On the Expenditure-Dependence of Children's Resource Shares

Martina Menon, Krishna Pendakur and Federico Perali[*]
University of Verona, Simon Fraser University, University of Verona

Abstract

Collective household models posit that each household member has access to a fraction of the household budget, called a *resource share*, which defines the shadow budget faced by a household member. Together with the within-household shadow price vector, the shadow budget determines the material well-being of the household member. In general, it is difficult to identify resource shares from typical household-level consumption data. However, several recent papers have shown that if resource shares do not depend on total household expenditure, then identification of resource shares may proceed from commonly available Engel curve data. Unfortunately, typical datasets do not allow the testing of this restriction. In this paper, we use a novel Italian dataset to establish that children's resource shares do not exhibit much dependence on total household expenditure. Thus, identification of resource shares on the basis of this restriction may be valid.

Keywords: Collective Households; Resource Shares; Sharing Rule; Identification.

JEL Codes: C2, D1, D6, D7.

Contact Information of Corresponding Author: Krishna Pendakur, Department of Economics, 3rd Floor, West Mall Complex, Simon Fraser University, Burnaby, BC, Canada, V5A 1S6, 778-782-5501, pendakur@sfu.ca.

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1 Introduction

Economic well-being relies on individual consumption. Unfortunately, consumption is typically measured at the household, not at the individual, level. One possible solution to this problem is the use of a structural model of the household to fill in the missing information about the within-household allocation of consumption. A long history of modeling, dating back at least to Becker (1965, 1981), has considered this problem. In particular, 'collective household' models are those in which the household is characterised as a collection of individuals, each of whom has a well-defined objective function, and who interact to generate household level decisions such as consumption expenditures. Given household-level data, useful measures of individual consumption expenditures are *resource shares*[1], defined as each member's share of total household consumption. If there is intra-household inequality, these resources shares will be unequal so standard per-capita calculations (assigning equal resource shares to all household members) are invalid measures of individual well-being.

Many papers exist on identification of resource shares in collective household models. Browning, Chiappori and Lewbel (2011) show that resource shares are nonparametrically identified from observable demand behaviour. That is, resource shares identified without the assumption of parametric structure on the collective household model. They show nonparametric identification of resource shares from household-level expenditure data if: individual preferences are known (or identified); household-level demands are observed; and there is sufficient observed price and household expenditure variation. Unfortunately, such data are very hard to come by, and their econometric models are in practise very difficult to implement.

A series of papers have found a middle ground where resource shares are semiparametrically identified, that is, identified with the assumption of parametric structure on some, but not all, parts of the model (Lewbel and Pendakur 2008; Dunbar, Lewbel and Pendakur 2012; Bargain and Donni 2012; Bargain, Donni and Gbakou 2010).[2] These papers assume

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[1] Collective household models often refer to the *sharing rule* when defining each person's within-household budget. The restriction that the resource share is invariant to household expenditure is equivalent to the restriction that the sharing rule is proportional to household expenditure.

[2] There is another, older, stream of collective household models which we do not consider in this paper. Based on the collective household model of Chiappori (1988, 1992), a series of papers show identification of *changes* in resource shares as functions of distribution factors, defined as variables which affect bargaining power, but which do not affect preferences over goods or scale economies. See, *e.g.*, Bourguignon and Chiappori (1994), Browning, Bourguignon, Chiappori, and Lechene (1994), and

that resource shares do not vary with household expenditures, so that, for example, if children get one-third of the resources in a poor household with 2 parents and 2 children, then they get one-third of household resources in a similar middle-class household. With this assumption (and some others), these papers are able to show that resource shares identified from household-level expenditure in the absence of price variation. Thus, typically available Engel curve data are sufficient for identification. Further, the econometric models they provide are nearly linear, and therefore easily implemented.

Empirical estimates of resource shares are useful for welfare analysis, poverty analysis (e.g., Dunbar, Lewbel and Pendakur 2012) and social- or group-level redistribution (e.g., Lewbel 2003). A group of empirical papers has implemented these models in a variety of settings, using the restriction that resource shares are independent of expenditure (Allessie, Crossley and Hildebrand 2006; Butikofer and Gerfin, 2009; Butikofer, Lewbel and Seitz 2011; Bargain, Donni and Kwenda 2011). Ease of implementation via (nearly) linear models and the use of only Engel curve data with no need for observed price variation are clearly valuable features of these identification theorems.

