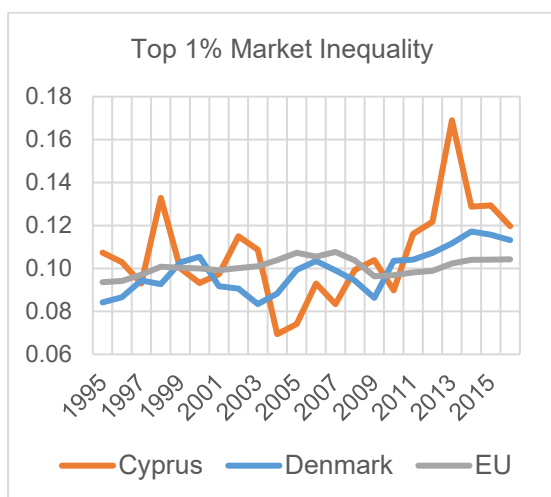


FIGURE 3F

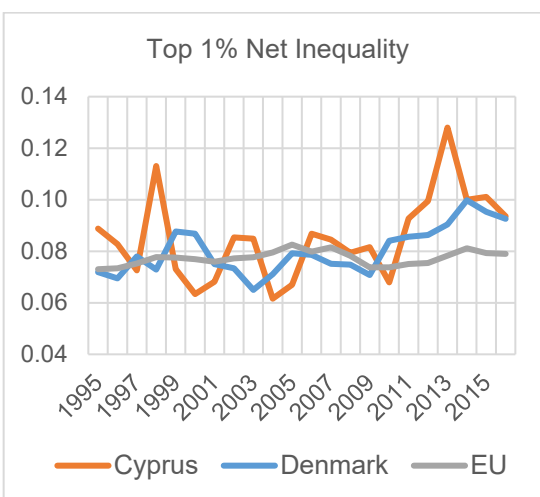
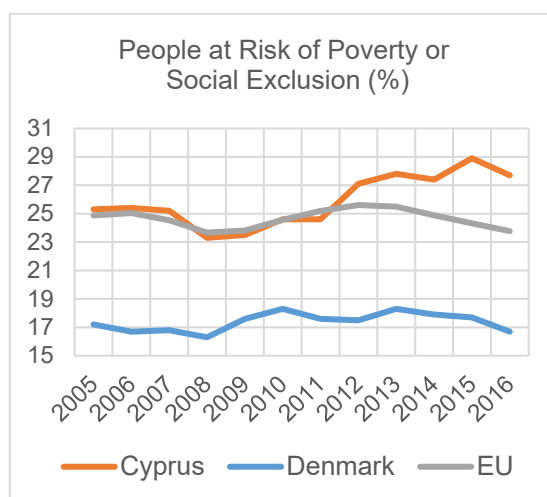


FIGURE 3G



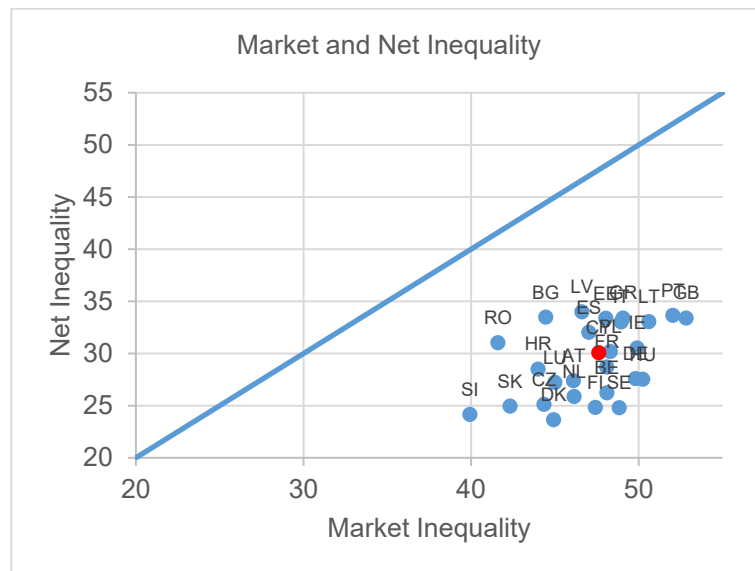
Sources: The Standardized World Income Inequality Database, the World Inequality Database, and Eurostat



Figure 4 shows the relationship between the net and market inequality. We see that all countries lie below the 45-degree line implying some degree of redistribution. Cyprus appears to be in the center of the cluster of the EU countries while Nordic countries such as Denmark appear to have a large distance from the line implying higher levels of redistribution.

FIGURE 4

*The relationship between market and net inequality*



Source: The Standardized World Income Inequality Database

### 2.3 The Great Gatsby Curve

Here, we study the Great Gatsby Curve via scatter plots that relate intergenerational persistence and inequality, both market and net. Figure 5 presents the corresponding scatter plots with the least-squares (LS) fitted line. We find that a lack of relationship between immobility and market inequality. However, the slope of the LS line becomes positive and significant when we use the post-tax and post-transfer Gini coefficient. Notably, Cyprus is above the LS fitted line for both cases implying that the observed immobility in Cyprus is higher than the predicted average value. In contrast, the Nordic and Baltic countries exhibit the reverse behavior with lower observed immobility than the predicted average value.

FIGURE 5

The relationship between inequality and intergenerational persistence - Gatsby Curve

FIGURE 5A

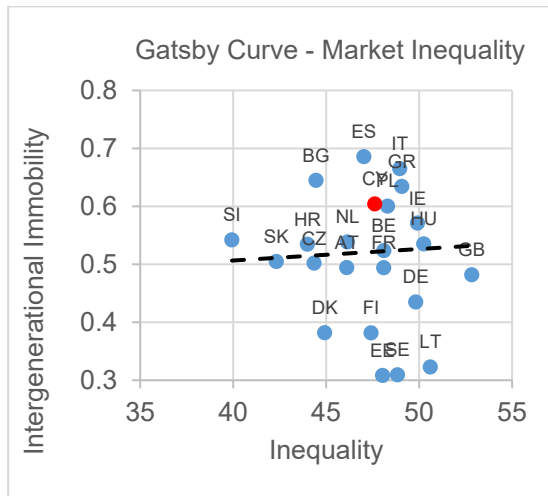
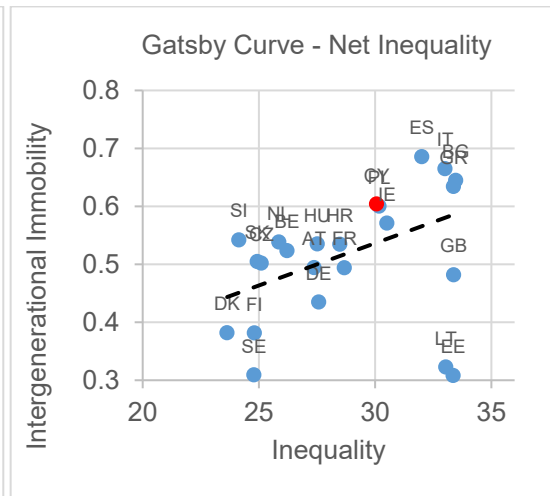


FIGURE 5B



Sources: The European Social Survey, and the Standardized World Income Inequality Database

### 3. Macro-level disparities

#### 3.1 Economic growth

We start our analysis of macroeconomic disparities by examining the level and the growth rate of the GDP per capita; both drawn from Eurostat. Denmark has the highest average GDP per capita for the period 1995-2016 with €43,000 while Cyprus is just below the EU average with about €21,500 in 2010 prices. Also, both Cyprus and Denmark, like the other advanced economies such as Germany, France, and Belgium, have exhibited average growth rates well below the EU average.

Figure 6 presents the t-plots of the two variables. Figure 6A shows that the trend of the GDP per capita appears to be similar for Cyprus, Denmark, and the EU average apart for the years 2010 to 2016. In particular, the trend for Cyprus appears to break in 2011 downwardly due to the lag effect of the global financial crisis following the collapse of the Lehman Brothers (September 2008) and the various events that lead to the 2013-2016 Cyprus economic crisis (e.g., Michaelides (2014)). This structural break is also documented in Figure 6B which presents the corresponding growth rates series. The cycles of the three series appear to be mostly synchronized except for the period after the global financial crisis that resulted in negative growth rates during 2008-2009. Specifically, while the growth rates of the EU average and Denmark turned positive by 2010, Cyprus continued to exhibit negative growth rates until 2015.

