

Preliminary and incomplete

Resources, Composition and Family Decision-Making*

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Extended Abstract

This paper examines the role of family members in resource allocation decisions, taking into account the distribution of resources, demographic composition and living arrangements and location choices of spatially-dispersed family members. The goal of our analyses is to provide new insights into the extent to which observed resource allocation choices provide insights into the extent and nature of connections among non co-resident family members. In particular, our focus is on the connections among members of “extended” families.

Following Altonji, Hayashi and Kotlikoff (1992), the nature of the connections are examined by testing whether fluctuations in resources in one household are fully insured by access to resources in other households within the same family. Intuitively, under the assumptions of the unitary model, income effects on resource allocations – i.e., household budget allocations across consumption goods – should be the same across all decision-makers within the unit, i.e., within extended families. We find evidence that such insurance is incomplete, a result consistent with Altonji et al. and also with a large literature on decision-making within households.

We go on to assess whether non co-resident households within extended families behave as a collective in the sense that allocations can be treated as if they are Pareto efficient (Chiappori 1992; Browning and Chiappori 1998). The testable implication of this collective model is that the ratios of income effects on any consumption good are the same for all pairs of decision-makers in a unit. A substantial literature on decision-making within households – typically husbands and wives in these models -- has failed to reject Pareto efficiency. The first key contribution of our research is the extension of the theory to the extended family and the new result that the Pareto efficient model is rejected for the extended family.

The second contribution of the paper is an empirical investigation to identify whether there are systematic patterns underlying these departures from efficiency. We find that when investments in education and housing are at stake, efficiency is rejected. In particular, we find that the departures from efficiency appear to be related, on the one hand, to spending on education by families with college-aged children and non co-resident grandparents, and, on the other hand, to spending on housing among younger, childless couples and their parents. In contrast, when such investments appear to be of little importance, the behavior of extended households is consistent with the collective model. These findings, in particular those regarding investments in education, are consistent with the findings of Dalton (2013), who reports that families target their transfers to other family members in the form of educational investments rather than as general purpose funds. This evidence suggests new avenues for empirical tests of models of family behavior and investment in human and physical capital. It also suggests that co-location of family members plays a potentially important role in these choices.

The study relies critically on key features of the longitudinal design of the Panel Study of Income Dynamics (PSID). Because it has followed “gened” children in sample families who create new households (referred to as “splitoffs”), the PSID design provides the data necessary to investigate decision-making among members of extended families, whether or not they coreside. We use data from the 199-2013 Waves, exploiting the extensive consumption data gathered in each of these waves for each PSID sample household. We exploit the longitudinal structure of these data to include family fixed effects in all of our empirical models. We also exploit the geographic dispersion of households, both cross-sectionally and over time, to construct measures of changes in local housing values as well as changes in local employment which we use as instrumental variables (IV) to further account for the potential endogeneity of within-extended-family levels of household total consumption.

1. INTRODUCTION

Whereas families play a central role in many economic models of behavioral choices, empirical studies of these models typically focus on the influence of members of the household, rather than the family, in decision-making. This largely reflects constraints imposed by data that seldom provide detailed information about non co-resident family members. This project examines the role of family members in resource allocation decisions, taking into account the distribution of resources, demographic composition and living arrangements and location choices of spatially dispersed families.

The research reported here, which is part of that broader project, provides an initial exploration into resource allocations by families in an effort to shed light on the extent to which non co-resident family members are connected through such allocations. In addition, we provide some evidence on the boundaries that are empirically important for interpreting these behavioral choices. Following Altonji, Hayashi and Kotlikoff (1992), the nature of the connections are examined by testing whether fluctuations in resources in one household are fully insured by access to resources in other households within the same family. We find insurance is incomplete within “extended” families¹, a result that is consistent with Altonji et al as well as a large literature on decision-making within households. (Bourguignon, Browning et al. 1993; Lundberg, Pollak and Wales, 1998; Thomas, 1990.) Of central interest in this research is an exploration of whether non co-resident family members behave as a collective in the sense that allocations can be treated as if they are Pareto efficient (Chiappori 1992; Browning and Chiappori 1998). That model is also rejected.

Further, the paper investigates whether there are systematic patterns underlying these

¹ The term “extended family” is intended to refer to the same concept as non-co-resident family members. The extended family includes everyone within one’s household, as well as their genetically related family members living in separate households.

departures from efficiency. Highlighting decisions revolving around large, lumpy expenditures, we find that the departures from efficiency appear to be related, on the one hand, to spending on education by families with college-aged children and non co-resident grandparents, and, on the other hand, to spending on housing among younger, childless couples and their parents. This evidence suggests new avenues for empirical tests of models of family behavior and investment in human and physical capital. The evidence also suggests that co-location of family members plays a potentially important role in these choices. These new avenues will be pursued in future research.

There is a long and distinguished literature on interactions between families and individuals in the economics and social science literatures (Becker 1973, 1974, 1991, Browning, Chiappori and Weiss, 2011.) The simplest model of a household or family treats it as a single unit – the unitary model – and assumes either that all members share the same preferences or that one member behaves as if he or she were a dictator who makes decisions. The power of the model lies in its simplicity and tractability. The cost is that assumptions about preference homogeneity that lie at the heart of the model have been rejected in multiple different settings. Intuitively, under the assumptions of the unitary model, income effects on resource allocations should be the same across all decision-makers within the unit. Several alternative, less restrictive models of family or household behavior have been proposed in the literature. In seminal work, McElroy and Horney (1981) and Manser and Brown (1980) suggested modeling decision-making as a Nash co-operative game which spawned a very large literature on bargaining models. See, for example, Lundberg and Pollak (1998) for an excellent discussion.

As an alternative to imposing a specific equilibrium concept, the collective model of decision-making, introduced and developed by Chiappori (1999, 1992 and 1997), assumes that decisions within the unit are Pareto efficient – that is one member of the unit cannot be made better off without some other member not being made worse off. The efficiency assumption yields empirically testable restrictions on both price and income effects (Browning and Chiappori, 1999).

The empirical implications of the unitary model can be interpreted as special cases of restrictions in the collective model. Moreover, in the absence of informational asymmetries, co-operative bargaining models will, in general, yield equilibria that are Pareto efficient and so those models can also be interpreted as special cases of the collective model. Browning and Chiappori (1999) have shown how these models can also be used to identify the number of decision-makers in a unit – be it a household, family or other form of collective decision-making unit such as a village or collective. For applications, see Rangel (2008) and Dauphin El Lahga, Fortin and Lacroix (2008). This is a potentially powerful result for better understanding decisions that are made within families and complex households.

An implication of the collective model is that the ratios of income effects on any good are the same for all pairs of decision-makers in a unit. To fix ideas, consider a male and female decision maker each of whom has resources under his or her own control. The ratio of the effect of the male's resources to the effect of the female's resources should be the same for all allocation choices. Using data on household budget allocations, this assumption has been tested in a variety of settings; see, for example, Bourguignon, Browning, Chiappori and Lechene (1993), Browning and Chiappori (1999), Bobonis (2009) and Rangel and Thomas (2012). In all of these studies, the empirical implications of the collective model are not rejected. While a key advantage of this type of test is that it only requires estimation of income effects, there is relatively little evidence on the power of the test in practice. Over and above the fact that some income effects may not be well determined, in the unitary model, the ratio of income effects will be equal when resources are subject to (classical) measurement error (Thomas, 1990). Power may be less of a concern in tests of the collective model based on price effects but those implications have been subjected to less empirical scrutiny; see Browning and Chiappori (1999) and Hotz, Peet and Thomas (2010) for two applications.

A handful of empirical studies provide evidence on the behavior of extended families.

Those studies reject the unitary model but fail to reject the collective model. See, for example, Witoelar (2012) who examines budget allocations in Indonesia and LaFave and Thomas (2012) who investigate the impact of family resources on human capital outcomes of young children also in Indonesia. This paper, which uses data on families in the United States contributes directly to that literature.

Our research is also motivated by seminal work by Altonji, Hayashi, and Kotlikoff (1992, 1996, and 1997) who consider the role that the resources of non-co-resident family members play in consumption choices. They find that resources of the extended family are predictive of food consumption in the respondent's own household but reject the implications of a model in which extended family members are perfectly altruistic. This is observationally equivalent to rejecting the unitary model for the entire extended family. In a similar vein, Cox (1987) considers competing models of intergenerational transfers, and attempts to determine the motivations behind these intra-familial, inter-household transfers. He finds evidence that strictly altruistic motives are not consistent with the data, suggesting the need for a more complete and complex model of dynamic interactions of extended family behavior.

Much of the empirical work that tests models of the behavior of households, families and villages has drawn on data from developing countries. One line of inquiry tests whether a group of households, defined as living in close geographic proximity (a village) or tied by blood (a family), are able to share risk efficiently (Townsend 1994; Udry 1994; Ravallion and Chaudhuri 1997). The evidence indicates households assist each other in the face of unanticipated shocks but households do not fully insure against idiosyncratic risk. Groups of households that have a bond beyond simply living near one another, such as family, are more likely to insure one another (Rosenzweig and Stark, 1989; Fafchamps and Lund 2003). Tests of risk-sharing between households often reject efficiency of sharing whereas tests based on decisions within households seldom reject efficiency. This paper fills the gap between studies of households and villages by

exploiting extremely rich longitudinal data on non co-resident family members.