Unfortunately, the Engel curve setting does not generally allow for the testing of the assumption that resource shares do not depend on household expenditures. For example, Dunbar, Lewbel and Pendakur (2012) propose an empirical model that could rationalise all possible estimated reduced forms with a structural model wherein resource shares are independent of total household expenditure. Hence identification comes from a restriction that is not sharply testable in that data environment. The contribution of this paper is to use a novel Italian dataset to establish that children's resource shares do not exhibit much dependence on household expenditure. Thus, identification of resource shares on the basis of this restriction may be valid.

Our Italian survey, conducted in 2009, asked the following question of each household respondent who had children living in their household: "Of the monthly expenditure of your household, what you spend in percent for your children?". Thus, we have direct information from the household respondent about the children's resource share in their household.[3] We are able to compare this response to the total monthly

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Browning and Chiappori (1998). However, these papers (along with more recent variants such as Vermeulen 2002) do not identify the *level* of resource shares. In contrast, we focus on the assumption that resource shares are invariant to expenditure which underlies the theorems showing identification of the *levels* of resource shares.

[3]Cherchye, De Rock and Vermeulen (2012) use micro-data that includes intra-household expenditure allocations to test hypotheses about labour supply. Such data

expenditure of the household, and assess directly whether or not this resource share varies across household expenditures for households of a given size. We find no evidence that children's resource shares vary across levels of total household expenditures. Thus, the restrictions underlying semiparametric identification of resource shares in collective households may be valid.

2   The Data

Household data are drawn from a survey sponsored by the Italian International Center of Family Studies (CISF). This nationwide survey was conducted in 2009 using computer assisted telephone interviews by Coesis Research.[4] The sample of 4,017 interviews is a representative sample of Italian households from the population households with land-based or cellular telephone service. We exclude households with four or more children because of the small proportion of these household sizes in the data (and, in Italy). Thus, the final sample comprises 794 households with two adult parents and 1-3 children aged 18 or less.

The survey was designed to study the material and relational well-being of Italian households and the cost of children by a multidisciplinary group of sociologists, psychologists and economists.[5] Survey modules cover household demographics, composition, respondent working status, monthly disposable household income, social and relational capital, the cost of children and hours allocated to look after children. The module focused on the cost of children also includes questions about the intra-household distribution of resources including the proportion of family income allocated to children.

In addition to graphical analysis, we use OLS regressions to test the expenditure-dependence of children's resource shares, by regressing the percentage of household income allocated to children on thirteen income classes and controlling for geographical location. Table 1 shows descriptive statistics of the variables used in the empirical analysis. On average, these households spends 39 percent of their monthly disposable household income on their children. Households with one or two children comprise 40 and 50 percent of the sample, respectively. Only 10 percent of the households in our sample has three children. The table also shows the frequency distribution of the income classes. The regional

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are similar to ours in that one could compute children's shares directly. Although they do not specifically investigate expenditure-dependence of resource shares, their results are broadly consistent with ours.

[4]Coesis Research is an Italian service research agency specialized both in qualitative and quantitative researches located in Milan (http://www.coesisresearch.it/).

[5]The economic section of the survey was designed by Federico Perali.

distribution of households in our sample is presented at the end of the table. Detailed information about the dataset may be obtained in CISF (2010).

Table 1. Descriptive Statistics of the Sample of 794 Households

Variable	Mean	Std. Dev.
Resource share	39.217	14.853
Number of children:		
1	0.398	0.490
2	0.495	0.500
3	0.107	0.309
Income classes:		
less than 500 Euro	0.006	0.079
From 501 to 750 Euro	0.019	0.136
From 751 to 1,000 Euro	0.040	0.197
From 1,001 to 1,250 Euro	0.096	0.294
From 1,251 to 1,500 Euro	0.145	0.352
From 1,501 to 1,750 Euro	0.112	0.316
From 1,751 to 2,000 Euro	0.137	0.344
From 2,001 to 2,250 Euro	0.112	0.316
From 2,251 to 2,500 Euro	0.115	0.319
From 2,501 to 2,750 Euro	0.050	0.219
From 2,751 to 3,000 Euro	0.081	0.272
From 3,001 to 4,000 Euro	0.071	0.256
From 4,001 to 6,000 Euro	0.016	0.127
Northwest	0.261	0.439
Northeast	0.181	0.386
Center	0.196	0.398
South	0.241	0.428
Islands	0.121	0.326

