Income and Wealth Inequality in Malta

Ilias Georgakopoulos[1]

[1]Economic Analysis Department, Central Bank of Malta, Castille Place, Valletta, Malta

Correspondence: Ilias Georgakopoulos, Economic Analysis Department, Central Bank of Malta, Castille Place, Valletta Malta.

Abstract

This paper studies for the first time the distribution of income and wealth in Malta based on three waves of micro-level data from the Household Finance and Consumption Survey (HFCS). The focus of the analysis is to examine various socioeconomic aspects of income and wealth inequality and contributing factors, as well as determinants of the joint distribution of income and wealth. Results suggest that household main residence (HMR) is the most equalising factor of wealth inequality, while self-employment wealth is the most disequalising factor. The financing structure of HMR is particularly important to explain the position of a household in the wealth distribution. Furthermore, the age and education level of the reference person of a household, increases in household income and inheritance or gifts affect positively the probability of a household to be in a higher net wealth quintile.

Keywords: wealth and income distributions, inequality, generalised ordered logit model, household, Malta

1. Introduction

Since the onset of the recent financial crisis many euro area countries experienced sizeable adverse shocks. At the macro level, gross domestic product (GDP) and employment rates decreased in many euro area counties. At the micro level, households' losses on their incomes and assets were considerable. However, such losses have not been uniformly distributed across different socioeconomic groups. In addition to the above, the crisis of 2008/9 highlighted the importance of credit constraints and marginal propensity of households to consume out of different sources in explaining aggregate consumption dynamics. These developments, have led to a renewed interest in income and wealth inequality, in both academia and policy-making, especially after the publication of "The Capital in the Twenty-First Century" by Piketty (2014) and the results by Stiglitz, Sen and Fitoussi (2009).

Contrary to economic developments in many euro area countries, Malta's performance remained favourable since the start of the crisis. Real GDP growth rate averaged 5.3% from 2010 to 2017, while the unemployment rate decreased from 7.3% to 4.0% in 2017, despite an increasing labour participation rate. Home-ownership remained elevated at around 82% in 2017 according to the European Union Survey of Income and Living Conditions (SILC) (Note 1). At the same time, rental costs increased rapidly, potentially amplifying inequality. Thus, developments in Malta's booming housing market are crucial due to the widespread implications they have on wealth, private consumption and on the respective ability of banks and borrowers to lend and borrow.

The data used in this paper are from the Maltese Household Finance and Consumption Survey, first held in 2010 and subsequently in 2014 and 2017. The HFCS collects detailed micro-data on household assets and liabilities, wealth, income, consumption and savings. Most of these questions are answered by the most financially knowledgeable household member, that is, the reference person. There are few papers studying aspects of inequality (see e.g. Darmanin, Georgakopoulos & Knoppe, 2018) and, more specifically, how it has evolved over time. Furthermore, studies on the wealth distribution are largely lacking in Malta. This paper attempts to fill this gap by examining how income and wealth inequality evolved in a period during which the Maltese economy experienced strong macroeconomic growth.

The first part of the analysis relates to distributional statistics and findings across a variety of dimensions, namely age, employment status and education. In addition, equalising and disequalising factors of the overall income and net wealth inequality are reported by applying Lerman and Yitzhaki's (1985) decomposition method. The second part analyses the joint distribution of income and net wealth by estimating a generalised ordered logit model.

Results indicate that wealth inequality increased moderately but at a quicker pace than that of income inequality

between 2010 and 2016. Households whose reference person has tertiary education saw sizable increases in their median incomes and net wealth. The Gini coefficient decomposition analysis reveals that labour income drives income inequality, whereas income from pensions decreases it. As regards real assets, household main residence is the most equalising factor for net wealth inequality, while self-employment wealth is the most disequalising one. In contrast, the role of financial assets is rather limited. Analysis of the joint distribution of income and wealth suggests that age, high levels of education and income increase the probability of a household to be in a higher net wealth quintile. Furthermore, the financing structure of the main residence is important in determining the position of a household in the net wealth distribution. Lastly, inheritance or gifts affect positively and significantly the probability of a household to move to a higher quintile of net wealth.

The rest of the paper is organised as follows: section 2 provides a brief overview of the literature. Section 3 describes the data. Section 4 and 5 present the results of the descriptive analysis and socioeconomic dimensions of inequality, respectively. The decomposition of income and wealth by component is presented in Section 6. Section 7 examines the joint distribution of income and wealth. Section 8 concludes.

2. Literature Review

Research on inequality has historically used information from various data sources to study the distribution of income and wealth. For example, Bricker et al. (2016) measure income and wealth inequality at the top quintiles in the United States (US) based on administrative data and the Survey of Consumer Finances (SCF). Without accounting for the conceptual differences between the two sources, the estimates of inequality at the top quintiles, based on administrative tax data, are substantially higher than those based on the SCF. On the methodological side of things, the literature has employed different methods, but decomposition techniques have been the most widely used. Shorrocks (1982, 1983) and Lerman and Yitzhaki (1985) provide decomposition methods based on the Gini coefficient. Counterfactual analysis is another and more recent technique to study inequality (see e.g. Chernozhukov et al., 2009 and Fortin et al., 2011). Both papers provide an analytical toolkit for applying counterfactual analysis with reference to inequality metrics, broadly defined as the result of either a change in the distribution of a set of covariates that determine the outcome variable, or as a change in the relationship of the covariates with the outcome.