There are many reasons why households, families and villages may not allocate resources (Pareto) efficiently. First, it is possible that individuals in a particular unit choose to behave non co-operatively (Pollak and Lundberg, 1991). If members of the unit are likely to participate in a repeated game over many periods, it is possible that behaviors will converge to a co-operative equilibrium; however, given that exit is an option, it is not clear that this will pertain to individuals within a household, family or village. Second, allocations may not be efficient in the presence of information asymmetries and some evidence suggests that individuals attempt to hide resources within households, families and villages (Ashraf, Karlan and Yin, 2006) or that parents may wish to hide their preferences (degree of altruism) from their offspring in order to act strategically (Hao, Hotz and Jin, 2008). Third, in a dynamic model in which resources are allocated in one period in anticipation of a *quid pro quo* in the future period, it is imperative that contracts be enforceable. Contracts within families are notoriously difficult to enforce. This may result in allocations being *ex ante* inefficient or, after behaviors are revealed, being *ex post* inefficient (Coate and Ravallion 1993; Foster and Rosenzweig 2001; Mazzocco 2007). A special case arises when resource allocations are contingent on future actions and there is scope for at least one party to not follow through on these prior commitments.

We find that resource allocations in extended families are not consistent with the implications of the efficient model. With these tests, it is not possible to distinguish among reasons for the departure from efficiency. However, our results are suggestive of potential explanations. Specifically, we find that when investments in education and housing are at stake, efficiency is rejected. When such investments appear to be of little importance, the behavior of extended households is consistent with the collective model. Future work will explore these results – and implications of models of non co-operative behavior – in more detail.

2. MODEL

2.1 *The Collective Model in the Context of a Household*

While all results in this section can be extended to include households of greater than 2 decision-makers, we will present a simplified version with only 2 decision-makers for simplicity. Assume both decision makers, wife (a) and husband (b), in the household have preferences that can be represented by general utility functions of the vectors of their own private consumption and the private consumption of the other person ($\mathbf{c}^a, \mathbf{c}^b$), and a household specific public good (\mathbf{C}). In order to satisfy Pareto efficiency, we assume that household h solves the following problem:

$$\begin{aligned}
 v^h(x^h) &= \max_{\mathbf{c}^a, \mathbf{c}^b, \mathbf{C}} u^a(\mathbf{c}^a, \mathbf{c}^b, \mathbf{C}; \mathbf{e}^a) + \mu(x, \mathbf{P}, \mathbf{z}) u^b(\mathbf{c}^b, \mathbf{c}^a, \mathbf{C}; \mathbf{e}^b) \\
 \text{s.t.} & \\
 \mathbf{p}'_a \mathbf{c}^a + \mathbf{p}'_b \mathbf{c}^b + \mathbf{p}' \mathbf{C} &= x^h
 \end{aligned} \tag{1}$$

where \mathbf{e}^k represents the vector of factors that determine preferences for person $k = a, b$, $\mu(x, \mathbf{P}, \mathbf{z})$ is the Pareto weight function, \mathbf{z} represents the vector of distribution factors, x^h are the predetermined total expenditures spent by the household, \mathbf{P} is the combined vector of prices that the husband and wife face ($\mathbf{p}_a, \mathbf{p}_b, \mathbf{p}$). The Pareto weight represents the balance of power between the two decision makers of the household. It has a lower bound of zero (when the husband has all of the power), and the larger the weight, the more decision power the wife has. The key point here is that distribution factors only affect the optimization program (1) through their influence on the Pareto weight. Distribution factors might include, for example, divorce laws, custody laws, public benefits, or factors within the household that determine the decision power of each person, such as relative wages or assets that are fully under the control of an individual under all states of the world. As a solution to this program and dropping the household h superscript for notational ease, we get a demand for good g for person $k = a, b$:

$$c_g^k(x, \mathbf{P}, \mathbf{e}^a, \mathbf{e}^b, \mu(x, \mathbf{P}, \mathbf{z})) \tag{2}$$

The primary test of the collective model that we will rely upon comes from taking the derivative

of this demand function with respect to one of the distribution factors:

$$\frac{\partial c_g^k}{\partial z_1} = \frac{\partial c_g^k}{\partial \mu} \times \frac{\partial \mu}{\partial z_1} \quad (3)$$

where this derivative follows from applying the chain rule. The ratio of the derivative (3) to the derivative of the same good with respect to a different distribution factor is:

$$\frac{\partial c_g^k / \partial z_1}{\partial c_g^k / \partial z_2} = \frac{\partial \mu / \partial z_1}{\partial \mu / \partial z_2}, \quad \forall g = 1, \dots, N; k = a, b \quad (4)$$

which is independent of the good i . It arises because the distribution factors only affect the demand for a good through their effect on the Pareto weight and so the ratio of marginal changes of demand for goods in response to changes in two different distribution factors must be the same across all goods. It is a remarkable result which is both necessary and sufficient for the collective model.

2.2 *The Collective Model and the Extended Family*

This model can be generalized to decisions in an extended family, f which maximizes

$$\begin{aligned} & \max_{\tilde{c}^1, \dots, \tilde{c}^{N^f}} \sum_{h=1}^{N^f} \tilde{\mu}^h(\tilde{x}, \tilde{\mathbf{P}}, \tilde{\mathbf{z}}) \tilde{u}^h(\tilde{\mathbf{c}}^h, \tilde{u}^{-h}) \\ & \text{s.t.} \\ & \tilde{\mathbf{P}}' \tilde{\mathbf{c}} = \tilde{x} \\ & \sum_{h=1}^{N^f} \tilde{\mu}^h(\tilde{x}, \tilde{\mathbf{P}}, \tilde{\mathbf{z}}) = 1 \end{aligned}$$

where tilde denotes a household level quantity; $\tilde{\mathbf{c}}^h$ is a vector of goods that household h consumes; N^f is the number of households in extended family f ; $\tilde{\mu}^h$ is the function that determines the Pareto weight of household h ; \tilde{x} is total expenditures of the entire extended family; $\tilde{\mathbf{P}}$ is the vector of prices faced by the extended family; $\tilde{\mathbf{z}}$ is the vector of relevant distribution factors of the extended family; and \tilde{u}^h is the household utility, which is a function of household consumption and the utility of all other households in the extended family. Note that this setup is nearly identical to the setup of the household collective program in the previous section, with one exception. Here we

restrict the utility of each household to be a function of other household's utility, instead of other household's specific consumption bundles. With these "caring preferences," the model yields predictions that are analogous to those for a household. The extended family optimization program can be recast as a two-step budgeting problem, where total resources are first divided amongst households:

$$\begin{aligned}
 W &= \max_{x^1, \dots, x^{N^f}} \sum_{h=1}^{N^f} \tilde{\mu}^h(\tilde{x}, \tilde{\mathbf{P}}, \tilde{\mathbf{z}}) \tilde{v}^h(x^h, \tilde{\mathbf{v}}^{-h}) \\
 & \text{s.t.} \\
 & \sum_{h=1}^{N^f} x^h = \tilde{x}
 \end{aligned} \tag{5}$$

and in the second stage, each household solves (1) given the assigned resources (x^h). The restriction that the ratio of income effects are the same across goods follows. Specifically, the ratio of the impact on consumption choices of distribution factors that affect the bargaining power of one household to the impact of distribution factors of another household within the same extended family should be the same across goods. These tests will be reported below.

3. DATA

Longitudinal data on individuals and families is drawn from the Panel Study of Income Dynamics (PSID), which has been collected annually from 1968-1997, and biennially between 1999-2011. The PSID is ideally suited to this research for several reasons.

First, the PSID baseline, conducted in 1968, interviewed a random selection of approximately 5,000 households across the United States. Every individual living in a baseline household in 1968 was eligible to be followed and interviewed in subsequent waves. In addition, children of those individuals are also eligible to be interviewed. We refer to all of these individuals as being assigned the PSID "gene". As these people move through their life course and separate from the baseline household, forming new households and even third or fourth generation households, they create a sample of extended families with non co-resident members. It is this

feature of the PSID that is key for this research. Moreover, detailed information on the demographic and socio-economic characteristics of each household collected in every wave reaching back nearly 50 years provides an extremely rich set of controls that are difficult to measure in the absence of the extended family frame. The composition of the analysis sample we use is described in Figure 1.

Second, in 1999, the PSID consumption module was substantially revised and more detailed information was collected on a broader set of items from each respondent. Data from this revised module plays a central role in this research. In addition to spending on food – which has been collected by the PSID since the baseline survey – we examine spending on education, housing (which includes rent, mortgage payment, utilities and maintenance costs), transportation, health and care-giving (which includes both child-care and care for adults). These measures turn out to play a central role in the empirical analyses. The categories of consumption expenditures and the component expenditures each category includes is listed in Figure 2.