In sum, we find that Cyprus is an economy that stands at about the EU average in terms of the level of development and shares similar growth with Denmark and other advanced EU countries for most of the last 20 years. However, the recent economic crisis that hit the Cyprus economy in 2011 has resulted in persistent adverse macroeconomic conditions until the end of the period examined in this study.

FIGURE 6

Trends in the level and the growth rate of the GDP per capita for Cyprus, Denmark, and the European Union average

FIGURE 6A

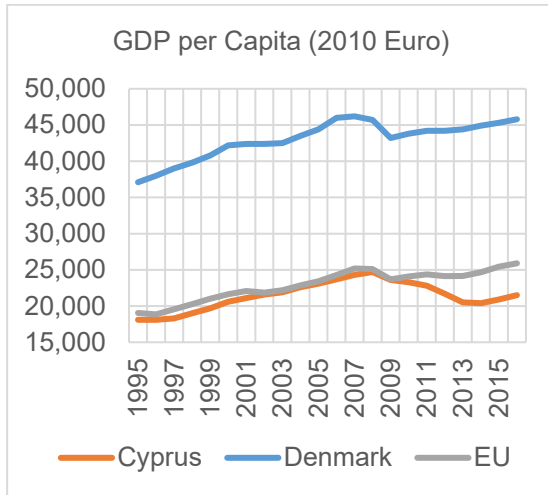
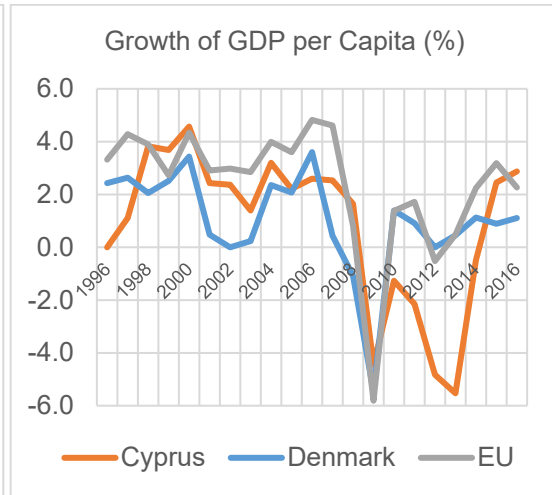


FIGURE 6B



Source: Eurostat

Next, in Figure 7 we describe the relationship between GDP per capita and growth with both market and net inequality. We find an inverted-U relationship between both forms of inequality and the level of development consistent with the Kuznet's hypothesis. There is a positive relationship for the relatively poor EU countries and a negative for the richer ones. In the case of growth, we identify two clusters of countries that exhibit different behavior. Countries that enjoy lower growth rates exhibit a negative relationship between inequality and growth while countries with higher growth rates such as the ex-Soviet Union countries show a positive relationship.

FIGURE 7

The relationship between inequality and the level and the growth rate of the GDP per capita

FIGURE 7A

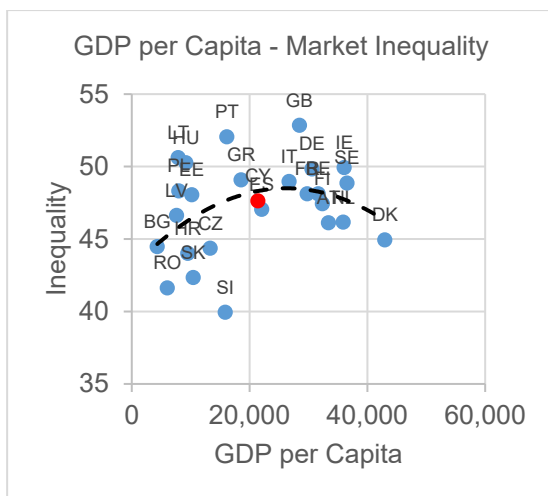


FIGURE 7B

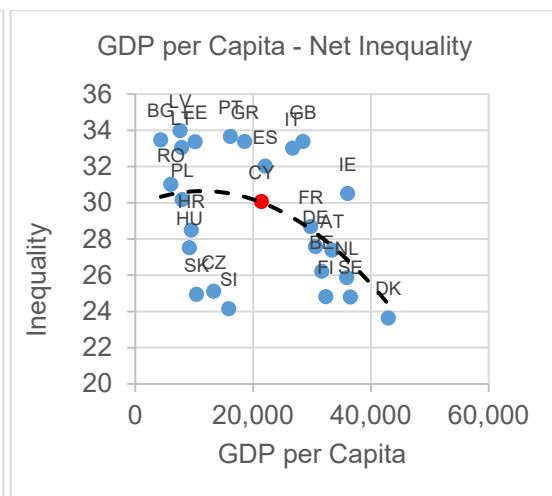


FIGURE 7C

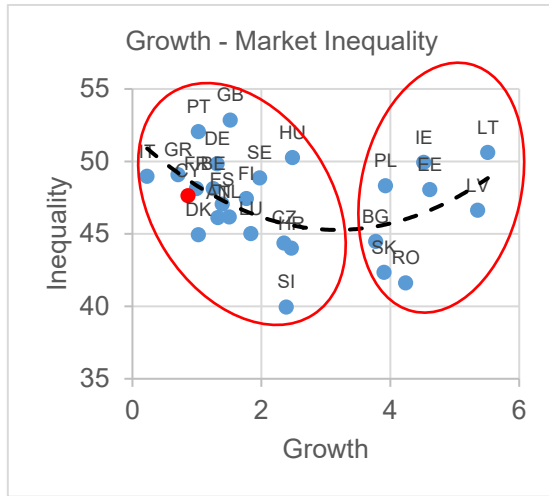
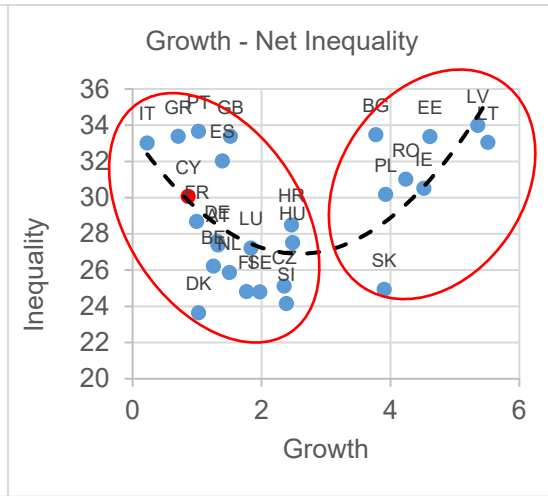


FIGURE 7D



Sources: The Standardized World Income Inequality Database, and Eurostat

### 3.2 Redistribution

Next, we examine redistribution using absolute redistribution and government social protection benefits as a percentage of GDP.

The data for absolute redistribution are drawn from Solt (2016) and is calculated as the difference between the market and the net income inequality indices. This variable is a measure of the efficiency of the various government policies (tax and transfers) which aim at lowering income inequalities. A zero value indicates that market and net inequality are the same. Higher values of absolute redistribution imply more efficient redistributive policies. Social protection benefits capture government interventions to relieve households and individuals from risks or needs, including unemployment, social exclusion, old age, invalidity and disability, sickness, etc. This variable is drawn from Eurostat.