3 Results

Figures 1, 2 and 3 show the data and give the conditional mean of reported resource shares at each level of (the discretely reported) total household expenditure variable for households with 1, 2 and 3 children, respectively. We show 95% pointwise confidence intervals are given with dotted lines. Clearly, respondents discretise their responses over resource share values, so that the conditional distribution of resource shares is lumpy. A small jitter is added to make it easier to see the density of the data at these points. These figures essentially tell the whole story: resource shares exhibit little or no dependence on total
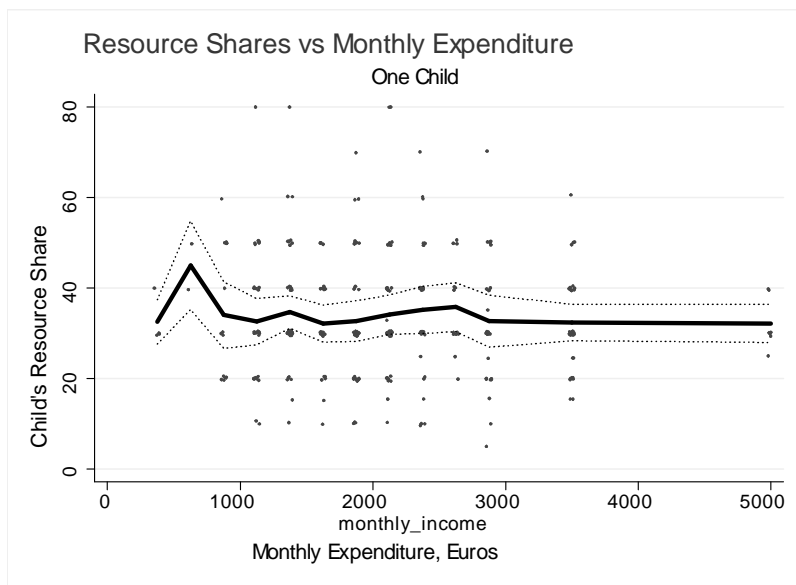
Figure 1: Couples with One Child

household expenditure.[6]

The lack of dependence we observe in the scatter plots may be driven in part by the relatively small samples we observe for each household type. Pooling the 3 household sizes would give a test with more power to reject. In Table 2, we present estimated coefficients from a regression of the resource share on dummies for each household size, each total expenditure level, and region of residence.

The regression results indicate that households with more children allocate more resources to children. For households with 1 child, the children's resource share is about 1/3, and it rises by about 7 percentage points for each additional child. However, none of the dummies for region of residence or monthly total expenditure are individually statistically significant. Of course, the restriction that resource shares are independent of expenditure is stronger than these individual tests: it requires that the expenditure level dummies are jointly irrelevant to the size of children's resource shares. The F-test of this hypothesis is 0.72, with a p-value of 0.73, so we do not reject the hypothesis that resource