The literature on income inequality and its decomposition is extensive. On the one hand, papers by Machado and Mata (2005) and Bourguignon et al. (2008) examine differences in income and income distribution with respect to differences in socioeconomic and labour market characteristics. On the other hand, Rani and Furrer (2016) apply Lerman and Yitzhaki's (1985) method to decompose the Gini coefficient, based on micro-level data from household surveys in 13 G20 countries. The authors report that labour income is the most significant contributing factor to inequality in all countries, whereas transfers and benefits are the most important factors that reduce inequality.

With respect to wealth inequality, empirical research is more limited due to the availability of good quality data. Existing studies focus predominately on the US. For example, Wolff (1994, 2004) track the evolution of US household wealth since the 1960 using the Survey of Consumer Finances. Bilias et al. (2005) use information from the same data source to show that an increased participation rate in risky financial assets does not entail a reduction in the overall inequality of wealth. The literature on European countries was limited until recently, but expanded significantly since the first wave of the HFCS became available to researchers. Early studies include Brandolini et al. (2004) and Azpitarte (2010) who explore the composition and distribution of household wealth in Italy and in Spain, respectively. Both papers show that wealth inequality is mainly driven by inequality in real assets rather than by financial assets. At a broader level, Lindner (2015) examines the distribution of wealth in 15 HFCS participating countries. The author finds that households' main residence contributes a much higher proportion to inequality in comparison to other assets. Similar methodological approaches and findings are documented by Bezrukovs (2013) and Grejcz and Żółkiewski (2017), for the euro area and Poland, respectively.

In recent years, there have been more papers on the determinants of wealth accumulation and the role of intergenerational transfers in wealth inequality. For example, Fessler and Schürz (2015) examine the role of inheritance, income and welfare state policies in explaining differences in household wealth within and between Eurozone countries. The main conclusion of this paper is that social services provided by the state are substitutes for private wealth accumulation and only partly explain observed discrepancies in the levels of households' net wealth across European countries. Leitner (2016), using data from the first wave of HFCS, tries to identify the sources of inequality in household gross, net wealth across eight euro area countries. Dispersion in bequests and *inter vivos* transfers affects wealth inequality more strongly than the one caused by income differences. Life-cycle considerations in relation to pension wealth and total wealth accumulation are examined by Cowell et al. (2016).

The increasing availability of wealth data has also led to research on the joint distribution of income and wealth. For example, Jäntti et al. (2008) study the joint distribution of income and wealth in Canada, Germany, Italy, Sweden and

the United States and observe that net wealth and disposable income are highly, but not perfectly correlated between individuals within each country. A paper by Arrondel et al. (2014) explore the distributions of household wealth and income for 15 European countries to provide evidence of heterogeneity in wealth accumulation behaviours. The authors also find that the effect of income or inheritance on wealth accumulation varies, depending on the rank of the households in the wealth distribution.

For the case of Malta, research on inequality from a micro perspective is limited. Betti et al. (2015) use SILC and Census data to assess economic poverty and inequality by district and locality for households with children. Their findings indicate a considerable degree of heterogeneity across localities. More recently, Knoppe (2018) studies the distribution of wage and wage mobility between 2000 and 2015, using administrative data. The main conclusion of the study is that the increased dispersion in the wage distribution reflects structural changes in the Maltese economy, and the sluggish response of the labour supply to the evolving demand. Wealth inequality in Malta has to date been analysed in the context of countries participating in the HFCS without however examining its dynamics and trends over time. This paper attempts to fill this gap.

3. Data

This paper is based on data from the Household Finance and Consumption Survey. The survey was conducted for the first time in 2010 and repeated in 2014 and 2017 (Note 2). It includes detailed questions about households' balance sheet, income and consumption patterns, and on specific forms of credit constraints. Most of these questions are answered by the most financially knowledgeable household member, that is, the reference person. The probabilistic design of the survey entails that each household in the target population has an ex ante non-zero probability of being part of the sample, contributing to the representativeness of the survey, while survey weights are adjusted for the non-response items and coverage issues. To address the issue of missing values the dataset is multiply imputed using multivariate imputation by chained equations following the methodology presented in Rubin (1987). In particular, five imputations were made for every missing value.

The unit of analysis is the household. No equivalisation is made in order to take into account differences in household size or composition. The aim of this paper is to investigate wealth and income inequality across households rather than individuals. Moreover, there is no consensus on whether household wealth should be equivalised and common approach to account for household composition effects (Note 3).

Net wealth is defined as the sum of real and financial assets, less liabilities. Real assets consist of the household's main residence, other real estate property, investments in self-employed businesses, vehicles, and other valuables. Financial assets are deposits, securities (bonds), listed shares, voluntary pension scheme investments in mutual funds, and life insurance and other financial assets (e.g. amount owned to household). Housing debt is the outstanding amount of mortgage on the main residence and other property. Liabilities are defined as the outstanding amount of mortgages, loans financing other real estate property, outstanding debt on credit cards and credit lines/bank overdrafts as well as outstanding amounts of other, non-collateralised, loans (including loans from commercial providers and private loans).

