

Modeling the Joint Distribution of Income and Wealth

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This paper analyzes comparatively the joint distribution of income and wealth in several OECD countries using harmonized household-level data from the Luxembourg Wealth Study (Sierminska et al. 2006). Using an original, robust statistical model for the joint distribution of income and wealth, we study whether accounting for wealth and income jointly reveals a different pattern of social inequality than the traditional income-based approach. Are inequalities reinforced by taking net worth into account or can wealth substitute for low income? Are patterns similar across North American and European countries?

Relatively little is known about the dependence between income and wealth, especially outside the United States (Kennickell 2009) although some work has begun using the Luxembourg Wealth Study (Jantti et al. 2008). While there are obvious links between income and net wealth accumulation via savings and borrowing constraints, the dependency between these two covariates cannot be summarized in a simple way. The relationship is mitigated by, e.g., wealth portfolio allocation choices, life-cycle effects, intergenerational transfers (inheritance), past income streams and their volatility, etc. It is not entirely clear --empirically and theoretically-- if there is some trade-off between them (think of a miserly millionaire) or if they tend to be strongly positively associated thereby reinforcing social inequality overall. Better knowledge about the joint distribution of income and wealth is also relevant for the design of taxation and redistribution policies as well as for better identification and targeting of vulnerable population groups.

Some conceptual and measurement issues make measurement of inequality in wealth somewhat more challenging than standard analysis of income or consumption --these include the presence of a substantial fraction of negative net worth in most sample data on wealth, and the skewness and long tail of the distributions leading to extreme data. These features make some traditional measures of relative inequality inadequate, in particular because of negative net worth (Jenkins and Jantti 2005). The presence of negative net worth also requires different parametric models from those typically used for income distribution. Finally, given the long tails of the distribution of wealth, robust estimation techniques are required to keep the impact of extreme data under control at the estimation stage (Cowell and Victoria-Fester 1996, Van Kerm 2007). Our paper presents methods to deal with these particular characteristics of wealth data and we incorporate them in the estimation of a model for the joint distribution of income and wealth. Our model robustly captures features of the marginal distributions of income and wealth separately and picks up the dependency between the two variables in a flexible way.

Specifically, our approach to studying the joint distribution of income and wealth is based on separate estimation of univariate marginal distributions for income and for wealth (using OBRE algorithms robust to outliers, Victoria-Feser 2000), and estimation of parametric copula functions to capture the dependence between income and wealth (Genest and McKay 1986, Trivedi and Zimmer 2007). Combination of estimates for the marginal distributions and the copula provides flexible estimates of the joint distribution of income and wealth. This approach has the advantage of separating problems of estimation of marginal distributions (discussed above) and the dependence structure between the two variates.

Endowed with robust estimates of the joint distribution of income and wealth, we contrast the degree of dependence between the two varieties in different countries, and estimate the implications of this for broader measures of social inequality, such as multidimensional inequality measures (Atkinson and Bourguignon 1982, Maasoumi 1986) or conceptually simpler, univariate measures of inequality using an 'augmented income' concept that adds an annuitized value of wealth to annual income flows (Weisbrod and Hansen 1968, Irvine 1980).

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