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[6]The conditional means are computed separately at each level of total expenditure, so no smoothness is imposed upon this function over a continous total expenditure variable. One could instead estimate nonparametric regressions of resource shares given total expenditure, which would impose smoothness, and which would tighten the confidence intervals. Figures constructed using this methodology give the same result: there is no dependence of resource shares on total expenditure.
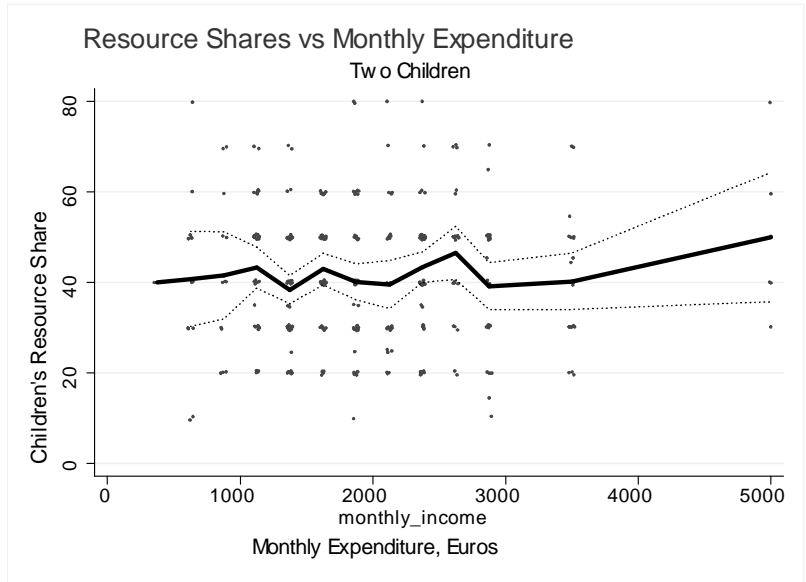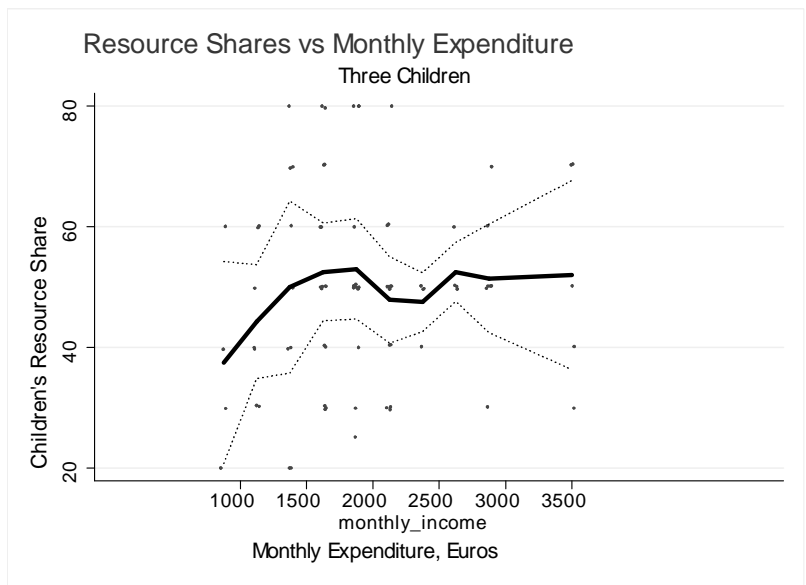
Figure 2: Couples with Two Children

Figure 3: Couples with Three Children

shares are independent of household expenditure.

Table 2. Coefficients from Resource Share Regression

		Coef.	Std. Err.	t-stat
Constant		32.71	1.78	18.34
Children	2	7.34	1.09	6.76
	3	15.91	1.75	9.12
Income	From 501 to 750 Euro	-1.40	6.46	-0.22
(left out:	From 751 to 1,000 Euro	1.52	3.95	0.38
<500 E)	From 1,001 to 1,250 Euro	-1.18	2.91	-0.40
	From 1,251 to 1,500 Euro	0.32	2.21	0.15
	From 1501 to 1750 Euro	-0.62	1.99	-0.31
	From 1751 to 2000 Euro	1.54	2.11	0.73
	From 2,001 to 2,250 Euro	0.23	2.00	0.11
	From 2,251 to 2,500 Euro	2.59	2.11	1.23
	From 2501 to 2750 Euro	4.90	2.69	1.82
	From 2751 to 3000 Euro	-0.46	2.30	-0.20
	From 3001 to 4000 Euro	-0.12	2.39	-0.05
	From 4001 to 6000 Euro	4.01	4.17	0.96
Region	Northeast	-0.29	1.52	-0.19
(left out:	Center	-0.02	1.50	-0.02
Northwest)	South	1.87	1.46	1.28
	Islands	0.80	1.78	0.45

Other tests are possible with these data, but they all suggest that the hypothesis that resource shares do not vary with expenditure is not violated in these data. We see this result in F-tests of the hypothesis for each household size (with or without region dummies). We also see the result if we replace the expenditure dummies with either a linear or quadratic model in expenditure.