Third, measurement of economic resources is far from straightforward in any survey. The PSID is designed to conduct interviews with multiple households within each extended family over time. It is thus possible to not only measure total resource availability at the level of the extended family but the repeat observations on multiple households within an extended family will be exploited by including family fixed effects in the empirical models. Assuming those resources affect household consumption in a linear and additive way, the fixed effects will absorb total extended family resources. Moreover, unobserved heterogeneity is a pernicious problem in this literature. To the extent that such factors as tastes and preferences, altruism and trustworthiness are fixed, they are also absorbed in a fixed effects framework. Fixed effects are discussed more fully in the next sub-section.

4. ECONOMETRIC STRATEGY

We estimate dynamic Working-Leser Engel curves:

$$\omega_{hft}^g = \beta_0^g + \beta_1^g \tilde{z}_{1t} + \beta_2^g \tilde{z}_{2t} + f(\tilde{x}^f) + \delta_g' \mathbf{X} + \alpha_f^g + \alpha_t^g + \varepsilon_{hft}^g \quad (6)$$

where ω_{hft}^g is the share of total expenditures of household h in family f spent on good g in period t . The vector \tilde{z} contains the extended family distribution factors that determine how resources are split within the family. The models include expenditures at the extended family level, \tilde{x}^f , in a flexible form, as well as detailed socio-demographic controls at the household and family level, \mathbf{X} . These include the size of the household and household composition captured age- and gender-specific indicators for the presence of members of the household, parallel measures at the level of the extended family, the age and education of the male and female head of the household and indicators for the structure of the extended family (specifically the presence of parents, children and other members of the extended family). All models include dynasty or extended family level fixed effects, α_f^g , and time (or survey wave) effects, α_t^g as well as unobserved heterogeneity ε_{hft}^g .

An important advantage of the dynamic models is that it is possible to take into account unobserved heterogeneity that is fixed for extended families. Since, by definition, this includes lifetime resources of the extended family, the dynamic Engel curves can be interpreted as identifying the impact on budget allocations of shifting resources across periods and between households. The fixed effects may also include genetic factors and preference such as altruism or trustworthiness as long as they can be treated as fixed during the study period. For example, families that have a preference for investment in human capital may be wealthier or share resources more equitably. To the extent these traits do not vary, they are absorbed in the dynasty fixed effects.

We have explored models that include household fixed effects (which absorb dynasty fixed effects). The coefficient estimates in these models are very similar to those that include only

dynasty fixed effects but the standard errors are substantially larger. Since these models sweep out changes in the distribution of resources within families over time, and they are likely to be of substantial value for identification of income effects, we report estimates of (6) with dynasty fixed effects.

It is straightforward to test the unitary model in (6) since income effects should not vary with the source of the income. That is, \tilde{z} of each household in an extended family should have the same impact on the share of the budget spent on any good, g :

$$\beta_h^i = \beta_g^i \quad \forall h, g = 1, \dots, N_k \text{ s.t. } h \neq g. \quad (7)$$

Tests for Pareto efficiency are based on the ratios of the income effects:

$$\frac{\beta_h^i}{\beta_g^i} = \frac{\beta_h^j}{\beta_g^j} \quad \forall i \neq j = 1, \dots, M; \quad h, g = 1, \dots, N_k, \quad (8)$$

which amounts to a non-linear Wald test. Finding that the ratios are significantly different from each other implies a rejection of the collective model.

The measurement of \tilde{z} is less straightforward. We assume that, controlling total extended family resources, higher levels of spending are indicative of elevated levels of \tilde{z} and thus power within the extended family and rely on expenditure collected in the PSID as our measure of resources. This raises at least two legitimate concerns. First, in the model, household expenditure is arguably an endogenous outcome of the family bargaining process. Second, there are potentially correlations between unobserved characteristics that affect both the household's budget share and total expenditure; common measurement error is one example.

An alternative to using expenditure would be to use wealth, non-labor income, earnings or income. All of these raise the same concerns regarding the endogenous distribution of resources (including time and savings) within the extended family. We have investigated the use of both earnings and income in the models. However, we decided to rely on expenditure since many of the extended families span multiple generations and include, on one hand, households of retired people

whose incomes are relatively low, but wealth is relatively high and, on the other hand, younger households with higher incomes but relatively little wealth. To put aside first order effects of the correlation between household size and household resources, household per capita expenditure, *PCE*, is our empirical measure of \tilde{z} and it is expressed in logarithms to generate a distribution that is close to symmetric.

Studies have used resources of the families of spouses – who are not “gened” members of the extended family in the PSID – but since those resources reflect the outcome of the marriage market, they are unlikely to be exogenous. Finally, the most natural measure of resources available to the extended family is the total expenditure of all households in that family. Relying on *PCE* at both the household and the extended family level in the models substantially simplifies interpretation of the effects of *PCE* at the household level.

Two strategies to address the concern that household *PCE* may be correlated with unobserved heterogeneity in the Engel curves have been explored. First, exploiting the panel nature of the data, if *PCE* in prior survey waves is conditionally exogenous in models of budget shares in the current period, those are valid instruments (Arellano and Bond, 1991). We have estimated IV models. With multiple previous waves, the models are over-identified so that it is possible to test the validity of the assumption that more recent *PCE* is exogenous, maintaining the exogeneity of *PCE* in the earliest period.

Second, models that include extended family fixed effects hold total lifetime resources of the extended family constant. In this context, it may be reasonable to assume decisions are made, at least to a first approximation, under certainty in which case the distribution of future resources within the extended family should have no impact on budget allocations in the current period. Under this assumption, future *PCE* provides an alternative set of instruments. In addition to using future *PCE* as instruments in IV models, we further probe the assumption by including future *PCE* in our baseline fixed effects models. It is not possible to attribute a single interpretation to rejection

of the assumption. It may indicate that *PCE* is correlated with unobserved heterogeneity or it may be that expectations about the future distribution of resources affects the path of budget shares over time.

5. EMPIRICAL RESULTS

Before presenting estimates of dynamic Engel curves, we examine correlations in resources among households within families. The first column of Table 1 relates (the logarithm of) *PCE* for each household to (the logarithm of) *PCE* of parents, children and others in the extended family, controlling the same household and extended family characteristics in (6). There is a positive and significant association between *PCE* of the index household with the *PCE* of the parents' household, the households of children and the households of other family members (who are mostly siblings). The association is largest for the latter group. All of these associations are well-determined and establish that families have much in common (share a common factor): richer households tend to be members of richer extended families.

In the second column, a dynasty fixed effect is added to the model. The estimates can be interpreted as reflecting the distribution of total extended family resources between households. As the share of the family pie attributed to the index household increases, the share attributed to other households should decline. It does. In all cases, there is evidence of competition for resources with the effects being smallest for parents and largest for others (i.e. siblings).

Table 2 presents estimates of the dynamic Engel curves that distinguish only the resources of the index household and the resources of the rest of the extended family or dynasty. In each panel, models with and without dynasty fixed effects (in columns 1 and 2, respectively) are reported. The budget shares are measured as the percentage of the household's budget spent on each of the six sub-aggregates. Thus, in the first column of the first panel, a 1% increase in *PCE* is accompanied by a 1.99% increase in the share of the budget spent on food. All own income effects are

significantly different from zero and are little affected by the inclusion of dynasty fixed effects.

Controlling own *PCE*, the *PCE* of the rest of the dynasty also predicts budget allocations. In models without fixed effects, this may reflect the fact that families have much in common (the common factor). Comparing those estimates with models that include dynasty fixed effects confirms this is empirically important. The estimated effects are not only significantly different in some cases but even change sign as is the case of budget shares allocated to transportation for which the dynasty income effects turn from being significantly positive to significantly negative. Dynasty resources are significant predictors of spending on housing and education indicating that dynasty resources affect investments in the future – or at least spending on durables. In the case of housing, the effect of dynasty resources is larger in magnitude than the effect of own resources. It is worth noting that food shares are positively and significantly related to dynasty resources in models without fixed effects but the magnitude of the effect falls by about 40% and is not significant when the models include fixed effects.

The final row of Table 2 reports tests of the equality of the effect of own and dynasty $\ln PCE$ in each Engel curve. These provide information on whether the budget allocations are consistent with the unitary model. It is rejected in all cases, with and without fixed effects.

Tests of the collective model are reported in Table 3 for the models that include dynasty fixed effects. The ratio of own to dynasty income effects are reported in the bottom panel of the table. Under the assumption of collective rationality, they should not be significantly different from each other. Inspection suggests they are not the same: they range from -18.73 (for food) to 3.97 (for care). However, they are not all well-determined – only three are significantly different from zero. The p-values for tests of the equality of ratios for each pair of goods are reported in the body of the table. Of the 15 tests, seven are significantly different at a 5% size of test and these seven include all five pair wise comparisons between housing and the other categories. The results indicate that in these models, extended family behavior is not consistent with collective rationality.

Apparently extended families do not allocate resources efficiently.

The table highlights a concern with empirical tests of the collective models. The own to dynasty income ratio for health is negative and large in magnitude but poorly determined; as a result, it is not possible to reject that it is the same as all the other ratios (except for housing which is very well determined). Precise estimation of income ratios is demanding of data and tests based on differences in ratios that are poorly determined are likely to have little power. This concern is likely to be exacerbated as the number of goods in the system increases.