Gross household income is a measure of all before-tax income and includes employee income, self-employment income, income from pensions, regular social transfers, regular private transfers, income from real estate property, income from financial investments, income from private business and partnerships and other non-specified sources of income (e.g. income from regular private transfers).

4. Descriptive Analysis

4.1 The Distribution of Income and Net Wealth

Figure 1 displays the distribution of gross household income and net wealth by percentiles. As can be seen, the distribution of gross household income moved upwards in the period under review, mainly for households between the 60th and 80th percentiles. Income for households in the lowest 30% of the distribution remained relatively flat. However, the distribution of net wealth did not change as much as the income distribution as accumulation of wealth over the lifetime is a lengthy process and cannot be easily reversed. The most significant changes are noted in the upper parts of the net wealth distribution (80th percentile and upwards), with small changes in the rest of net wealth distribution.
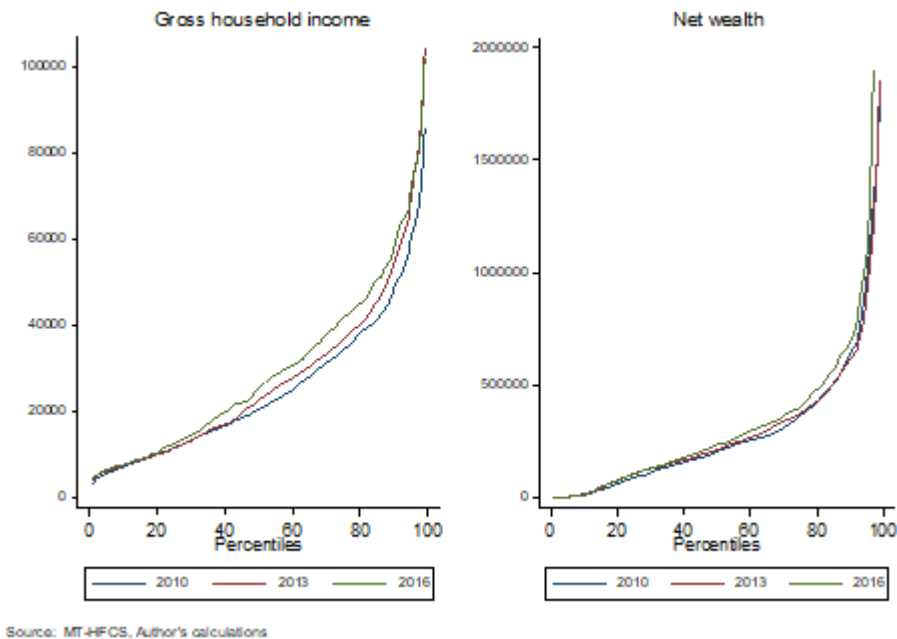
Figure 1. Percentile distribution of gross household income and net wealth

Qualitatively, the percentile plots of real income and real net wealth are very similar and are omitted.

4.2 Distributional Statistics

Table 1 reports some widely used measures of inequality for gross household income, net wealth, real assets, financial assets and liabilities. A first observation relates to financial assets, which are the most unequally distributed variable among the ones chosen. This statement is supported by the Gini coefficient and by two of the three relative measures of inequality considered here. For example, the 90-50 ratio, which captures differences in the top half of the distribution, increased at a faster rate than the 50-10 ratio across the three waves, which concerns the bottom half of the distribution. A second observation is that generally inequality increased moderately since 2010 and may even have decreased according to some relative measures. However, this is not the case for financial assets. The Gini coefficient for gross household income, net wealth and real assets increased in the period 2010-16. At a more granular level, the 90-50 ratio decreased in all the variables above, whilst a decrease in the 75-25 ratio is also noted, except for household income. A final observation is the sizeable decrease in the Gini coefficient for household liabilities.

With regards to net wealth, the 90-50 ratio indicates that the gap in the top half of the distribution became less pronounced over time, suggesting that the net wealth of the middle 50% exerts more weight on the net wealth distribution. This is also supported by the decline in the 75-25 ratio. In contrast, inequality in the bottom half increased as indicated by the rise in the 50-10 ratio.

Table 1. Summary of distributional statistics for the sample households

Variable	Mean	Median	P10	P25	P50	P90	P90/P50	P50/P10	P75/P25	Gini
Gross household income										
2010	25,299	20,562	7,292	11,657	20,562	49,022	2.38	2.82	2.97	0.378
2013	27,682	22,718	7,597	11,566	22,718	54,997	2.42	2.99	3.17	0.396
2016	31,203	25,417	7,668	12,655	25,417	58,639	2.31	3.31	3.32	0.409
Net wealth										
2010	324,576	204,908	15,937	88,319	204,908	639,102	3.12	12.86	4.15	0.566
2013	340,652	212,067	14,298	107,857	212,067	612,576	2.89	14.83	3.45	0.562
2016	402,611	236,529	12,612	105,600	236,529	692,368	2.93	18.75	3.87	0.598
Real assets										
2010	306,669	193,511	5,300	91,187	193,511	583,564	3.02	36.51	3.76	0.573
2013	327,313	209,840	19,361	129,684	209,840	574,893	2.74	10.84	2.65	0.538
2016	382,895	225,752	9,387	127,302	225,752	643,001	2.85	24.05	2.98	0.584
Financial assets										
2010	46,860	23,454	1,876	7,562	23,454	104,856	4.47	12.50	7.73	0.622
2013	53,140	22,150	2,722	8,184	22,150	140,101	6.33	8.14	6.81	0.653
2016	57,498	22,512	1,751	7,000	22,512	130,166	5.78	12.86	8.36	0.679
Liabilities										
2010	39,868	17,122	496	3,057	17,122	105,201	6.14	34.52	14.67	0.682
2013	46,676	19,273	401	2,134	19,273	131,949	6.85	48.09	36.09	0.643
2016	63,937	40,000	1,000	6,500	40,000	162,751	4.07	40.00	15.91	0.559