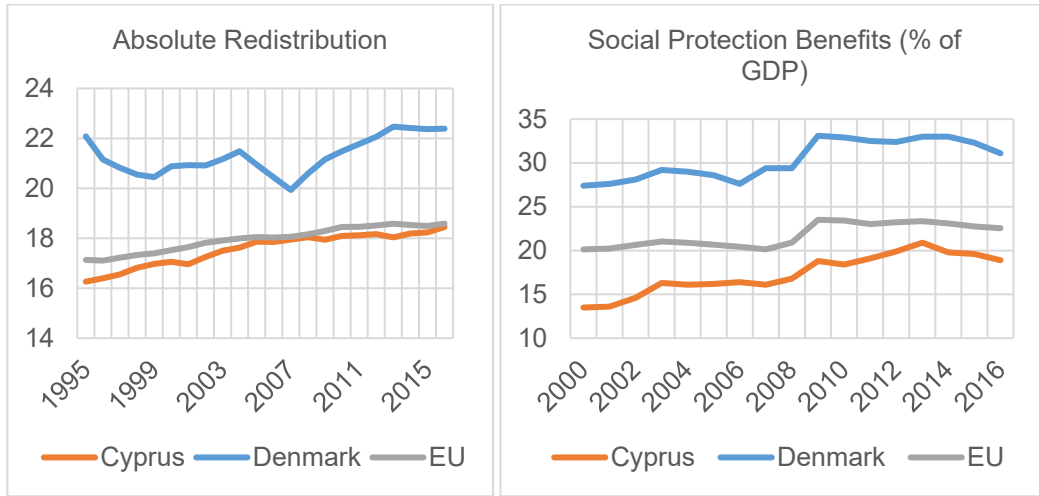
Figure 8 presents the t-plot of absolute redistribution and social protection benefits for Cyprus, Denmark, and EU. In terms of absolute redistribution, Denmark is on average among the leading countries while Cyprus is just below the EU average. Likewise, Denmark had the highest social protection benefits as a percentage of GDP for the period 2000-2016 with about 27.5%, Cyprus ranked 22<sup>th</sup> with 13.5%, while the EU average was about 20%. In particular, for both the series, Denmark is always above Cyprus and the EU average for the entire period. In the case of absolute redistribution, we observe a similar upward trending pattern for Cyprus and the EU average. In contrast, Denmark exhibits a relatively constant trajectory from 1995 to 2004, followed by a temporary decline until 2007, and a rapid increase afterward. In the case of social protection benefits, while all three time-series do not exhibit any trending behavior, there is a modest shift in their means at about 2008.

FIGURE 8

Trends in redistribution for Cyprus, Denmark, and the European Union average

FIGURE 8A

FIGURE 8B



Sources: The Standardized World Income Inequality Database, and Eurostat

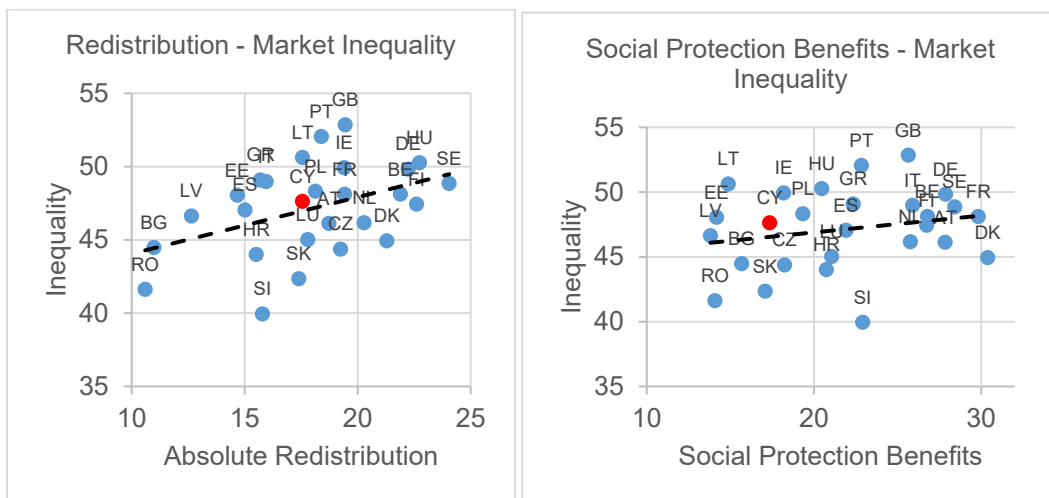
Finally, Figure 9 presents the scatter plots of absolute redistribution and social protection benefits against market inequality for the average values of the period 1995-2016. As expected there is a positive and statistically significant relationship between absolute redistribution and market inequality and a weak positive and not statistically significant relationship between social protection benefits and market inequality. According to Meltzer and Richard (1981) higher levels of market inequality create pressures for redistribution leading the median voter to demand more redistribution. Interestingly, Cyprus lies on the least-squares line which suggests that the relationship between redistribution and market inequality is adequately captured by the least-squares line.

FIGURE 9

The relationship between inequality and redistribution

FIGURE 9A

FIGURE 9B



Sources: The Standardized World Income Inequality Database, and Eurostat

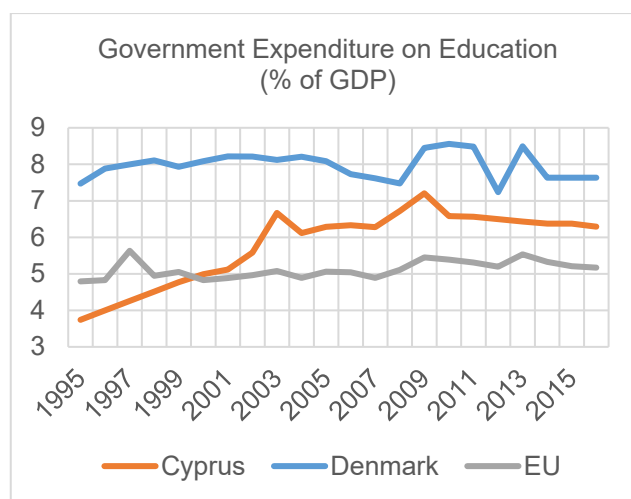
### 3.3 Education

We measure education using the following four indicators: the share of government expenditure on education in GDP and the shares of underachieving 15-year old students in mathematics, reading, and science. The former is drawn from the World Bank while the latter three are drawn from the Program for International Student Assessment (PISA). PISA is a triennial international survey conducted to test the skills and knowledge of 15-year-old students and provides cross-country comparable measures for secondary education quality. The three PISA indicators are calculated as the share of 15-year-old students that failed to reach the basic skills level on the three aforementioned core school subjects. Cyprus participated in 2012, 2015, and 2018 waves.<sup>8</sup>

On average for the period 1995-2016, Cyprus is ranked 5<sup>th</sup> in government expenditure on education with 5.8%, well above the EU average with 5.1% but below Denmark which ranks first with 8%. In particular, Figure 10 shows that the series of government expenditure on education of Denmark and the EU appear to be constant for the period 1995-2016. In contrast, the government expenditure on education of Cyprus shows an upward trend, for the period 1995-2003, which breaks to turn into a constant behavior thereafter.

FIGURE 10

*Trends in government expenditures on education (as a % of GDP) for Cyprus, Denmark, and the European Union average*



Source: The World Development Indicators

Figure 11 shows the average relationship of government expenditure on education with the market and net inequality. In the case of market inequality, the relationship is positive but insignificant and becomes negative and significant in the case of net inequality as a result of redistribution.

<sup>8</sup> Given that our analysis ends in 2016 we focus on the 2012 and 2015 waves.

FIGURE 11

The relationship between inequality and government expenditures on education  
(as a % of GDP)

FIGURE 11A

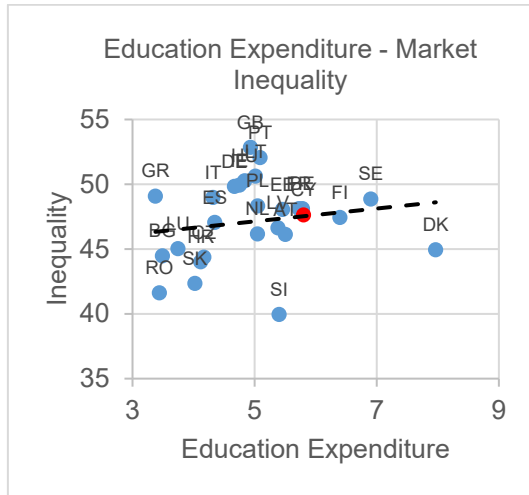
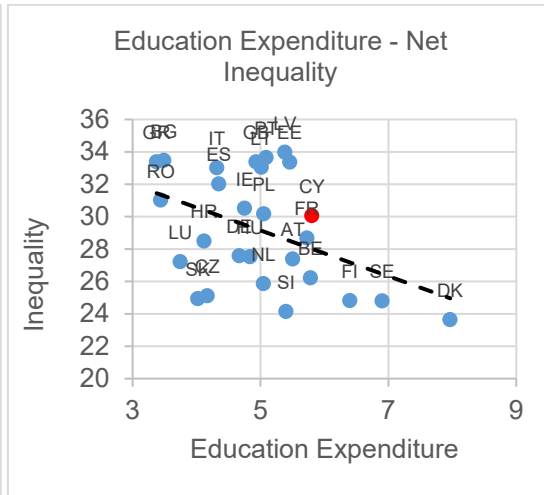


FIGURE 11B



Sources: The Standardized World Income Inequality Database, and the World Development Indicators

Figure 12 presents the results for the three PISA indicators, for all European countries, in math, reading, and science, respectively. The results are discouraging. In all subjects, Cyprus is among the top three countries (the other two are Bulgaria and Romania) with the highest failure percentage. For Math, the failure percentage is 42%, for Reading 34%, and for Science 40%, well above the European average. Denmark, on the other hand, is one of the best countries with the lowest percentage of failure, along with Finland and Estonia.