It is of substantial interest to investigate how the distribution of resources within families affects budget allocations. The issue of power of the tests also arises if dynasty resources are disaggregated very finely. With this in mind, we have chosen to distinguish the *PCE* of 4 family groups: own households, households with at least one parent, households with at least one child and all other households (which are mostly households of siblings). the parents' of the index household, *PCE* of households with children of the index household and the *PCE* of the rest of the dynasty. Results for the specification in (6) are reported in Table 4.

We have three main results. First, after taking into account dynasty fixed effects, resources of other dynasty members are not related to budget shares in the index household. This is in spite of the fact that the correlations are highest among siblings (who comprise the majority of these other households). Second, higher levels of *PCE* in households of children (controlling total extended family resources) results in lower shares of the budget spent on housing. As parents downsize, their adult children may be beneficiaries. Third, as resources in the parents' household increase, the share of the budget spent on education in the index household also increases. This result does not reflect transfers of income from the parents household to the index household to cover the costs of education since our measure of resources is household *PCE* in each case. Note that this does not preclude the possibility that grandparents contribute directly to the cost of educating their grandchildren who reside in the index household.

The bottom panel of Table 4 reports F tests for the equality of all four income effects which is a test of the unitary model. It is rejected in every case.

Tests for collective rationality are reported in Tables 5 and 6. Tests based on the ratio of the impact of own resources to the impact of parents' resources are reported in Table 5. In this case, the index household contains a child of the parent household. Although four of the ratios in the bottom panel are well determined, the ratio for housing shares is not. That ratio is also negative whereas all the others are positive. As shown in the body of the table, none of the ratios is significantly different from any other in any of the pair-wise tests at a 5% size of test. It is not possible to reject the hypothesis that parents and their adult children allocate resources in a way that is consistent with Pareto efficiency.

Table 6 reports tests based on the ratio of own resources to resources in children's households so that the index household contains a parent of a member of each child's household. In these models, the ratios of income effects are sufficiently well-determined that the ratio is significantly different from zero in only one case. However, the equality of ratios is rejected for six of the fifteen pairwise comparisons indicating that efficiency is rejected for these households. Housing plays a central role and unlike the case for parents in Table 5, the ratio for housing is very well determined.

The differences in inferences regarding the efficiency of resource allocation between adult children and their parents relative to adults and their children suggests that the nature of family resource sharing may vary over the life course. To investigate this hypothesis more directly, we stratify index households by age of the household head into those that are younger (age 40 or younger) and those that are older (age over 40 years). While many of both younger and older households are in extended families with their parents, it is only the older households that have a substantial number of children who are not co-resident. Results of the models with dynasty fixed effects are reported in Table 7.

Conditional on own resources and total lifetime extended family resources, more resources in the hands of parents results in significantly smaller shares of the budget allocated to housing and transportation among younger households. Among older households, more resources in the hands of parents results in a significantly smaller share of the budget allocated to health and a larger share of the budget allocated to education. Only one of the twelve estimated effects of children's resources is significant: more resources in the hands of children predicts higher transportation shares.

The ratios of own to parent income effects and tests for efficiency are reported for younger and older households in Tables 8 and 9 respectively. Among younger households, in Table 8, the ratios for food and health are substantively different from the other ratios – but they are also poorly determined. Nonetheless, four of the 15 tests for equality of the ratios are rejected – with housing playing a key role in these tests. Among older households, the ratio for food and transportation stand out although the ratio of income effects for food is very poorly determined. Four of the 15 tests for equality are rejected. The evidence for both older and younger households indicates that resource sharing with parents is not consistent with the cooperative model.

In order to delve more deeply into the nature of families that appear to not allocate resources efficiently, we explore whether departures from efficiency are related to the demographic composition of the index household. It is possible that resource allocations by non co-resident family members are targeted at specific goods and possibly specific household members. For example, parents may target spending on items for their biological children or their grandchildren. As is clear from the two-stage budgeting interpretation of the collective model, this would be a violation of the assumptions of the model. The regression model is amended to include in the vector of covariates, \mathbf{X} , indicators for whether there is a household member other than the head and spouse in the age ranges 0-12, 13-18, 19-25 and 26 and older along with an indicator for no one else in the household. Each of these indicators is interacted with resources of the index

household, parent, child and other households. This model is flexible enough to assess whether more resources in the hands of non co-resident parents is associated with changes in budget allocations in households with children of specific ages. Table 10 reports results for older and younger households with dynasty fixed effects. We report only the interactions between demographic composition of the household and resources of the index household and parent household.

Parents' resources are only significant in a small number of cases. For older households, the share of the budget allocated to education is higher among those households that have a 19-25 year old living in the household and parents who have relatively more resources. A natural interpretation of this result is that resources in the parent household assisting with the cost of college of grandchildren resident in the index household.

Younger households are slightly more likely to have significant effects from parents' resources. There are significant effects on transportations share in the interactions for a 13-18 year old household member and also for no household member besides the head and spouse. Housing shares decrease with increased parents' *PCE* when interacted with the presence of a household member of 26 or older and also with no household member besides head and spouse.

Since housing is a category in which we have consistently seen significant dynasty effects, which has also led to more precision on the ratio tests we use to test efficiency, we will spend a little extra time analyzing this result. The two coefficients mentioned above are of comparable magnitude to many of the coefficients for own resources, which suggests parents' resources play as big a role in housing consumption decisions as own resources for young households with these compositions. Also, in younger households, members 26 or older who are not the male or female head are often a live-in significant other of the head who does not yet meet the PSID requirements

for spousal equivalence.² This is worth pointing out because such households are the most similar to those with no extra member: in the next wave, the couple will either be considered head and spousal equivalent or have separated. In either case, the household will lose its “other” member 26 and up, and will move to the classification of no extra members. Thus, once we account for family heterogeneity, parents’ resources tend to only matter for housing decisions in the case when their offspring are under 40 years of age and have yet to have had any children.

Because of the similarity between the two groups, we turn next to the Pareto efficiency tests for the case of no additional household member. For young household heads with an interaction for this household composition, we observe similar rejection patterns to the previous specification’s young household heads. Five restrictions are rejected at the 5% level, including four related to housing. We do not see similar rejections when testing the interactions with other household members in the 0-12, 13-18 or 19-25 range, indicating that it is the households without children that are most likely to behave inefficiently.

It is important to not over-interpret the result since budget shares sum to 100 and so as resources increase, an increase in the share of one sub-aggregate must be offset by a decline in one or more of the other sub-aggregates. To investigate whether this is driving the results, we estimate Engel curves that are analogous to a translog model except that we use the square root of per capita expenditure on each sub-aggregate instead of a log since it is not uncommon for households to report zero expenditure on specific items. Dropping those households with zero expenditures from the analyses will substantially complicate the analyses without a model of decisions to allocate resources to each good. While the square root approximates the log transform reasonably well, the coefficients are more difficult to interpret directly. We focus on signs and relative magnitudes. Results for the model in Table 10 are reported with this specification of the dependent variable in

² This is usually based on a continuous co-habitation for a period of at least one year.

Table 11.

All interactions for both younger and older households with own resources as significant at the 1% level for housing. The coefficient on the interaction of own resources with presence of a 19-25 year old for older households is positive but slightly smaller than the other coefficients for own resources. This rules out the interpretation that households spend less in aggregate on housing when there is a 19-25 year old in the household. Therefore, the negative coefficient on the same regressor in the budget shares specification is the result of households spending more, relatively speaking, on goods other than housing when there is a 19-25 year old present. The explanation for this comes from the large increase in education spending that occurs when there is a college-aged individual that is a member in the household, which leads to a larger share of the budget going towards education, while a smaller share goes towards housing as total resources increase.

These results can also shed light on the interpretation of the negative, significant coefficients on the interactions with parents' resources for 26 and up presence and "none" for the young group on housing expenditures. The coefficients are -3.2 and -5.8 for 26 and older and no other members, respectively; they suggest that as parents' resources increase, less is spent on housing in aggregate. In this specification, there are negative coefficients on most of the housing coefficients for young and old on parents' resources. It is possible that parents with more income have more expensive homes (possibly larger homes, homes with more amenities or homes in more desirable locations) and the adult children avail themselves of these services and substitute away from their own housing expenditures. The biggest effect is observed among households with 26 and older members (live-in, non-spouse adult co-residents) and households with no other members aside from the head and the spouse. This substitution diminishes when the adult children have children of their own presumably because own children carries different responsibilities and budget allocations. This is one possible mechanism that may explain the consistent rejections of Pareto efficiency between adult children and their parents with respect to spending on housing.

The rejections would result from a situation where the parents make monetary transfers to their adult children but with a specific target in mind. If the parent makes a monetary transfer with the expectation between both parties that the money is meant for education expenses or to help with a car, while simultaneously offering their own residence as a “supplement” for their adult children as long as the conditions on the monetary transfer are met, then we will see this rejection of Pareto efficiency in the data.