Source: MT - HFCS, Author's calculations

Note: Italic indicates low sample size. A low number of observations can distort the data because of big variations in values

The distribution of gross household income is less concentrated than that of net wealth as indicated by lower Gini values. In 2016, households at the top of the income distribution earned 2.31 times more than those at the median of the distribution, down from 2.38 in 2010. Concurrently, households in the middle-to-upper parts of the distributions saw higher increases in income, which resulted in small increases in the Gini values over the period under review.

Overall inequality in liabilities, measured by the Gini index, dropped to 0.55 in 2016, from 0.68 in 2010. The main driver of the reduction in the Gini coefficient is the increasing availability of housing loans to households in the bottom half of the distribution since 2010. By the end of 2016, the 90-50 ratio dwindled from 6.14 to 4.07 as liabilities held by households at the median of the distribution grew by 134%. Strong increases in household debt are also noted in the lower parts of the debt distribution (i.e. P10 and P25).

4.3 Distributional Statistics Decomposition

To further investigate what drives inequality, the same analysis as in the previous subsection is repeated. However, the sample size is restricted to households whose reference person is between 20 and 60 years old, which broadly corresponds to the working-age category in Malta (see Table 2).

Inspection of Table 2 indicates that the picture of inequality changes somewhat for gross household income and financial assets. For gross income, the Gini index is lower by some 0.04-0.05, while all of the displayed percentiles ratios are lower. This suggests that the group of pensioners pushes up overall measures of inequality since their incomes are considerably lower compared to those of other low income households. Inequality in financial assets also decreases.

It therefore appears that life-cycle features play an important role in determining the level of gross household income and financial asset holdings. However, their impact on real assets and net wealth is rather limited as inequality indicators for the working-age households are close to those for the whole population. This is because most pensioners are asset rich at the household level, but income poor. It should be mentioned that the 50-10 ratio drops significantly for working-age households, indicating that there is higher inequality among retired households in the bottom of the net wealth and real assets distribution.

Table 2. Summary of distributional statistics for working-age households

Variable	Mean	Median	P10	P25	P50	P90	P90/P50	P50/P10	P75/P25	Gini
Gross household income										
2010	29,209	25,872	10,088	15,668	25,872	51,398	1.99	2.56	2.48	0.334
2013	32,651	28,665	10,211	17,080	28,665	59,578	2.08	2.81	2.40	0.342
2016	38,976	33,301	12,630	21,027	33,301	65,281	1.96	2.64	2.25	0.357
Net wealth										
2010	346,872	218,672	24,107	107,819	218,672	642,187	2.94	9.07	3.40	0.565
2013	360,607	214,859	36,494	117,060	214,859	569,684	2.65	5.89	3.08	0.567
2016	418,487	237,690	30,802	118,452	237,690	681,328	2.87	7.72	3.49	0.601
Real assets										
2010	333,278	204,709	7,154	108,085	204,709	598,118	2.92	28.62	3.20	0.576
2013	353,780	215,448	40,247	134,807	215,448	559,190	2.60	5.35	2.54	0.552
2016	409,102	228,752	17,501	135,302	228,752	640,001	2.80	13.07	2.84	0.581
Financial assets										
2010	41,918	22,937	1,339	7,938	22,937	103,018	4.49	17.13	7.32	0.586
2013	45,319	22,067	2,930	8,673	22,067	110,181	4.99	7.53	6.10	0.614
2016	49,696	21,520	1,590	6,667	21,520	100,000	4.65	13.54	8.33	0.654
Liabilities										
2010	42,017	18,701	500	4,174	18,701	113,000	6.04	37.40	11.35	0.667
2013	51,549	24,900	467	3,826	24,900	138,000	5.54	53.27	21.28	0.619
2016	68,941	45,946	1,200	10,000	45,946	175,001	3.81	38.29	10.95	0.531

Source: MT - HFCS, Author's calculations

Note: Italic indicates low sample size. A low number of observations can distort the data because of big variations in values

5. Socioeconomic Dimensions of Inequality

Some household characteristics such as age, education and employment status are related to income and wealth. For example, wealth could influence one's decision on whether to invest in further education, which could have an impact on employment outcomes or on decisions to purchase assets that generate future income stream. Figure 2 examines how median income and net wealth are distributed across different age cohorts, by level of education and employment status of the reference person.

5.1 Inequality by Age

The top panel of Figure 2 shows median income and net wealth by age. As can be seen, income and net wealth display the typical hump shape that is found in the literature and usually attributed to the life-cycle profile. Median income tends to monotonically increase until the age of the household's reference person reaches 45-54, where it peaks. It declines thereafter because of retirement.