FIGURE 12

The shares of underachieving 15-year old students in mathematics, reading, and science across the European Union

FIGURE 12A

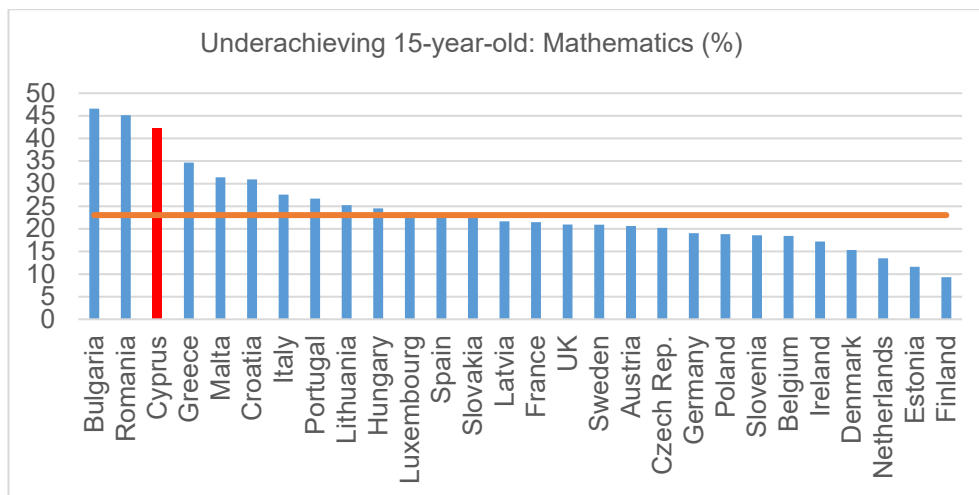


FIGURE 12B

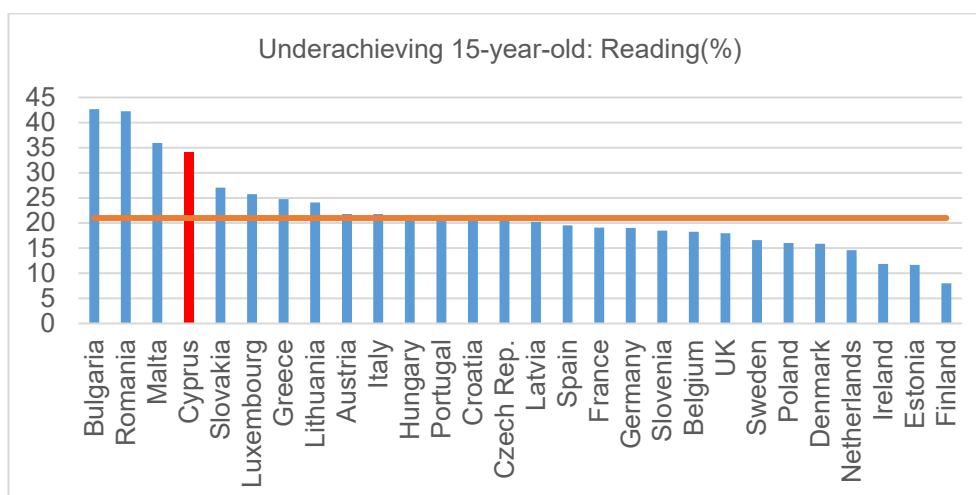
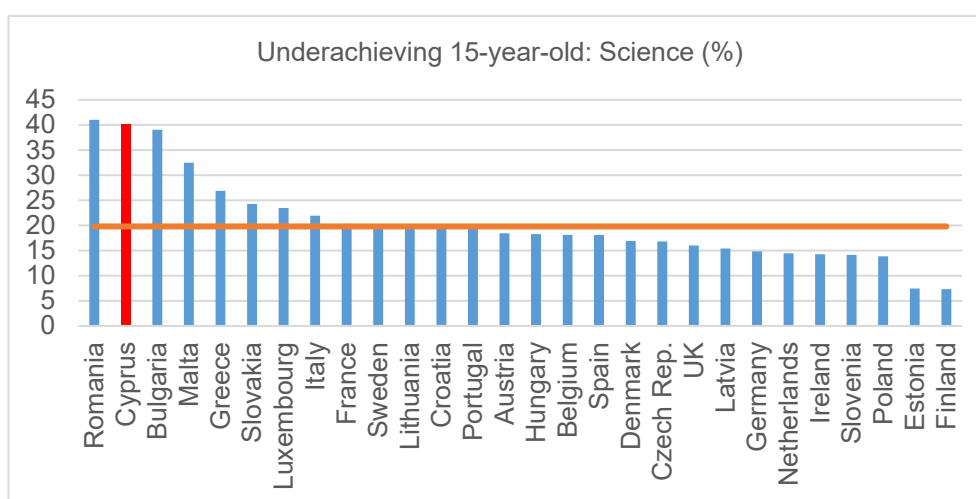


FIGURE 12C



Note: The orange line represents the European average  
 Source: The Program for International Student Assessment

### 3.4 Health

Next, we measure health quality using the following four indicators. Government health expenditure measures all health-related public expenditures and computed as a percentage of GDP, obtained from the World Bank. Life expectancy is defined as the mean number of years that a new-born child is expected to live given the current mortality conditions. Infant mortality rate is the ratio of the number of deaths of children under one year to the number of live births in that year, expressed per 1,000 live births. Finally, health care capacities are measured using the number of hospital beds per hundred thousand inhabitants, which are regularly maintained and staffed and immediately available for the care of admitted patients (both in public and in private hospitals). The latter three indicators are obtained from Eurostat.

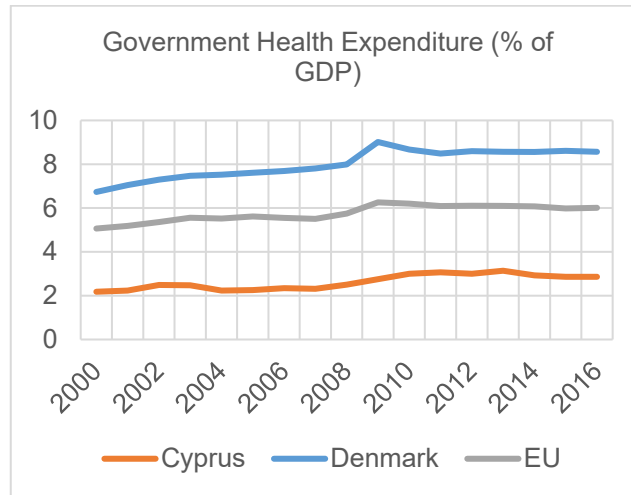
In terms of the average health expenditure, Cyprus is ranked last for the period 2000-2016 with 2%, well below the EU average of 5.1%, while Denmark is ranked 3<sup>rd</sup> with 6.7%. Figure 13 presents the three time-series for government health expenditure. All



three series exhibit a similar pattern with a moderate upward trend. This trend appears to break in about 2009 followed by constant behavior for the rest of the period.