The empirical analyses thus far have assumed that *PCE* is not correlated with unobserved heterogeneity in the models. We turn next to evaluate this assumption. First, we have re-estimated the models combining fixed effects with instrumental variables. As noted above, lagged own *PCE* is assumed to be a valid instrument for current *PCE*; we also explore using future *PCE* as instruments. The sample is restricted to those households who are surveyed in all four waves. Results are reported for the model that distinguishes own, parent, child and other *PCE* for housing, education and food shares in Table A1 and for transportation, health and care budget shares in Table A2. FE OLS estimates for this analytical sample are reported for comparison purposes in column 1 and the IV estimates with lags and leads as instruments are reported in columns 2 and 3 respectively in each panel of the tables.

Results are mixed. While the coefficient estimates are not identical across the specifications, conclusions regarding the direction of the impact of own *PCE* are not changed substantively in the IV models relative to the OLS models. In all cases, the first stage models indicate the instruments are valid in the sense that they are powerful predictors of current *PCE*. (F tests are large in all cases.) However, J tests for over-identification are rejected in 4 of the 12 models. In some cases, lagged *PCE* is rejected as a valid instrument (in education and care budget shares) and in other cases future *PCE* is not valid (housing and transportation). This suggests that inter-temporal substitution of resources and the role of expected future resources have different impacts on current resource allocations.

With these concerns in mind, it is worth summarizing the IV results. Using lagged *PCE* as instruments, there are no cases in which estimated effects that are statistically significant have different signs. In every category except food expenditure, at least one extended family member type has a significant effect on the budget share. Recall that dynasty resources did not affect food consumption in the baseline specifications. There are some differences in the particulars of extended family effects, but the main result holds. Across categories, dynasty effects are non-zero but tend to be smaller than own effects. Results are qualitatively the same as the OLS estimates when leads of *PCE* serve as the instruments. Except in the case of health expenditure, estimates in these IV models are the same sign and significance as the OLS FE estimates. Own resources are not significant predictors of health budget shares. Conclusions about the effect of resources of parent households on education, resources in childrens' households on housing and other households on care are not substantively changed.

As an alternative approach to evaluating the results, future (log) *PCE* is added to the models that include interactions with household composition. Results are reported in Table C. Significant coefficients on future *PCE* suggests that households and families take into account the expected future distribution of resources within the family when making allocation decisions. Future *PCE* is predictive of current budget shares for four sub-aggregates. Higher expected resources in the future results in elevated current housing and health budget shares and lower current food and transportation shares.

6. CONCLUSIONS

This research has established that the allocation of the budget depends not only on household resources but also on the resources of non co-resident family members. While extended families share resources, the impact of those resources varies with the kin relationship between family members, with the demographic composition of the household and with the point in the life

course of the household head. Moreover, the source of funds – be it from parent households or child households – is predictive of how resources are allocated to different commodity sub-aggregates.

Incorporating extended families into empirical models of household consumer behavior is not straightforward. Treating the extended family as a single unit is unambiguously rejected. A more general model that has more appeal from a theoretical perspective assumes that resource allocations are Pareto efficient. That model is also rejected in our context.

Delving inside families and households and examining how the impact of resources in the hands of on co-resident family members vary with household composition turns out to be profitable. Among households with older heads and household members (presumably children) age 19 through 25, more resources in the hands of the parents of the head (and thus grandparents of the 19-25 year old children) are associated with elevated spending on education. We interpret this as indicating that grandparents are likely contributing resources that enable investments in college education. These results are not driven by income transfers to the index household – for those would be reflected in their own levels of resources; they are not driven by direct spending on the education of grandchildren for those would be reflected in their own education spending and not that of the index household. Rather, the result reflects a more subtle form of sharing that is indirect. We also find that parental resources have an influence on housing shares among households earlier in the life course and those without young children.

The latter results are particularly intriguing as they implicate co-location of extended family members in the nature of resource sharing. Moreover, co-location potentially addresses concerns regarding asymmetric information which is potentially a key impediment to efficient resource sharing. To this end, on-going research examines the relationship between location, resources, household composition and sharing among non co-resident family members.

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Table 1

Regress Own PCE on PCE of family members		
Fixed Effects?	No	Yes
	(1)	(2)
Parents	0.095 (0.0077)	-0.12 (0.012)
Kids	0.11 (0.012)	-0.18 (0.018)
Other Dynasty	0.14 (0.012)	-0.22 (0.026)

Observations- 21012, Dynasties- 1462
 No Fixed Effects use robust standard errors
 Dynasty Fixed Effects use clustered standard errors

Table 2

Working-Leser Engel Curves													
Dynasty resources aggregated together													
Budget share of consumption category													
Log PCE of:	Fixed Effects? ⇒	Housing		Education		Food		Transportation		Health		Care	
		No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Own		1.99 (0.36)	1.93 (0.45)	2.02 (0.15)	2.10 (0.19)	-11.84 (0.50)	-11.84 (0.55)	8.56 (0.42)	8.41 (0.49)	-1.27 (0.32)	-1.14 (0.37)	0.53 (0.07)	0.54 (0.08)
Dynasty		-0.85 (0.43)	-3.84 (0.86)	0.77 (0.18)	0.65 (0.31)	1.02 (0.46)	0.63 (0.77)	-2.01 (0.44)	2.13 (0.84)	1.03 (0.27)	0.29 (0.35)	0.04 (0.09)	0.14 (0.14)
Unitary Test		17.70 [0.00]	30.63 [0.00]	22.59 [0.00]	14.05 [0.00]	215.69 [0.00]	136.28 [0.00]	193.46 [0.00]	35.13 [0.00]	17.91 [0.00]	5.13 [0.02]	10.95 [0.00]	4.74 [0.03]

Observations- 21012, Dynasties- 1462

No Fixed Effects use robust standard errors; Dynasty Fixed Effects use clustered standard errors

Each test of unitary is an F-test with 1 restriction

(Standard errors in parentheses); [Probability under the null in brackets]

Analysis Sample Construction

	HHs	HH-years	Dynasties
Overall PSID Sample	9,655	30,227	
Less			
Latino/immigrant sample	683	2,065	
Only One HH in Dynasty	1,923	5,219	
No PSID-gened person in HH	1,433	3,744	
Gened HH member, but not head/spouse	357	1,723	
Dynasty (id = 5065) with two separately gened parents	11	33	
No legitimate expenditure categories (missing PCE)	28	28	
Analysis Sample	6,354	21,012	1,462

Source: PSID, 1999, 2001, 2003, 2005 Waves

Figure 1: Table D.1

Categories of Household Consumption Expenditures

Food	Housing	Transportation	Education	Health	Care
Food Home	Mortgage Payments	Loan/Lease	Education	Insurance	Child Care
Food Out	(up to 2 mortgages)	(up to 3 cars)		Hospitals	Adult Care
	Rent	Insurance		Nursing Homes	
	Property Tax	Gas		Doctors	
	Insurance	Maintenance		Prescriptions	
	Electric	Parking			
	Heat	Car Other Payments			
	Water	Bus/Train			
	Other Utilities	Taxi			
		Other Transportation Expenses			

Source: PSID, 1999, 2001, 2003, 2005 Waves

Figure 2: Table D.2

Table 3
Nonlinear Wald test: Are ratios equal across goods?
P-values from Pareto Efficiency Ratio Tests

Ratio: coefficient on OWN divided by coefficient on DYNASTY						
Category	Housing	Education	Food	Transportation	Health	Care
Housing		0.00	0.00	0.00	0.01	0.00
Education			0.01	0.74	0.16	0.85
Food				0.00	0.52	0.24
Transportation					0.18	1.00
Health						0.25
Care						
Ratio (SE)	-0.50 (0.12)	3.22 (1.54)	-18.73 (22.53)	3.95 (1.42)	-3.95 (4.04)	3.97 (4.34)

21012 Observations, 1462 Dynasties

P-values reported are from unreported Chi-squared statistic with 1 restriction

Only upper triangle is reported to avoid redundancy in reporting tests

Ratios are calculated from results in Table 2, Dynasty Fixed Effects

(Standard errors) are calculated using the delta method

Table 4
Working-Leser Engel Curves
Dynasty resources by family member

Log PCE of:	Fixed Effects? ⇒	Budget share of consumption category											
		Housing		Education		Food		Transportation		Health		Care	
		No (1)	Yes (2)	No (3)	Yes (4)	No (5)	Yes (6)	No (7)	Yes (8)	No (9)	Yes (10)	No (11)	Yes (12)
Own		1.64 (0.33)	1.44 (0.45)	2.21 (0.14)	2.20 (0.19)	-11.54 (0.43)	-11.76 (0.54)	8.13 (0.36)	8.68 (0.49)	-0.97 (0.27)	-1.15 (0.35)	0.53 (0.06)	0.59 (0.07)
Parents		0.64 (0.24)	-0.20 (0.33)	0.35 (0.11)	0.35 (0.14)	-0.40 (0.19)	-0.66 (0.25)	-0.79 (0.23)	0.50 (0.29)	0.18 (0.10)	-0.15 (0.14)	0.02 (0.06)	0.16 (0.08)
Kids		-1.45 (0.38)	-1.46 (0.48)	0.33 (0.17)	0.18 (0.20)	0.86 (0.29)	0.64 (0.34)	0.09 (0.34)	0.74 (0.42)	0.29 (0.23)	-0.10 (0.27)	-0.12 (0.06)	-0.02 (0.08)
Other Dynasty		0.62 (0.26)	0.53 (0.36)	0.16 (0.11)	-0.08 (0.14)	0.43 (0.21)	0.29 (0.28)	-1.56 (0.26)	-0.59 (0.33)	0.21 (0.18)	-0.31 (0.25)	0.14 (0.06)	0.15 (0.08)
Unitary Test		12.40 [0.00]	7.09 [0.00]	48.14 [0.00]	39.13 [0.00]	190.80 [0.00]	184.06 [0.00]	151.40 [0.00]	108.91 [0.00]	4.84 [0.00]	2.67 [0.05]	18.14 [0.00]	10.66 [0.00]