5.2 Inequality by Employment Status

The middle panel of Figure 2 depicts the distribution of income and net wealth according to the employment status of the reference person (Note 4). Employee income has been on the rise since 2010, which contrasts with a relatively flat profile for self-employed income. In fact, while median self-employed income initially was broadly equal to median employee income, by 2016 it stood lower. However, differences in employee and self-employed income remain relatively small. Regarding net wealth, the self-employed, which account for less than 8% of the sample in each of the three waves, on average, had 2.4 times the net wealth of employees in 2010, who are the majority of households (around 40% of respondents). In 2016, this ratio stood lower, at 2.1, reflecting a decrease in the median net wealth of self-employed persons.

Figure 2. The distribution of median gross income and net wealth by age, employment status and education

5.3 Inequality by Education Level

The distribution of income and net wealth by education level is depicted in the bottom row of Figure 2. It is evident that there exists a close association between education and economic performance. For example, households with better-educated reference persons have higher incomes than their less-educated counterparts, and the respective absolute gap has widened across the three waves. However, in relative terms, those with tertiary education earned 1.7 times the income of those with secondary education in 2016, slightly lower than the 1.8 ratio recorded in 2010. For less-educated persons, the income gap between households with secondary and primary education increased considerably. The ratio stood at 2.4 in 2016, from 1.8 in 2010. A slightly different picture emerges with regards to net wealth. The gap between those with secondary education and primary education decreased since 2010, standing at 1.3 in 2016. In addition, in 2016, households with tertiary education held 1.3 times more net wealth, compared to households with as secondary education, down from 1.4 in 2010.

6. Income and Net Wealth Inequality Decomposed by Component

This section examines which components of net wealth and income are important in determining overall inequality. To this end, the decomposition technique developed by Lerman and Yitzhaki (1985) is applied. According to this method, the contribution of different income and net wealth components to overall inequality is quantified by taking into account the share of each individual source in the total distribution, its own Gini index and its correlation with the given total distribution. In particular:

$$G = \sum_{i=1}^{I} S_i G_i R_i$$

where:

G – net wealth (income) Gini coefficient

S_i – share of source in total net wealth (income)

G_i – Gini index of source

R_i – The relative Gini correlation between net wealth (income) source and the distribution of total net wealth (income). is a form of rank correlation coefficient, similar to Pearson's correlation coefficient and its values are within the range [−1, 1].

Following the literature, the main focus of the analysis is on the relative contribution $(S_i G_i R_i / G)$ and marginal contribution $(S_i G_i R_i / G - S_i)$ of source i to the overall Gini coefficient. The former represents how much of the observed inequality in income or wealth is due to inequality in source i. The latter measures the first round effect of a percentage change of the overall Gini coefficient in response to a unit change in one of the components of net wealth (income).

6.1 Decomposition of Gross Household Income

As can be seen in Table 3, income from employment and pensions accounts for around four fifths of total household income, while other income sources contribute significantly less. As evidenced from the marginal contribution row, income from pensions and social transfers tend to decrease inequality, with an increasing equalising effect of transfers since 2010. This reveals the significant impact of government benefits in reducing gross household income inequality.

Employee income drives up overall income inequality having by far the highest marginal contribution. Its contribution was slightly lower in 2016 than in 2010 (see marginal contribution panel in Table 3). On average, a 1% increase (ceteris paribus) in employee income edges up inequality by some 0.1%. Interestingly, an increase in income from pensions tends to decrease income inequality by roughly 0.2%.

Table 3. Gini decomposition of total gross household income by component

		Employee income	Self-employed income	Income from pensions (including widows and disability)	Regular social transfers (except pensions)	Income from financial investment	Other household income
Income share S_i	2010	0.630	0.109	0.162	0.020	0.038	0.042
	2013	0.640	0.092	0.166	0.029	0.033	0.040
	2016	0.674	0.088	0.136	0.029	0.021	0.053
Gini correlation R_i	2010	0.842	0.539	-0.172	-0.127	0.423	0.680
	2013	0.872	0.497	-0.109	-0.107	0.446	0.766
	2016	0.908	0.565	-0.271	-0.178	0.308	0.765
Gini index G_i	2010	0.579	0.894	0.678	0.864	0.752	0.959
	2013	0.587	0.899	0.690	0.842	0.808	0.968
	2016	0.568	0.913	0.674	0.791	0.885	0.968
Relative contribution $S_i G_i R_i / G$	2010	0.812	0.139	-0.050	-0.006	0.032	0.072
	2013	0.828	0.105	-0.031	-0.006	0.030	0.076
	2016	0.851	0.111	-0.061	-0.010	0.014	0.095
Marginal contribution $S_i G_i R_i / G - S_i$	2010	0.182	0.030	-0.212	-0.025	-0.006	0.030
	2013	0.188	0.012	-0.197	-0.035	-0.003	0.035
	2016	0.177	0.023	-0.197	-0.039	-0.007	0.043

Source: MT - HFCS, Author's calculations

6.2 Decompositon of Net Wealth

This subsection presents the results of the decomposition of net wealth. Table 4 suggests that the most important equalising asset is household main residence, with a marginal contribution of around 0.2%. This is not surprising not only because home-ownership in Malta is around 81% according to the HFCS, but also due to the higher values of HMR compared to other forms of assets. Moreover, houses are more often than not associated with mortgage debt, and it is found that housing loans (marginal contribution of around 0.12%) and other forms of loans (marginal contribution of around 0.01%) tend to increase net wealth inequality.