FIGURE 13

*Trends in government health expenditure (as a % of GDP) for Cyprus, Denmark, and the European Union average.*



Source: The World Development Indicators

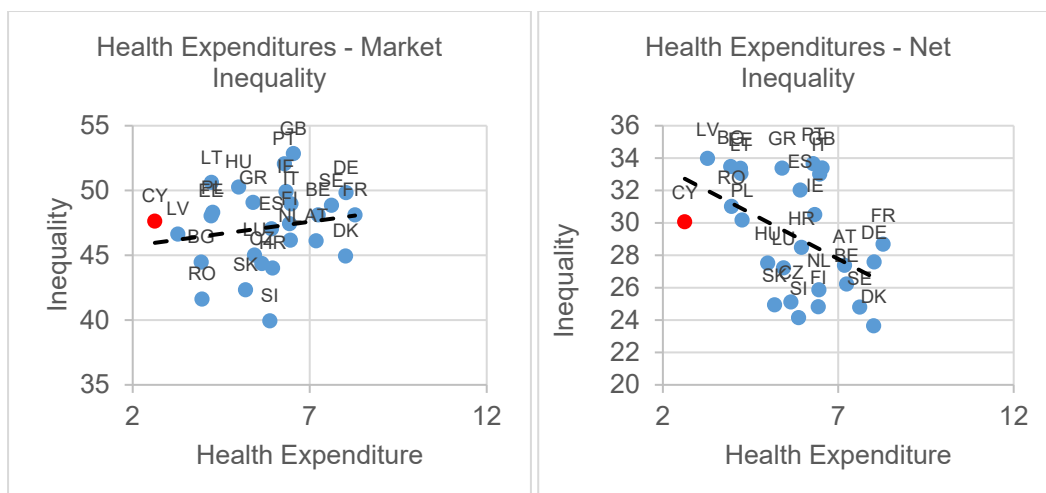
Figure 14 shows the scatter plot between the average relationship of health expenditure and inequality with similar patterns of correlations between market and net inequality as in the case of education. There is a weak positive relationship in the case of market inequality but becomes negative and statistically significant for net inequality. Notably, although Cyprus exhibits an average behavior in terms of inequality, it has the lowest health expenditure.

FIGURE 14

*The relationship between inequality and government health expenditure (as a % of GDP)*

FIGURE 14A

FIGURE 14B



Sources: The Standardized World Income Inequality Database, and the World Development Indicators

Remarkably, life expectancy has increased by 6 years on average for the period 1995-2016, for all European countries. Similar improvements appear in the infant mortality rate. For example, Cyprus had about 8.5 deaths for every 100,000 live births in 1995 while in 2016 this rate decreased to 2.6 while the corresponding rates for the EU average decreased from 8.8 in 1995 to 3.7 in 2016. These improvements are reflected in the t-plots of life expectancy and infant mortality rate shown in Figures 15A and 15B, respectively. On the one hand all three series of life expectancy exhibit an upward linear trend and on the other hand, infant mortality exhibit a decreasing linear trend. Importantly, the life expectancy of Cyprus is above Denmark and the EU average for the entire period.

Finally, the numbers of hospital beds per 100,000 inhabitants in Cyprus and Denmark are well below the EU average for the period 2005-2016. Cyprus has about 360 beds and Denmark has 325 beds while the EU average is 536. Interestingly, as shown in Figure 15C all three series of the numbers of hospital beds show a moderate downward linear trend.

FIGURE 15

*Trends in health quality indicators for Cyprus, Denmark, and the European Union average*

FIGURE 15A

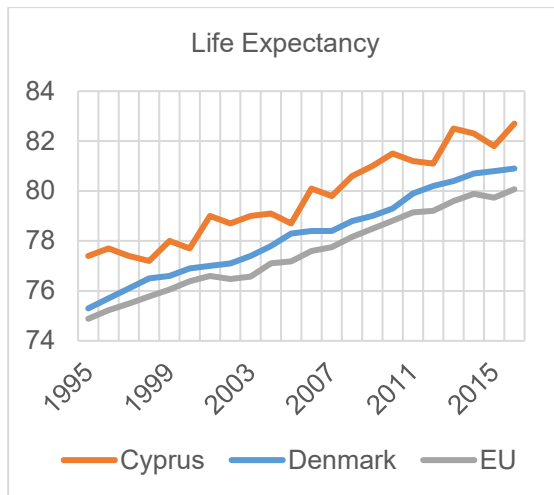


FIGURE 15B

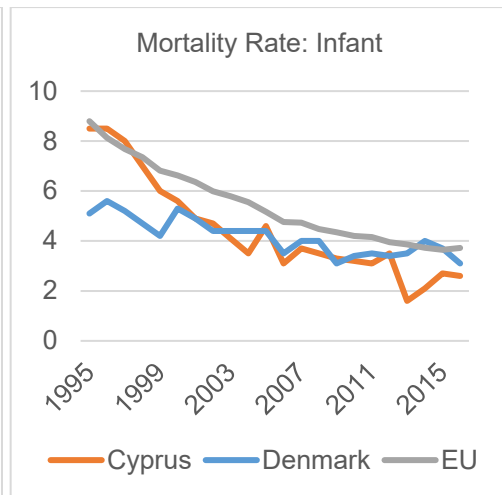
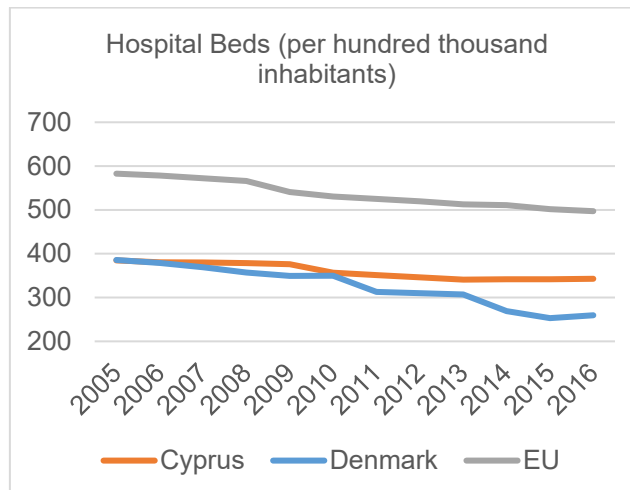


FIGURE 15C



Source: Eurostat

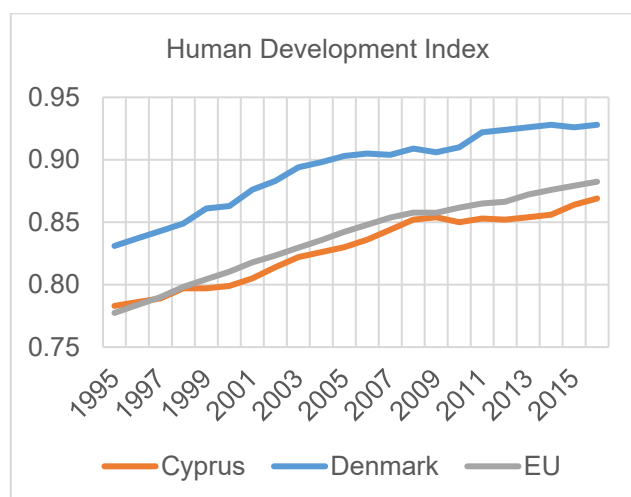
### 3.5 HDI

One way to summarize the level of development, education, and health is using the human development index (HDI). HDI is a composite index measuring three human development dimensions: a long and healthy life (measured by life expectancy), access to education (measured by expected years of schooling of children at school-entry age and mean years of schooling of the adult population), and a decent standard of living (measured by Gross National Income per capita adjusted for the price level of the country). Higher values of the index indicate higher health, education, and income levels. This index is obtained from the United Nations Development Program.

Figure 16 presents the t-plots for Cyprus, Denmark, and EU. All three series HDI exhibit an upward linear trend for the whole period. The time-series of Cyprus lies just below the corresponding EU average while Denmark's time-series is well above.

FIGURE 16

*Trends in the human development index for Cyprus, Denmark, and the European Union average*



Source: The United Nations Development Program

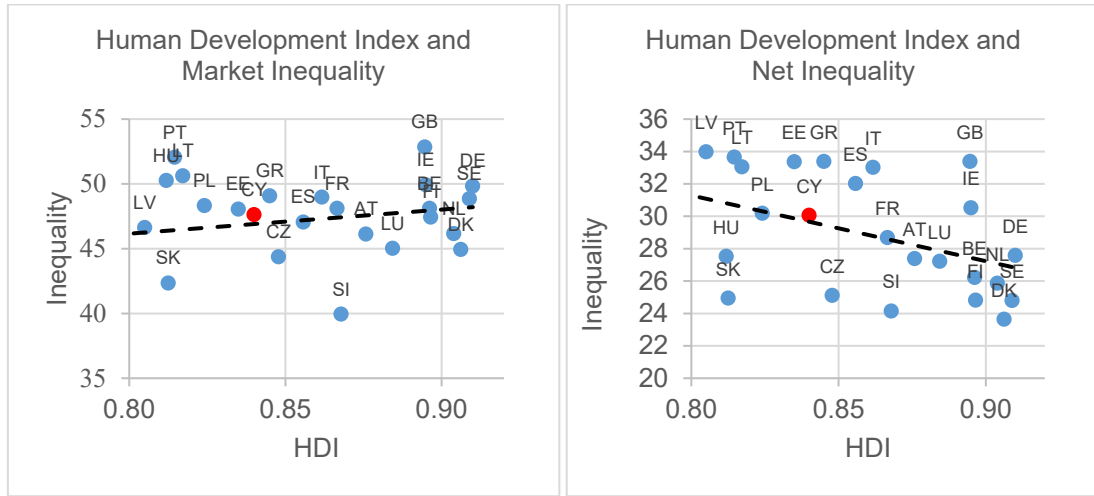
Finally, Figure 17 presents the scatter plots of HDI against both market and net inequality for the average values of the period 1995-2016. Consistent with the previous findings on education, and health there is a non-significant positive relationship in the case of market inequality and a significant negative relationship in the case of net inequality.