Observations- 21012, Dynasties- 1462

No Fixed Effects use robust standard errors; Dynasty Fixed Effects use clustered standard errors

Each test of unitary is an F-test with 3 restrictions

(Standard errors in parentheses); [Probability under the null in brackets]

Table 5
Nonlinear Wald test: Are ratios equal across goods?
P-values from Pareto Efficiency Ratio Tests

Ratio: coefficient on OWN divided by coefficient on PARENTS						
Category	Housing	Education	Food	Transportation	Health	Care
Housing		0.24	0.38	0.43	0.27	0.14
Education			0.12	0.18	0.85	0.42
Food				0.96	0.56	0.09
Transportation					0.56	0.11
Health						0.46
Care						
Ratio	-7.38	6.36	17.73	17.24	7.64	3.68
(SE)	(11.93)	(2.14)	(5.83)	(8.91)	(7.24)	(1.67)

21012 Observations, 1462 Dynasties

P-values reported are from unreported Chi-squared statistic with 1 restriction
Only upper triangle is reported to avoid redundancy in reporting tests
Ratios are calculated from results in Table 4, Dynasty Fixed Effects
(Standard errors) on ratios are calculated using the delta method

Table 6
Nonlinear Wald test: Are ratios equal across goods?
P-values from Pareto Efficiency Ratio Tests

Ratio: coefficient on OWN divided by coefficient on KIDS						
Category	Housing	Education	Food	Transportation	Health	Care
Housing		0.00	0.00	0.00	0.03	0.01
Education			0.13	0.99	1.00	0.49
Food				0.01	0.57	0.83
Transportation					0.99	0.44
Health						0.69
Care						
Ratio	-0.99	11.92	-18.32	11.65	12.02	-36.74
(SE)	(0.35)	(12.39)	(9.81)	(6.28)	(33.62)	(173.22)

21012 Observations, 1462 Dynasties

P-values reported are from unreported Chi-squared statistic with 1 restriction
Only upper triangle is reported to avoid redundancy in reporting tests
Ratios are calculated from results in Table 4, Dynasty Fixed Effects
(Standard errors) on ratios are calculated using the delta method

Table 7
Working-Leser Engel Curves
Dynasty resources by family member interacted with whether Head is Young or Old

Log PCE of:	Budget share of consumption category											
	Housing		Education		Food		Transportation		Health		Care	
	Young (1)	Old (2)	Young (3)	Old (4)	Young (5)	Old (6)	Young (7)	Old (8)	Young (9)	Old (10)	Young (11)	Old (12)
Own	2.47 (0.53)	0.59 (0.65)	2.27 (0.27)	2.06 (0.22)	-13.00 (0.80)	-10.50 (0.66)	8.96 (0.59)	8.41 (0.70)	-1.54 (0.50)	-0.81 (0.42)	0.84 (0.14)	0.30 (0.059)
Parents	-0.93 (0.39)	0.27 (0.53)	0.18 (0.15)	0.90 (0.24)	-0.23 (0.30)	-0.05 (0.38)	0.76 (0.36)	-0.69 (0.44)	0.16 (0.16)	-0.62 (0.26)	0.07 (0.10)	0.19 (0.088)
Kids	-2.99 (1.92)	-0.83 (0.51)	0.97 (0.51)	-0.08 (0.21)	1.30 (1.50)	-0.20 (0.37)	2.14 (1.81)	1.24 (0.44)	-1.30 (0.70)	-0.14 (0.30)	-0.12 (0.32)	-0.00072 (0.071)
Other Dynasty	0.27 (0.47)	0.62 (0.47)	-0.09 (0.20)	-0.05 (0.17)	-0.07 (0.39)	0.57 (0.35)	0.04 (0.46)	-0.96 (0.43)	-0.30 (0.24)	-0.26 (0.36)	0.16 (0.15)	0.076 (0.067)

Observations- 21012, Dynasties- 1462
Household head is Young if less than age 40, and Old if greater than or equal to age 40
All regressions have Dynasty Fixed Effects with clustered (standard errors)
(Standard errors in parentheses)

Table 8
Nonlinear Wald test: Are ratios equal across goods?
P-values from Pareto Efficiency Ratio Tests

Ratio for YOUNG: coefficient on OWN divided by coefficient on PARENTS						
Category	Housing	Education	Food	Transportation	Health	Care
Housing		0.02	0.01	0.01	0.16	0.03
Education			0.39	0.94	0.15	0.98
Food				0.10	0.28	0.59
Transportation					0.11	0.99
Health						0.27
Care						
Ratio (SE)	-2.67 (0.80)	12.79 (11.15)	55.36 (70.82)	11.82 (5.33)	-9.85 (9.89)	12.15 (18.20)

21012 Observations, 1462 Dynasties
P-values reported are from unreported Chi-squared statistic with 1 restriction
Only upper triangle is reported to avoid redundancy in reporting tests
Ratios are calculated from results in Table 7, Dynasty Fixed Effects
(Standard errors) on ratios are calculated using the delta method

Table 9
Nonlinear Wald test: Are ratios equal across goods?
P-values from Pareto Efficiency Ratio Tests

Ratio for OLD: coefficient on OWN divided by coefficient on PARENTS						
Category	Housing	Education	Food	Transportation	Health	Care
Housing		0.98	0.60	0.56	0.81	0.90
Education			0.00	0.00	0.43	0.54
Food				0.15	0.02	0.04
Transportation					0.01	0.02
Health						0.80
Care						
Ratio (SE)	2.14 (4.10)	2.29 (0.56)	199.10 (1441.96)	-12.20 (7.67)	1.31 (0.83)	1.59 (0.73)

21012 Observations, 1462 Dynasties

P-values reported are from unreported Chi-squared statistic with 1 restriction

Only upper triangle is reported to avoid redundancy in reporting tests

Ratios are calculated from results in Table 7, Dynasty Fixed Effects

(Standard errors) on ratios are calculated using the delta method

Table 10
Working-Leser Engel Curves
Dynasty resources by family member with interactions

Log PCE of:	If there is residing member age:	Budget share of consumption category											
		Housing		Education		Food		Transportation		Health		Care	
		Young (1)	Old (2)	Young (3)	Old (4)	Young (5)	Old (6)	Young (7)	Old (8)	Young (9)	Old (10)	Young (11)	Old (12)
Own	0-12	1.39 (0.67)	1.24 (1.05)	1.11 (0.23)	-0.15 (0.35)	-12.25 (0.92)	-6.33 (0.91)	8.69 (0.64)	3.63 (1.30)	-0.99 (0.61)	0.3 (0.38)	2.05 (0.31)	1.31 (0.21)
	13-18	-0.87 (1.16)	-1.21 (0.98)	0.37 (0.28)	1.28 (0.48)	-3.1 (1.91)	-5.56 (0.83)	5.02 (1.26)	6.31 (0.97)	-0.65 (1.27)	-0.67 (0.49)	-0.77 (0.25)	-0.16 (0.10)
	19-25	-2.23 (1.25)	-3.55 (1.12)	2.73 (0.53)	5.72 (0.57)	-6.42 (1.29)	-3.89 (1.02)	5.34 (1.39)	2.37 (1.52)	0.72 (0.52)	-0.61 (0.44)	-0.14 (0.29)	-0.04 (0.08)
	26 and up	0.77 (1.44)	-0.36 (1.66)	1.12 (0.58)	-0.69 (0.57)	-7.37 (1.30)	-4.79 (1.57)	6.94 (1.17)	5.54 (2.22)	-1.38 (1.49)	0.25 (0.68)	-0.07 (0.24)	0.04 (0.11)
	None	4.31 (0.75)	2.13 (0.88)	2.88 (0.49)	0.52 (0.22)	-11.47 (1.18)	-10.09 (0.87)	6.2 (0.82)	8.21 (0.74)	-1.87 (0.68)	-0.86 (0.57)	-0.05 (0.06)	0.08 (0.06)
Parents	0-12	-0.25 (0.49)	0.13 (0.88)	-0.09 (0.17)	-0.28 (0.40)	-0.03 (0.41)	0.14 (0.70)	0.19 (0.43)	-0.4 (0.79)	0.19 (0.19)	0.25 (0.48)	-0.01 (0.19)	0.16 (0.23)
	13-18	-0.27 (0.80)	1.39 (0.79)	0.17 (0.23)	0.14 (0.41)	1.23 (0.86)	-0.38 (0.58)	-1.8 (0.77)	-0.55 (0.79)	0.47 (0.41)	-0.6 (0.37)	0.19 (0.21)	0.01 (0.16)
	19-25	0.58 (1.04)	-1.62 (0.97)	0.43 (0.46)	1.67 (0.55)	-0.28 (1.00)	1.38 (0.68)	-0.66 (1.10)	-0.85 (0.85)	0.22 (0.48)	-0.6 (0.37)	-0.29 (0.25)	0.01 (0.11)
	26 and up	-2.75 (1.09)	-0.01 (1.53)	-0.29 (0.41)	-0.65 (0.60)	1.57 (0.95)	-1.35 (1.42)	1.07 (1.05)	2.01 (1.07)	0.24 (0.46)	-0.06 (0.55)	0.16 (0.28)	0.07 (0.16)
	None	-2.08 (0.67)	0.37 (0.90)	0.42 (0.31)	0.23 (0.35)	-0.38 (0.53)	0.08 (0.70)	1.95 (0.64)	0.01 (0.77)	0.07 (0.29)	-0.73 (0.42)	0.01 (0.07)	0.03 (0.08)