The most unequally distributed real asset is self-employment business. Its relative contribution to the net wealth

inequality is high compared to the rest of the real assets, whereas its marginal contribution is positive and on the high side, indicating that self-employment business increases net wealth inequality.

In terms of marginal contribution, other real estate assets display a decreasing contribution, from around 0.12% in 2010 to around 0.07% in 2016, while self-employment business is increasingly positively affecting inequality. The negative contribution of HMR to net wealth inequality is now stronger than that for 2010. This is due to changes in the composition of wealth components, and as can be seen in Table 4 other real estate and self-employment business are the main contributors to net wealth inequality in 2016.

With regards to financial assets, their contribution to net wealth is much lower compared to real assets. This is related to a rather low share of financial assets in total net wealth and a relatively even distribution of the most widely held financial asset, that is, deposits. The former statement suggests that the equalising effect of deposits has decreased over time.

Table 4. Gini decomposition of net wealth by component

		HMR	Other real estate	Self-employment business	Vehicles	Valuables	Deposits	Securities	Investment funds and listed shares	Voluntary private pensions/whole life insurance	Other financial assets	Housing loans	Other loans
Wealth share S_i	2010	0.544	0.285	0.100	0.034	0.014	0.073	0.019	0.020	0.028	0.009	-0.105	-0.022
	2013	0.588	0.219	0.182	0.039	0.007	0.055	0.013	0.019	0.021	0.007	-0.127	-0.023
	2016	0.443	0.267	0.281	0.031	0.006	0.047	0.007	0.017	0.019	0.011	-0.113	-0.016
Gini correlation R_i	2010	0.788	0.867	0.857	0.458	0.676	0.448	0.670	0.570	0.405	0.789	-0.254	-0.174
	2013	0.743	0.830	0.825	0.417	0.727	0.512	0.715	0.654	0.225	0.774	0.065	0.242
	2016	0.710	0.894	0.957	0.481	0.524	0.600	0.472	0.729	0.432	0.851	0.081	-0.186
Gini index G_i	2010	0.378	0.826	0.941	0.527	0.936	0.603	0.889	0.905	0.813	0.978	-0.773	-0.782
	2013	0.327	0.798	0.934	0.524	0.951	0.579	0.920	0.919	0.804	0.983	-0.694	-0.807
	2016	0.364	0.902	0.943	0.523	0.882	0.637	0.941	0.957	0.874	0.983	-0.628	-0.821
Relative contribution $S_iG_iR_i/G$	2010	0.325	0.409	0.162	0.017	0.018	0.040	0.023	0.021	0.018	0.014	-0.041	-0.006
	2013	0.288	0.292	0.281	0.017	0.010	0.033	0.017	0.023	0.008	0.010	0.012	0.009
	2016	0.177	0.333	0.393	0.012	0.004	0.028	0.005	0.019	0.011	0.015	0.009	-0.004
Marginal contribution $S_iG_iR_i/G - S_i$	2010	-0.219	0.124	0.062	-0.018	0.004	-0.034	0.004	0.001	-0.009	0.005	0.064	0.016
	2013	-0.300	0.073	0.099	-0.022	0.003	-0.022	0.004	0.004	-0.013	0.004	0.139	0.033
	2016	-0.266	0.066	0.111	-0.019	-0.002	-0.019	-0.002	0.001	-0.008	0.003	0.122	0.012

Source: MT - HFCS, Author's calculations

7. The Joint Distribution of Income and Wealth

This section investigates the joint distribution of income and wealth. In doing so, a transition matrix based on the quintile distributions of both variables is constructed. To assess how re-ranking among households has evolved between the three waves, results from 2010 and 2016 are presented, alongside the Shorrocks mobility index (see Azpitarte, 2010) (Note 5).

The high values of the Shorrocks index presented in Table 5 indicate a high re-ranking between the two distributions. Indeed, around 31% of households in the bottom income quintile were in the bottom net wealth quintile in 2016, compared to 37% in 2010. Similarly, in the top income quintile around 40% were in the top net wealth quintile in 2016 as opposed to 38% in 2010. From a different perspective, it implies a weak relationship between income and wealth, which is further supported by the low correlation coefficient between income and wealth (less than 0.45 in all waves) (Note 6).

In view of the above considerations, the position of a household in the income distribution is not a very good predictor of its position in the wealth distribution, except for households in the top income and net wealth quintile. This is mainly driven by pensioners who have low income levels due to low pensions, but are asset rich as a result of their large housing wealth. In fact, around 26% of households are in the bottom two income quintiles but in the highest net wealth quintile. To support this statement, Table 6 displays the joint distribution of income and net wealth across quintiles, excluding pensioners. It is now observed that around 28% of households are in the two bottom income quintiles, but in the highest wealth quintile in 2016. This percentage is close to the one found for the whole sample. Examining the percentage of households in the bottom two quintiles of income of the sample size as a whole and of the restricted sample, it is found that that 56% and 67% of households belong to the lower two income quintiles in 2016, respectively. Hence, it seems that the inclusion of pensioners only reduces the percentage of households in the lower quintiles of income, while the percentage of households in the bottom two income quintiles and in the highest net wealth quintile is very similar for both sample sizes.