FIGURE 17

The relationship between inequality and the human development index

FIGURE 17A

FIGURE 17B



Sources: The Standardized World Income Inequality Database, and the United Nations Development Program

#### 4. Micro-level Disparities

Having examined macro-level stylized facts about inequality across countries, we move to investigate how micro-level disparities vary across the EU countries including Cyprus and how they correlate with both net and market inequality.

##### 4.1 Men's Earning Disparity

We proxy men's earning disparity indirectly using estimates of the men's returns to skills. Countries such as US, UK, and France that exhibit higher returns to skills tend to have higher earning disparities while countries such as the Nordic countries have lower returns to skills and hence lower disparities (e.g., Hanushek (2015)).

The standard approach to estimate the returns to skills is based on the Mincer equation. For each country, this equation takes the form of a linear regression of men's hourly wage ( $y_i$ ) on cognitive skills ( $C_i$ ), and years of actual labor-market experience ( $E_i$ )

$$\ln y_i = \alpha + \beta C_i + \gamma_1 E_i + \gamma_2 E_i^2 + \varepsilon_i,$$

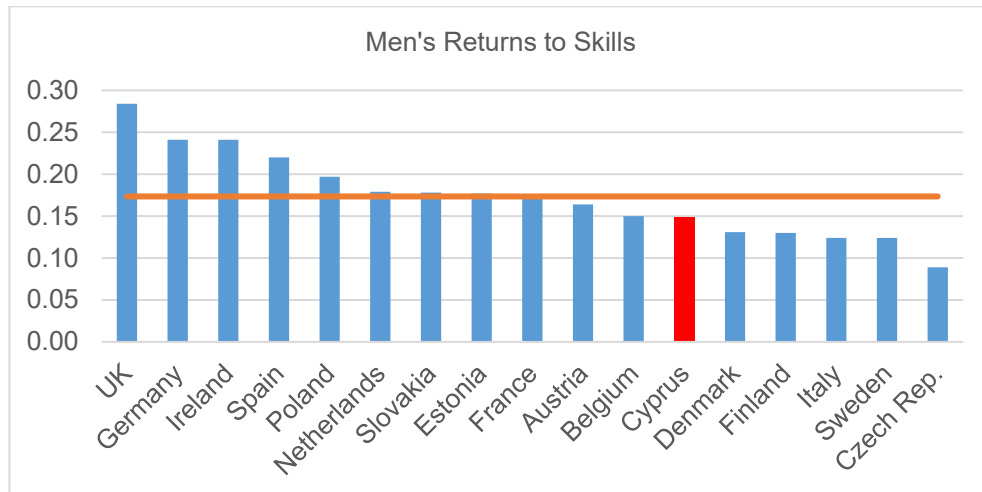
where  $\beta$  captures the returns to skills,  $\gamma_1$  and  $\gamma_2$  capture the influences of experience, and  $\varepsilon_i$  is a regression error.

We obtain the country-specific estimates of the men's returns to skill from Hanushek (2015) who estimates the above model based on data from the Program for the International Assessment of Adult Competencies (PIAAC) for 17 countries in 2012. In Figure 18 we present the men's returns to skills for the European countries. The men's return to skill for Cyprus is about 15%, just below the EU average. Notably, the United

Kingdom has the highest return to skills with 28% while the Czech Republic has the lowest return with only 9%.

FIGURE 18

*Men's returns to skills across the European Union*



Note: The orange line represents the European average.

Source: Hanushek (2015)

In Figure 19 we present the scatter-plots with the least-squares fitted line between the returns to skills and inequality (both net and market).<sup>9</sup> As expected both scatterplots show that countries with higher men's return to skills tend to have higher income inequality for both net and market, significant at 10% and 5%, respectively. Interestingly, Cyprus appears to be above the LS line, especially for net inequality. This implies that Cyprus exhibits higher inequality rather than the mean inequality conditional on men's returns to skills.

<sup>9</sup> This relationship assumes that the relative differences in men's returns to skills across countries have remained constant for the period 1995-2016.

FIGURE 19

*The relationship between inequality and men's returns to skills*

FIGURE 19A

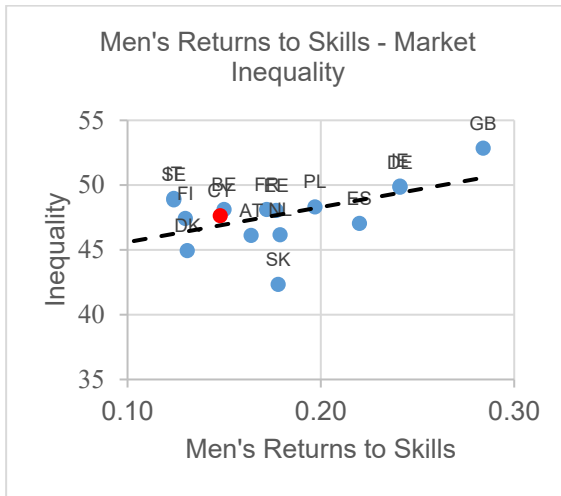
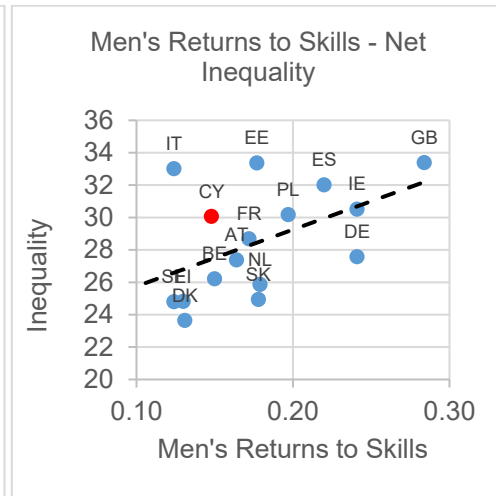


FIGURE 19B



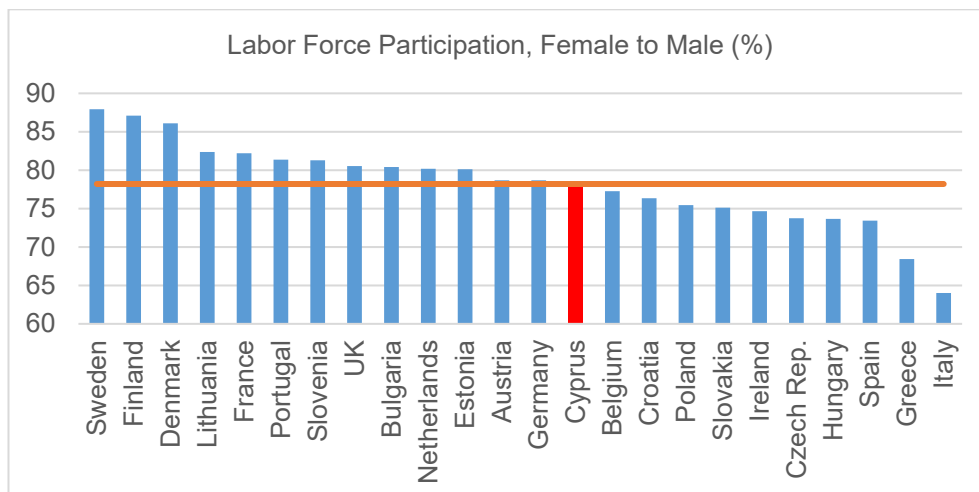
Sources: the Standardized World Income Inequality Database, and Hanushek (2015)

## 4.2 Employment

As discussed above men's employment contributes positively to inequality while women's employment is expected to reduce it. We consider the ratio of female to male labor force participation from Eurostat over 1995-2016. Figure 20 presents this ratio across the EU countries. Cyprus has a ratio of 0.78 just below the EU average. As expected, the Nordic countries enjoy the highest ratios while the south the lowest.