Observations- 21012, Dynasties- 1462

No Fixed Effects use robust standard errors; Dynasty Fixed Effects use clustered standard errors
(Standard errors in parentheses)

Table 11
 Dynasty resources by family member with interactions

Log PCE of:	If there is residing member age:	Square root of expenditures in consumption category											
		Housing		Education		Food		Transportation		Health		Care	
		Young (1)	Old (2)	Young (3)	Old (4)	Young (5)	Old (6)	Young (7)	Old (8)	Young (9)	Old (10)	Young (11)	Old (12)
Own	0-12	34.11 (1.63)	25.19 (2.66)	8.02 (0.85)	3.53 (1.72)	14.56 (0.58)	8.76 (1.01)	40.33 (1.80)	27.24 (3.80)	10.28 (0.78)	9.61 (1.17)	17.71 (1.09)	10.90 (1.20)
	13-18	16.96 (5.71)	22.85 (2.49)	4.79 (1.39)	12.68 (1.77)	6.33 (1.06)	10.01 (1.16)	19.27 (3.97)	29.05 (2.39)	6.11 (1.50)	7.99 (1.15)	-5.8 (1.25)	-1.08 (0.52)
	19-25	10.99 (2.05)	17.25 (2.81)	13.89 (1.97)	29.74 (2.71)	6.64 (1.16)	8.27 (1.10)	24.43 (3.01)	24.25 (3.43)	6.37 (1.20)	6.61 (1.86)	-1.57 (1.09)	-0.56 (0.44)
	26 and up	17.3 (1.96)	22.63 (6.56)	6.62 (2.17)	-2.67 (2.96)	8.31 (1.32)	10.71 (1.66)	26.59 (2.64)	24.74 (4.66)	5.77 (1.28)	10.7 (2.68)	-0.86 (1.04)	0.03 (0.49)
	None	32.67 (1.85)	37.63 (3.03)	11.56 (1.42)	2.58 (0.87)	15.83 (0.81)	20.41 (6.21)	33.18 (2.45)	36.9 (2.61)	6.24 (0.68)	14.47 (1.43)	-0.43 (0.26)	0.05 (0.23)
Parents	0-12	-1.54 (0.78)	-0.07 (1.42)	-0.91 (0.63)	-1.08 (1.72)	-0.56 (0.67)	0.62 (1.13)	-0.87 (0.81)	-3.26 (1.71)	-0.02 (0.56)	-0.35 (1.33)	0.05 (0.70)	1.33 (1.17)
	13-18	-0.02 (1.72)	1.28 (1.34)	2.16 (1.02)	0.38 (1.64)	0.36 (0.96)	-2.45 (0.90)	-2.38 (1.56)	-0.44 (1.55)	1.31 (0.95)	-1.11 (1.09)	0.48 (0.91)	-0.36 (0.72)
	19-25	-0.8 (1.61)	-2.64 (1.57)	0.89 (1.47)	6.75 (2.17)	-1.97 (1.18)	-0.43 (1.22)	-3.05 (2.16)	-2.16 (1.78)	-0.2 (1.26)	-1.27 (1.19)	-1.41 (0.93)	-0.26 (0.63)
	26 and up	-3.21 (1.62)	-0.3 (3.74)	-0.19 (1.56)	-1.43 (2.71)	1.92 (1.14)	-5.52 (3.75)	3.33 (1.94)	4.88 (2.08)	1.28 (1.35)	-0.91 (1.49)	1.17 (1.11)	0.05 (0.64)
	None	-5.77 (0.98)	-2.66 (1.17)	-0.02 (0.89)	-0.29 (1.11)	-1.95 (0.80)	-1.55 (0.94)	0.8 (1.08)	-1.06 (1.33)	-1.77 (0.62)	-3.31 (0.99)	0.02 (0.30)	0.03 (0.35)

Observations- 21012, Dynasties- 1462

No Fixed Effects use robust standard errors; Dynasty Fixed Effects use clustered standard errors
 (Standard errors in parentheses)

Table 12
Nonlinear Wald test: Are ratios equal across goods?
P-values from Pareto Efficiency Ratio Tests

Ratio for YOUNG interacted with dummy NONE: coefficient on OWN divided by coefficient on PARENTS						
Category	Housing	Education	Food	Transportation	Health	Care
Housing		0.00	0.00	0.00	0.04	0.87
Education			0.31	0.31	0.37	0.79
Food				0.01	0.69	0.85
Transportation					0.18	0.71
Health						0.89
Care						
Ratio (SE)	-2.07 (0.59)	6.79 (4.96)	30.58 (43.10)	3.18 (1.03)	-26.93 (107.62)	-4.30 (25.98)

21012 Observations, 1462 Dynasties
P-values reported are from unreported Chi-squared statistic with 1 restriction
Only upper triangle is reported to avoid redundancy in reporting tests
Ratios are calculated from results in Table 10, Dynasty Fixed Effects
(Standard errors) on ratios are calculated using the delta method

Table A1
Instrumenting for Own PCE
Using Past and Future PCE as instruments
Dynasty resources by family member

	Budget share of consumption category								
	Housing			Education			Food		
	OLS	IV with Lags	IV with Leads	OLS	IV with Lags	IV with Leads	OLS	IV with Lags	IV with Leads
Own	1.06 (0.56)	8.15 (1.28)	3.45 (1.35)	2.12 (0.21)	-0.37 (0.52)	2.59 (0.57)	-11.66 (0.59)	-12.12 (1.07)	-16.49 (1.10)
Parents	-0.58 (0.41)	0.38 (0.39)	-0.25 (0.39)	0.37 (0.17)	0.04 (0.17)	0.44 (0.18)	-0.29 (0.30)	-0.35 (0.30)	-0.95 (0.29)
Kids	-1.66 (0.54)	-0.64 (0.49)	-1.32 (0.48)	0.15 (0.22)	-0.21 (0.21)	0.22 (0.21)	0.32 (0.38)	0.25 (0.38)	-0.38 (0.38)
Other Dynasty	0.29 (0.43)	1.69 (0.46)	0.76 (0.46)	-0.03 (0.16)	-0.52 (0.18)	0.07 (0.18)	0.15 (0.28)	0.06 (0.34)	-0.80 (0.36)
Pvalue for J stat		0.13	0.023		0.0023	0.72		0.21	0.40

Using Stock and Yogo (2005) 5% critical values, we reject that the model is weakly identified.

Observations- 16340, Dynasties- 1462

All regressions use Dynasty Fixed Effects with robust standard errors
(Standard errors in parentheses)

Table A2
Instrumenting for Own PCE
Using Past and Future PCE as instruments
Dynasty resources by family member

	Transportation			Health			Care		
	OLS	IV with Lags	IV with Leads	OLS	IV with Lags	IV with Leads	OLS	IV with Lags	IV with Leads
Own	9.05 (0.58)	2.88 (1.11)	9.76 (1.20)	-1.11 (0.38)	0.56 (0.64)	0.06 (0.71)	0.53 (0.10)	0.91 (0.25)	0.63 (0.27)
Parents	0.50 (0.35)	-0.33 (0.35)	0.60 (0.36)	-0.21 (0.18)	0.01 (0.18)	-0.05 (0.19)	0.20 (0.10)	0.25 (0.10)	0.22 (0.09)
Kids	1.02 (0.47)	0.13 (0.44)	1.12 (0.43)	0.20 (0.30)	0.44 (0.27)	0.36 (0.27)	-0.03 (0.09)	0.03 (0.08)	-0.01 (0.09)
Other Dynasty	-0.36 (0.37)	-1.58 (0.40)	-0.22 (0.40)	-0.23 (0.26)	0.10 (0.29)	-0.00 (0.29)	0.18 (0.10)	0.25 (0.09)	0.20 (0.10)
Pvalue for J stat	0.26		0.000031	0.29		0.17	0.0013		0.29

Using Stock and Yogo (2005) 5% critical values, we reject that the model is weakly identified.