Table 5. Joint distribution of income and net wealth across quintiles

2010	Net wealth quintile (Shorrocks index = 0.909)				
Income quintile	1	2	3	4	5
1	**36.9**	22.4	19.7	12.5	8.6
2	23.8	**22.9**	20.2	18.2	14.9
3	20.5	26.5	**19.4**	19.3	14.3
4	13.8	20.5	22.4	**19.3**	24.0
5	5.7	8.2	18.0	30.5	**37.6**
2016	Net wealth quintile (Shorrocks index = 0.918)				
Income quintile	1	2	3	4	5
1	**30.5**	26.7	17.8	16.5	8.5
2	25.7	**18.4**	21.4	16.9	17.7
3	21.8	23.8	**21.4**	22.4	10.6
4	16.0	16.8	22.7	**22.3**	22.1
5	6.2	14.9	16.2	22.8	**39.9**

Source: MT - HFCS, Author's calculations

Hence, retired households tend to push up net wealth, but put downward pressure on income levels. These opposite effects tend to weaken the correlation between income and wealth, amongst other things.

Table 6. Joint distribution of income and net wealth across quintiles for working-age households

2010	Net wealth quintile (Shorrocks index = 0.905)				
Income quintile	1	2	3	4	5
1	**38.9**	20.0	21.4	11.6	8.1
2	26.7	**26.2**	22.6	13.0	11.5
3	17.0	28.7	**21.5**	19.7	13.1
4	14.2	20.0	25.4	**18.5**	22.0
5	5.8	6.7	20.9	33.6	**33.1**
2016	Net wealth quintile (Shorrocks index = 0.893)				
Income quintile	1	2	3	4	5
1	**36.1**	37.8	7.7	5.9	12.4
2	31.3	**21.9**	18.0	13.2	15.5
3	14.9	30.2	**27.1**	20.9	6.9
4	17.0	18.9	26.0	**20.1**	18.0
5	5.7	16.6	16.6	23.7	**37.4**

Source: MT - HFCS, Author's calculations

Motivated by the findings described above, the focus of the analysis is now shifted to examine factors that influence the position of a household in the net wealth distribution. For this purpose, a generalised ordered logit model for the probability of a household to be in a net wealth quintile given its position in the income distribution after also controlling for socioeconomic and demographic features is estimated:

$$Pr(y_i > j) = F\left(a_j + \beta'_j x_i\right), \qquad\qquad j = 0,1,\dots,J-1$$

where, y_i is an ordered categorical variable, J is the number of categories of y_i, $J-1$ is the number of thresholds required to divide the range of y into J categories, x_i is a vector that contains control variables other than the constant term and F is the standard cumulative distribution function. The model estimates $J-1$ binary regressions, that is, for values $j = 1,\dots J-1$, equation $J-1$ compares the choice between categories $1,\dots,J-1$ versus category J, while the higher the β_j ($\beta_j > 0$) is the higher the probability of moving from one category to another j. The generalised ordered model, as opposed to a standard ordered model, allows for greater flexibility in linking wealth and income, but, more importantly, for heterogeneous effects of the explanatory variables across the categories of the dependent variable (Williams, 2006; Greene & Hensher, 2010). This model estimates the odds of being beyond a certain category relative to being at or below that category. More specifically, the model estimates a separate vector of coefficients β'_j for each of the $J-1$ categories of the response variable.

The dependent variable of the model is net wealth quintiles. Control variables include income quintiles, the number of household members, gender, age, education level and labour status of the reference person, a dummy which is one if a household has received inheritance or gifts, and two dummies related to the financing structure of the HMR, namely owner-outright and owner with mortgage (as distinct from renters). The former indicates whether a household financed part or all of its HMR with its own resources, namely savings used for down payment or for the total purchase. The latter shows if a household financed its HMR with mortgage either completely or partially. These dummy variables are considered as proxies in order to capture the economic condition of a household in the past, which is also an indication of the wealth accumulation process of each household over time. In this framework, the reference groups are households in the first income quintile, whose reference person is an employee, has a primary level of education and belongs to other/renter category. Overall, similar frameworks can be found in Arrondel et al. (2014) and Martinez and Uribe (2018).

Table 7. Generalised ordered logit regression results

	1st Wealth threshold	2nd Wealth threshold	3rd Wealth threshold	4th Wealth threshold
2nd Income quintile	0.115	0.591**	0.434*	0.825**
3rd Income quintile	1.038**	1.281***	1.122***	1.279***
4th Income quintile	0.928*	1.642***	1.340***	1.758***
5th Income quintile	1.662***	2.117***	2.252***	2.879***
Gender	-0.282	-0.104	0.185	0.041
Age of reference person	0.429***	0.456***	0.375***	0.418***
Household size	-0.049	0.141	0.055	-0.146
Secondary education	0.926***	0.349	0.354*	0.397
Tertiary education	1.425***	1.111***	1.103***	1.155***
Self-employed	0.757	1.223***	1.844***	2.426***
Retired	-0.329	0.135	0.173	0.508
Other	-1.156**	0.001	0.116	0.388
Owner outright	5.251***	3.484***	4.622***	17.273
Owner with mortgage	3.961***	2.406***	3.527***	16.704
Credit-constrained households	-1.707***	-0.451	0.338	0.763
Inheritance/gifts	0.953***	1.149***	0.877***	0.491**
Pseudo R2	0.28			
N.Obs	996			