FIGURE 20

*Ratio of female to male labor force participation across the European Union*



Note: The orange line represents the European average.

Source: Eurostat

The scatterplots in Figure 21 shows a constant, non-significant, relationship between the female-to-male ratio and market inequality and a significant at 5% negative relationship between the female-to-male ratio and net inequality. That is, increases in

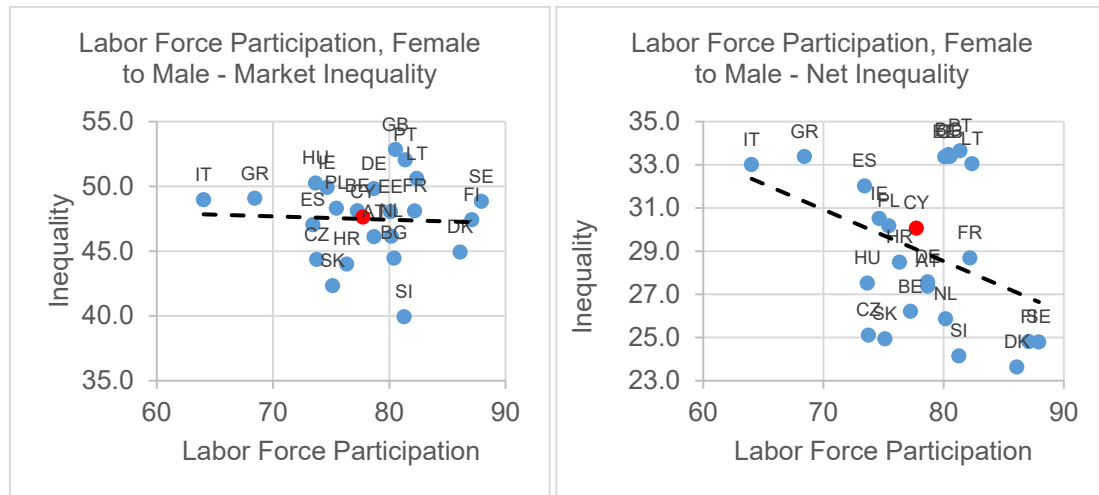
female labor force participation relative to men are associated with lower net inequality but not market inequality. This suggests that the presence of redistributive policies in the EU creates incentives so that increases in the relative labor force participation of women are negatively associated with inequality.

FIGURE 21

*The relationship between inequality and the ratio of female to male labor force participation*

FIGURE 21A

FIGURE 21B



Sources: The Standardized World Income Inequality Database, and Eurostat

### 4.3 Assortative Mating

Assortative mating or homogamy reflects the idea that people choose spouses who are more similar to themselves in certain characteristics such as education. The literature suggests that an increase in assortative mating has led to a rise in income inequality (e.g. Cancian and Reed (1998), Schwartz (2010), and Greenwood et al. (2014)).

For each country, we measure assortative mating by estimating a linear regression between an individual's completed level of education ( $educ_{it}$ ) and the education of the spouse ( $educ_{it}^S$ ):

$$educ_{it} = \alpha + \beta educ_{it}^S + \gamma_t + \varepsilon_{it},$$

where  $\beta$  measures the degree of assortative mating,  $\gamma_t$  denotes time fixed effects, and  $\varepsilon_i$  is a regression error. We estimate the above model using data from the ESS, as described in Section 2.1.<sup>10</sup>

Table 2 and Figure 22 present the estimated assortative mating coefficient for the European countries. Cyprus is ranked 6<sup>th</sup>, above the EU average with an estimate of 0.616. Portugal has the highest degree of assortative mating in the EU with an estimated coefficient of 0.723 while Germany has the lowest coefficient with 0.354 by far.

<sup>10</sup> For robustness reasons, we also estimate assortative mating using the 2011 ISCED classification of education with similar results. Results are available upon request.

TABLE 2

Assortative Mating. Least-squares regressions based on the equation presented in Section 5.3, using robust standard errors (s.e)

<b>Country</b>	$\hat{\beta}$	<b>s.e</b>
<b>Austria</b>	0.506	0.014***
<b>Belgium</b>	0.553	0.011***
<b>Bulgaria</b>	0.679	0.012***
<b>Croatia</b>	0.492	0.025***
<b>Cyprus</b>	0.616	0.016***
<b>Czech Republic</b>	0.418	0.012***
<b>Denmark</b>	0.434	0.012***
<b>Estonia</b>	0.433	0.014***
<b>Finland</b>	0.479	0.011***
<b>France</b>	0.543	0.011***
<b>Germany</b>	0.354	0.010***
<b>Greece</b>	0.636	0.011***
<b>Hungary</b>	0.583	0.013***
<b>Ireland</b>	0.556	0.011***
<b>Italy</b>	0.650	0.019***
<b>Lithuania</b>	0.489	0.018***
<b>Netherlands</b>	0.524	0.011***
<b>Poland</b>	0.588	0.011***
<b>Portugal</b>	0.723	0.010***
<b>Slovakia</b>	0.505	0.014***
<b>Slovenia</b>	0.507	0.013***
<b>Spain</b>	0.642	0.010***
<b>Sweden</b>	0.406	0.014***
<b>United Kingdom</b>	0.471	0.012***

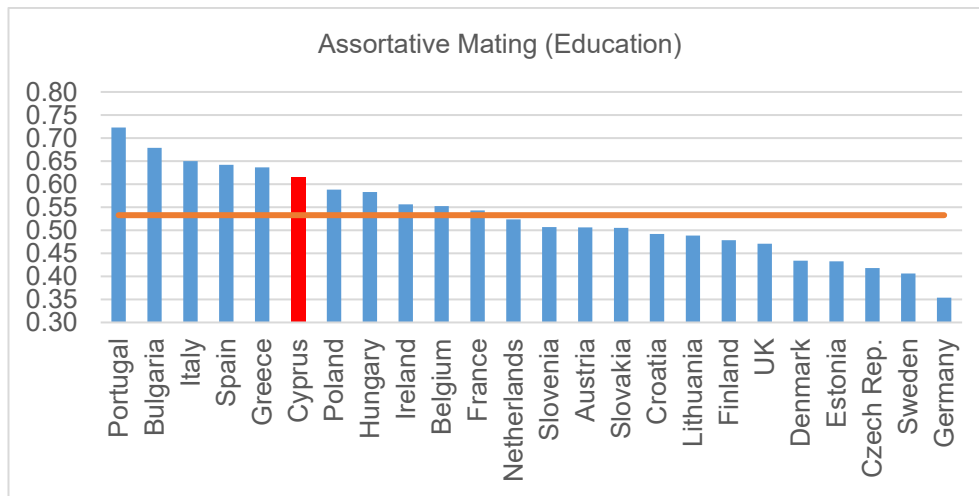
Note: \*\*\* denotes significance at 1%.

Source: the European Social Survey



FIGURE 22

*Assortative Mating across the European Union*



Note: The orange line represents the European average.  
 Source: The European Social Survey.

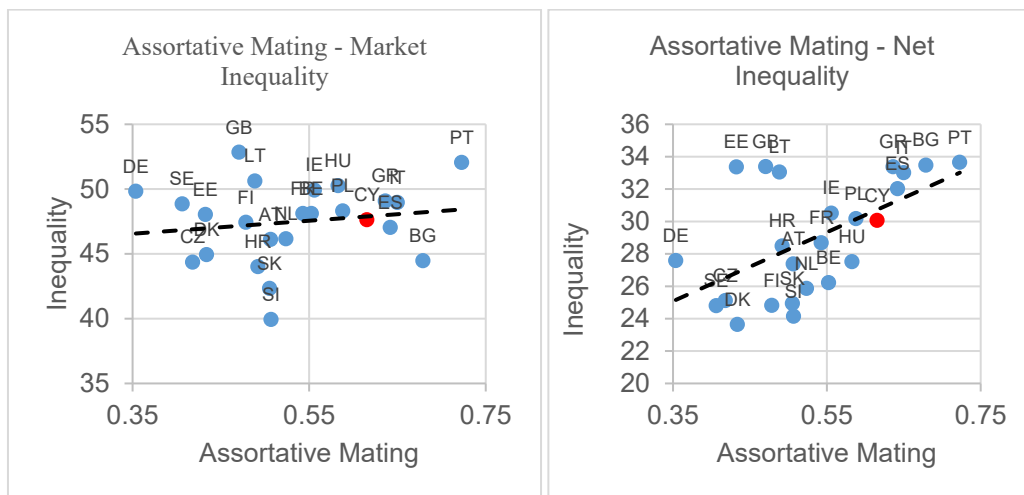
The scatterplots, in Figure 23, show a non-significant positive relationship between assortative mating and market inequality but a positive, significant at 1%, relationship in the case of net inequality. This positive relationship may be suggestive of the presence of distortionary redistributive policies across the EU countries. However, our descriptive analysis cannot provide further insights and further research is required which is beyond the scope of the current study.