4 Conclusions

Recent theoretical work (Lewbel and Pendakur 2008; Dunbar, Lewbel and Pendakur 2012; Bargain and Donni 2012; Bargain, Donni and Gbakou 2010) has provided semiparametric identification results for resource shares of each member of collective households on the basis of Engel curve data. These papers all invoke the restriction that resource shares do not depend on expenditure, but to date no test of this restriction has been offered. In this paper, we use a novel Italian dataset to establish that children's resource shares do not exhibit much dependence on household expenditure. Thus, identification of resource shares on the basis of this restriction may be valid.

References

[1] Alessie, R,.; Crossley, T, and V. Hildebrand (2006): "Estimating a collective household model with survey data on financial satisfaction", Discussion paper series / Tjalling C. Koopmans Institute, Volume: 06, Issue: 07 (2006), pp. 1-45.

[2] Bargain, O., and O. Donni (2012): "The Measurement of Child Costs: A Rothbarth-Type Method Consistent with Scale Economies and Parents' Bargaining," *European Economic Review*, forthcoming.

[3] Bargain, O., O. Donni, and M. Gbakou (2010): "The Measurement of Child Costs: Evidence from Ireland," *The Economic and Social Review*, 41(1): 1-20.

[4] Bargain, O., O. Donni, and P. Kwenda (2011): "Intrahousehold Distribution and Child Poverty: Theory and Evidence from Côte D'Ivoire", IZA Discussion Paper No. 6029.

[5] Becker, G. S. (1965): "A Theory of the Allocation of Time," *Economic Journal*, 75(299): 493-517.

[6] Becker, G. S. (1981): "Altruism in the Family and Selfishness in the Market Place," *Economica*, 48(189): 1-15.

[7] Browning, M., F. Bourguignon, P.-A. Chiappori, and V. Lechene (1994): "Incomes and Outcomes, A Structural Model of Intra-Household Allocation," *Journal of Political Economy*, 102(6): 1067-1096.

[8] Browning, M., and P.-A. Chiappori (1998): "Efficient Intra-Household Allocations, A General Characterization and Empirical Tests," *Econometrica*, 66(6): 1241-1278.

[9] Browning, M., P. A. Chiappori, and A. Lewbel (2011): "Estimating Consumption Economies of Scale, Adult Equivalence Scales, and Household Bargaining Power," Working Paper, Department of Economics, Boston College.

[10] Bütikofer, A. and M. Gerfin, M. (2009): "The Economies of Scale of Living Together and How They are Shared: Estimates Based on a Collective Household Model", IZA Discussion Paper No. 4327. Available at SSRN: http://ssrn.com/abstract=1442642.

[11] Butikofer, A., Lewbel, A. and S. Seitz (2010): "Health and Retirement Effects in a Collective Consumption Model of Older Households", Boston College Working Paper Series, WP 767.

[12] Cherchye, L., De Rock, B. and F. Vermeulen (2012): "Married with Children: A Collective Labor Supply Model with Detailed Time Use and Intrahousehold Expenditure Information", *American Economic Review*, forthcoming.

[13] Chiappori, P.-A. (1988): "Rational Household Labor Supply,"

Econometrica, 56(1): 63-90.

[14] Chiappori, P.-A. (1992): "Collective Labor Supply and Welfare," *Journal of Political Economy*, 100(3): 437-467.

[15] CISF (2010): *Il Costo dei Figli. Quale Welfare per le Famiglie?*, Milano: FrancoAngeli. http://dse.univr.it/data4you.

[16] Dunbar, G., A. Lewbel, and K. Pendakur (2012): "Children's Resources in Collective Households: Identication, Estimation and an Application to Child Poverty in Malawi," *American Economic Review*, forthcoming.

[17] Lewbel, A. (2003): "Calculating compensation in cases of wrongful death", Journal of Econometrics, Volume 113, Issue 1, March 2003, Pages 115–128.

[18] Lewbel, A., and K. Pendakur (2008): "Estimation of Collective Household Models with Engel Curves," *Journal of Econometrics*, 147(2): 350-358.

[19] Vermeulen, F. (2002): "Collective Household Models: Principles and Main Results," *Journal of Economic Surveys*, 16(4): 533-564.