Observations- 16340, Dynasties- 1462

All regressions use Dynasty Fixed Effects with robust standard errors
(Standard errors in parentheses)

Table B
Instrumenting for Own PCE and Parents PCE
Using EITC of Own and Parent's states of residence as instruments
Dynasty resources by family member

Log PCE of:	Budget share of consumption category					
	Housing (1)	Education (2)	Food (3)	Transportation (4)	Health (5)	Care (6)
Own	36.40 (20.40)	22.59 (11.64)	-22.15 (11.33)	-42.63 (23.91)	-0.18 (6.87)	5.98 (4.40)
Parents	3.28 (6.27)	3.68 (3.33)	-7.45 (3.47)	-7.80 (7.50)	7.26 (2.37)	1.03 (1.30)
Kids	4.62 (3.58)	4.02 (2.00)	-2.42 (2.04)	-8.84 (4.27)	1.65 (1.22)	0.98 (0.78)
Other Dynasty	7.97 (4.28)	4.28 (2.43)	-2.38 (2.39)	-11.65 (5.07)	0.46 (1.45)	1.32 (0.93)

Kleibergen-Paap underidentified rank test p-value: .018; Reject underidentification

Kleibergen-Paap Weak identification F-stat: 2.83

Using Stock and Yogo (2005) 5% critical values, we fail to reject that the model is weakly identified.

Observations- 20909, Dynasties- 1462

All regressions use Dynasty Fixed Effects with clustered standard errors
(Standard errors in parentheses)

Table C
Next period's Own PCE used as regressor
Dynasty resources by family member with interactions

Log PCE of:	If there is residing member age:	Budget share of consumption category											
		Housing		Education		Food		Transportation		Health		Care	
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Own	0-12	0.29 (0.20)	-0.54 (0.62)	0.30 (0.07)	0.14 (0.18)	-2.91 (0.18)	-5.73 (0.71)	2.10 (0.19)	6.34 (0.60)	-0.13 (0.12)	-0.90 (0.37)	0.36 (0.05)	0.68 (0.28)
	13-18	-0.10 (0.18)	0.13 (0.89)	0.44 (0.09)	0.49 (0.29)	-1.55 (0.17)	-2.24 (1.03)	1.36 (0.19)	3.08 (0.89)	-0.07 (0.10)	-1.23 (0.79)	-0.08 (0.04)	-0.24 (0.16)
	19-25	-0.14 (0.20)	-2.84 (0.86)	0.70 (0.11)	2.63 (0.48)	-2.18 (0.17)	-2.19 (0.69)	1.69 (0.20)	2.31 (0.82)	-0.05 (0.11)	0.14 (0.47)	-0.02 (0.04)	-0.04 (0.13)
	26 and up	0.37 (0.27)	-0.27 (1.42)	0.18 (0.10)	0.23 (0.35)	-2.39 (0.22)	-3.97 (0.81)	1.94 (0.25)	4.37 (1.16)	-0.16 (0.14)	-0.67 (0.96)	0.06 (0.05)	0.31 (0.18)
	None	0.32 (0.24)	1.08 (0.57)	0.47 (0.10)	1.19 (0.23)	-3.01 (0.22)	-5.52 (0.89)	2.52 (0.22)	4.18 (0.54)	-0.32 (0.17)	-1.00 (0.54)	0.02 (0.04)	0.07 (0.04)
Own, Next Period	0-12		0.89 (0.59)		0.09 (0.17)		3.13 (0.70)		-4.65 (0.59)		0.88 (0.33)		-0.34 (0.27)
	13-18		-0.20 (0.85)		-0.10 (0.29)		0.88 (1.00)		-1.95 (0.86)		1.24 (0.75)		0.15 (0.15)
	19-25		2.75 (0.85)		-2.01 (0.46)		0.27 (0.68)		-0.92 (0.81)		-0.11 (0.48)		0.01 (0.14)
	26 and up		0.68 (1.38)		-0.12 (0.34)		1.86 (0.80)		-2.76 (1.12)		0.61 (0.95)		-0.27 (0.17)
	None		-0.76 (0.54)		-0.83 (0.21)		2.92 (0.84)		-2.08 (0.51)		0.81 (0.46)		-0.06 (0.04)
Parents	0-12	-0.13 (0.12)	-0.14 (0.12)	-0.11 (0.05)	-0.09 (0.05)	0.62 (0.10)	0.53 (0.10)	-0.51 (0.12)	-0.40 (0.12)	0.14 (0.06)	0.11 (0.05)	-0.01 (0.03)	-0.00 (0.03)
	13-18	-0.11 (0.10)	-0.12 (0.10)	-0.06 (0.05)	-0.05 (0.05)	0.51 (0.08)	0.46 (0.08)	-0.38 (0.10)	-0.31 (0.10)	0.11 (0.05)	0.08 (0.05)	-0.07 (0.03)	-0.07 (0.03)
	19-25	-0.08 (0.12)	-0.10 (0.12)	0.05 (0.07)	0.08 (0.07)	0.47 (0.09)	0.42 (0.09)	-0.49 (0.12)	-0.43 (0.12)	0.02 (0.05)	0.01 (0.05)	0.02 (0.03)	0.02 (0.03)
	26 and up	-0.25 (0.17)	-0.26 (0.16)	-0.15 (0.06)	-0.13 (0.06)	0.63 (0.14)	0.55 (0.14)	-0.30 (0.16)	-0.21 (0.16)	0.07 (0.08)	0.05 (0.08)	-0.00 (0.04)	0.00 (0.04)
	None	-0.09 (0.15)	-0.09 (0.15)	-0.13 (0.07)	-0.10 (0.07)	0.75 (0.12)	0.64 (0.12)	-0.50 (0.14)	-0.38 (0.14)	0.01 (0.08)	-0.03 (0.07)	-0.05 (0.03)	-0.05 (0.03)
Kids	0-12	-0.20 (0.14)	-0.22 (0.14)	-0.21 (0.06)	-0.18 (0.06)	1.14 (0.13)	0.99 (0.12)	-0.63 (0.13)	-0.44 (0.13)	0.07 (0.07)	0.02 (0.07)	-0.18 (0.03)	-0.17 (0.03)
	13-18	-0.17 (0.13)	-0.19 (0.13)	-0.26 (0.06)	-0.24 (0.06)	0.71 (0.12)	0.63 (0.12)	-0.34 (0.13)	-0.25 (0.13)	-0.01 (0.06)	-0.04 (0.06)	0.08 (0.03)	0.08 (0.03)
	19-25	-0.14 (0.13)	-0.17 (0.13)	-0.27 (0.07)	-0.23 (0.07)	0.81 (0.11)	0.72 (0.11)	-0.47 (0.13)	-0.36 (0.13)	0.04 (0.06)	0.00 (0.06)	0.03 (0.03)	0.04 (0.03)
	26 and up	-0.22 (0.18)	-0.23 (0.18)	-0.23 (0.07)	-0.20 (0.07)	0.91 (0.15)	0.82 (0.15)	-0.53 (0.18)	-0.41 (0.18)	0.04 (0.08)	0.01 (0.08)	0.02 (0.04)	0.02 (0.03)
	None	-0.32 (0.17)	-0.33 (0.17)	-0.45 (0.08)	-0.39 (0.08)	1.43 (0.15)	1.24 (0.15)	-0.97 (0.17)	-0.75 (0.17)	0.21 (0.09)	0.14 (0.08)	0.09 (0.03)	0.10 (0.03)
Other Dynasty	0-12	-0.09 (0.16)	-0.14 (0.16)	-0.33 (0.07)	-0.28 (0.07)	2.06 (0.16)	1.81 (0.15)	-1.55 (0.17)	-1.25 (0.16)	0.06 (0.09)	-0.02 (0.08)	-0.14 (0.04)	-0.12 (0.04)
	13-18	0.20 (0.15)	0.17 (0.15)	-0.22 (0.08)	-0.18 (0.08)	0.95 (0.15)	0.80 (0.14)	-0.93 (0.16)	-0.75 (0.16)	0.05 (0.09)	-0.01 (0.08)	-0.04 (0.03)	-0.04 (0.03)
	19-25	0.07 (0.15)	0.02 (0.15)	-0.50 (0.08)	-0.43 (0.08)	1.36 (0.16)	1.17 (0.15)	-0.85 (0.17)	-0.63 (0.17)	-0.02 (0.10)	-0.08 (0.09)	-0.06 (0.03)	-0.05 (0.03)
	26 and up	-0.24 (0.21)	-0.28 (0.21)	-0.19 (0.08)	-0.13 (0.08)	1.63 (0.20)	1.39 (0.19)	-1.20 (0.22)	-0.92 (0.21)	0.10 (0.11)	0.02 (0.10)	-0.10 (0.04)	-0.08 (0.04)
	None	-0.07 (0.19)	-0.10 (0.19)	-0.44 (0.08)	-0.36 (0.08)	2.40 (0.19)	2.09 (0.18)	-1.93 (0.19)	-1.59 (0.19)	0.12 (0.12)	0.02 (0.10)	-0.08 (0.04)	-0.06 (0.04)

Observations- 14448, Dynasties- 1462
Dynasty Fixed Effects use robust standard errors
(Standard errors in parentheses)