FIGURE 23

*The relationship between inequality and assortative mating*

FIGURE 23A

FIGURE 23B



Sources: The Standardized World Income Inequality Database, and the European Social Survey

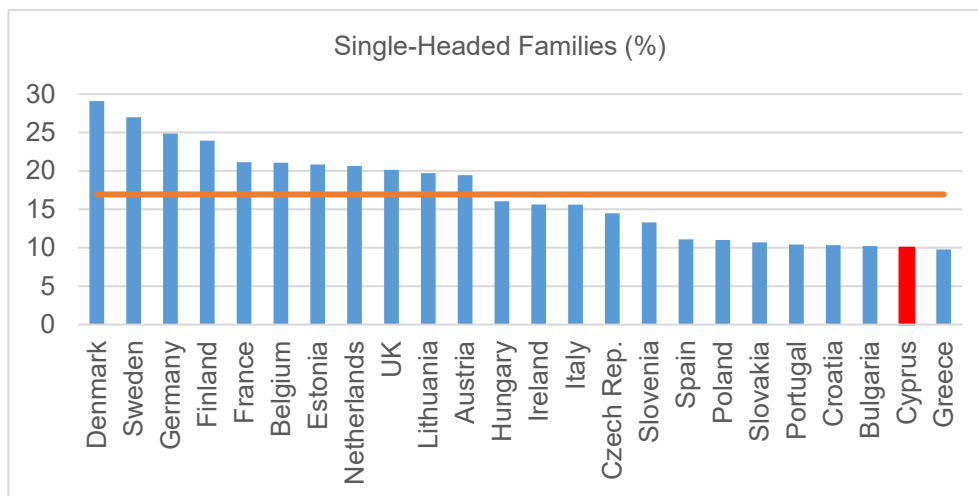
#### 4.4 Household Structure

Finally, there is a lot of evidence that suggests that the household structure affects inequality (Bernal and Keane (2011)). For example, Daly and Valetta (2015) show that single-headed families play a key role in the growth of inequality in the US.

Using data from Eurostat, Figure 24 shows that Greece and Cyprus enjoy the smallest percentages of single-headed families with about 10%. Interestingly, Denmark is the country with the highest share of single-headed families along with the other Nordic countries.

FIGURE 24

*The percentage of single-headed families across the European Union*



Note: The orange line represents the European average

Source: Eurostat

Figure 25 shows the scatter-plots between single-headed families and inequality. As in the case of men's earnings disparity, the relationship is weakly positive and not statistically significant for the market inequality. However, in the case of net inequality, higher levels of single-headed households tend to be negatively associated with inequality. This relationship is statistically significant at 5%. The change in the slope is suggestive of the effectiveness of redistributive policies.

FIGURE 25

*The relationship between inequality and the percentage of single-headed families*

FIGURE 25A

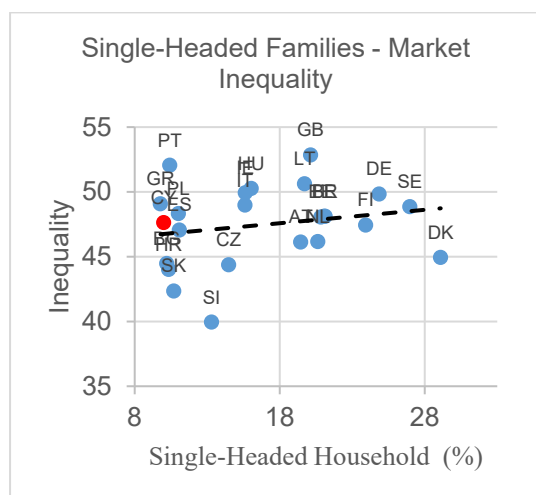
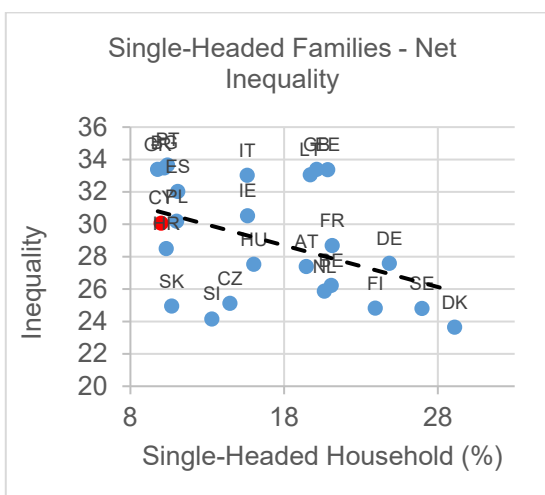


FIGURE 25B



Sources: The Standardized World Income Inequality Database, and Eurostat

## 5. Discussion and Conclusion

We present evidence about recent trends and disparities of economic inequalities for Cyprus and draw comparisons with the other EU countries for the period 1995-2016. Although Cyprus is characterized by a relatively high degree of educational intergenerational persistence, the average income inequality is at moderate levels and close to the EU average. Nevertheless, recent trends in income inequality show a spike in top income inequality due to the recent economic crisis. We reproduce the Great Gatsby Curve that demonstrates the positive relationship between inequality and intergenerational immobility.

In terms of macro-level disparities, we find that the processes of economic growth and level of development follow similar patterns as the EU average except for the period of the economic crisis starting as early as 2011 until the end of our sample period. Remarkably, the evolution of redistribution shows that although Cyprus appears to exhibit behavior similar to the EU average in terms of absolute redistribution, it systematically lags behind the direct form of redistribution as proxied by social protection benefits. Notably, these disparities are largest when Cyprus is compared with Denmark which is perceived by many as the ideal welfare state. The results of education appear to be disappointing. Cyprus is among the three countries with the highest percentage of students who underachieve in mathematics, reading, and science. This finding is particularly troublesome since the evolution of the government expenditure on education exhibited an upward trend for the period 1995-2003 before turning into a constant behavior well above the EU average. In contrast, the findings on health suggest that Cyprus is a top performer both at levels and trends. The government spending on health in Cyprus is among the lowest in the EU while Cyprus enjoys one of the highest life expectancy and lowest infant mortality rates. However, the decreasing trajectory of the number of hospital beds and the systematic gaps from the EU average are suggestive of infrastructure problems in the health sector of Cyprus.

Finally, we consider the sources of household earnings inequality by documenting the disparities in men's returns to skills, relative female labor force participation, assortative mating, household structure. We find that the labor force participation of the ratio of females to males in Cyprus is similar to the EU average with small negative deviations from the average value for men's returns to skills and moderate positive deviations for assortative mating. Notably, Cyprus enjoys the second smallest percentage of single-headed households in the EU. Net income inequality is positively associated with the men's returns to skills and assortative mating while it is negatively associated with the ratio of female to male labor force participation and the percentage of single-headed households.

In sum, our results suggest that Cyprus lags behind direct forms of redistribution and educational outcomes. However, we should emphasize that our findings constitute a purely descriptive summary of stylized facts of economic inequalities and cannot be used for inference and causal claims. For instance, the poor performance of Cyprus in PISA scores may reflect inefficiencies in the educational system or lack of aspirations but it may also reflect the fact that those achievement tests are not incentivized. Thus, our findings should be interpreted by the policymakers with caution and motivate further research so that future redistributive policies benefit the targeted groups without distorting incentives. For example, there is a need for an assessment of means-tested entitlement programs like the guaranteed minimum income scheme, which was recently implemented as part of the social welfare system reforms in Cyprus. There is also a need for educational early life interventions that target disadvantaged young children. Such interventions can be both socially fair and economically efficient (Heckman and Mosso (2014)). Finally, policymakers should also consider associational redistribution (Durlauf (1996)). Associational redistribution targets group membership as an object of redistribution such as affirmative actions in university admissions, charter schools, and public housing projects for migrants and refugees.

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