Source: MT - HFCS, Author's calculations

*** denotes significant at 1-percent level; ** denotes significant at 5-percent level; * denotes significant at 10-percent level

All estimates are weighted using household weights and take the multiple imputation structure into account

Table 7 presents the regression results of the generalised ordered logit model. The estimated coefficients of the income quintiles are positive and in most cases, significant. In other words, a rise in income increases the probability of being in a higher net wealth quintile with the exception of the fourth income quintile in the first net wealth threshold. Furthermore, within a given net wealth threshold, the estimated coefficients increase with income, suggesting that the probability of belonging to a given net wealth quintile increases along the income distribution, except for the first wealth threshold and fourth income quintile. The significance of income in the stock of household wealth and

distribution is very common in the literature (see e.g. Fessler & Schürz, 2015).

With reference to housing status, there exists a positive and significant impact on the probability of a household to be in a higher quintile in the wealth distribution for households who own their homes with no outstanding mortgages, except for the highest net wealth quintile. Hence, households that can save up enough money to partly or fully finance the purchase of a house have a high probability of being in the wealthiest quintiles in the future. With regards to households with a mortgage, this variable explains the position of households in the wealth distribution in a positive and significant way. This is related to the fact that households with mortgage are those with higher expected incomes and therefore, represent a lower risk to financial institutions. Overall, one could argue that the financing structure of the household home is an indicator of the household wealth position today.

Moving on to the effects of the other control variables, the age of the reference person is found to have a positive impact on the positon in the distribution of wealth. Gender seems to have mixed effects on the position of a household in the wealth distribution, but this dummy variable is not statistically significant. Households with a self-employed reference person are more likely to be in a higher wealth quintile, mainly due to the high value asset holdings. Household size is ambiguous and statistically insignificant. This could be attributed to the similar household structure across wealth quintiles (see Mathä et al., 2014). Credit-constrained households in the first wealth quintile are negatively affected by the lack of credit, but there is no statistically significant effect in the rest of the wealth distribution. In addition, the inheritance dummy is significant and positive, indicating that having received gifts or inheritance has a positive impact on the position in the wealth distribution. Finally, education has a positive impact on the position in the net wealth distribution.

8. Conclusion

The aim of this paper is to study income and wealth inequality in Malta in the period 2010/16, during which the Maltese economy experienced strong macroeconomic growth. Based on micro-level data from the Household Finance and Consumption Survey, various socioeconomic aspects of the distribution of income and wealth are examined. Moreover, factors that drive a household's position in the income and wealth distribution, mobility across the distributions are explored.

Similar to findings for other countries, wealth inequality in Malta is more pronounced than income inequality. However, wealth inequality increased moderately between 2010 and 2016, mainly driven by self-employment business, followed by other real estate properties and widened at a quicker pace than income inequality. In relative terms, wealth and income distribution changed somewhat in favour of households in the upper parts of the distributions.

The decomposition analysis suggests that inequality in labour income lead to greater overall income inequality, while income from pensions has the opposite effect. Furthermore, household main residence is the most equalising factor of wealth inequality, while self-employment wealth is the most disequalising factor. The role of the financial assets and indebtedness is rather limited.

As regards the factors that influence the position of a household in the wealth distribution, results indicate that higher household income levels tends to increase the probability of being in a higher net wealth quintile. More importantly, the financing structure of a household's main residence is crucial to explain its position in the wealth distribution, as is the incidence of having received inheritance or gifts.

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Disclaimer

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Notes

Note 1. The Household Finance and Consumption Survey also suggests a high home-ownership rate.

Note 2. Fieldwork was conducted in those years but data refer to preceding year. Only exception is 2010 as data are for 2010.

Note 3. For a debate see Davies and Shorrocks (2000), Sierminska and Smeeding (2005) and Jäntti et al. (2013).

Note 4. The 'Other' category includes those classified as unemployed, student/pupil/unpaid intern, permanently disabled, those in compulsory military service or equivalent social service, those fulfilling domestic task and those classed as other not working for pay.

Note 5. The Shorrocks index is based on the information on the diagonal of the transition matrix $M = [n − trace(P)]/(n − 1)$. A Shorrocks index of 1 means that there is complete mobility, while when there is no mobility the index is equal to zero. It is important to keep in mind that mobility in this analysis does not measure the joint evolution over time of the same individuals in the wealth and income distributions. It rather measures mobility within the joint distribution at two separate times. However, we note that when we repeat the analysis for the panel component of survey to trace rank mobility of households over time, the qualitatively results do not differ significantly compared to those in Table 5.

Note 6. The weak correlation between income and wealth is often found in the literature (see e.g. Kontbay-Busun & Peichl, 2015). Self-employment and housing (or home equity) are wealth components that provide highly idiosyncratic returns. Owner-occupied houses provide a financial return but they also provide nonpecuniary returns. Given their importance in the Maltese household portfolio, the weak correlation of income and wealth is possibly due to the components of wealth.