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Working Paper

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IZA Discussion Papers, No. 1869

Provided in Cooperation with:

IZA – Institute of Labor Economics

Suggested Citation: Becker, Sascha O.; Bentolila, Samuel; Fernandes, Ana; Ichino, Andrea (2005) : Job insecurity and youth emancipation: a theoretical approach, IZA Discussion Papers, No. 1869, Institute for the Study of Labor (IZA), Bonn

This Version is available at:

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IZA DP No. 1869

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ABSTRACT

Job Insecurity and Youth Emancipation: A Theoretical Approach^{*}

In this paper, we propose a theoretical model to study the effect of income insecurity of parents and offspring on the child's residential choice. Parents are partially altruistic toward their children and will provide financial help to an independent child when her income is low relative to the parents'. We show that first-order stochastic dominance (FOSD) shifts in the distribution of the child's future income (or her parents') will have ambiguous effects on the child's residential choice. The analysis identifies altruism as the source of ambiguity in the results. If parents are selfish or the joint income distribution of parents and child places no mass on the region where transfers are provided, a FOSD shift in the distribution of the child's (parents') future income will reduce (raise) the child's current income threshold for independence.

JEL Classification: D1, J1, J2

Keywords: altruism, emancipation, job security, option value

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^{*} This research is supported by the European Commission TSER Project number ERB4142 PL97/3148. This paper previously circulated under the title "Job Insecurity and Children's Emancipation". We thank the comments of Gian Luca Clementi, Sandra Black, Randy Wright, and seminar participants at the CEP (LSE), CEPR TSER workshop on "Labor Demand, Education and the Dynamics of Social Exclusion" (June 2001), EALE 14th Annual Congress, EEA 17th and 18th Annual Congresses, ESSLE 2002, IZA, SED 2003, and the Universities of Frankfurt, Mannheim, Munich, Oxford, Pompeu Fabra, Salamanca, and Salerno. We also wish to thank CESifo and EUI for hosting the author team during research visits.

1 Introduction

The age at which children leave the parental home differs considerably across countries. In 2002, for men aged 25 to 29 years old, some of the lowest coresidence rates in the European Union (EU) could be found in France, the Netherlands and the UK, ranging from 20 to 22%. In Italy, by striking contrast, the coresidence rate for the same group was 73%. Other southern European countries shared the Italian record, such as Greece (70%), Spain (67%), and, to a lesser extent, Portugal (58%). Perhaps surprising at first sight, the coresidence rate in a Nordic country like Finland was amongst the highest in Europe (73%). Similar disparities were present among women. Regarding time trends, for the same age group of males, in the mid-1980s coresidence rates were approximately 50% in Italy, Greece, and Spain (and 38% in Portugal). Thus, there has been a sustained upward trend in these five countries, with more stability in the remaining EU countries.

Early attention to household membership decisions – whether to stay at the parental home or to live apart – can be found in McElroy (1985), where the joint determination of labor supply participation and household membership is examined. Rosenzweig and Wolpin (1993), study the properties of financial transfers from parents to their young adult sons, as well as transfers in the form of shared residence, with particular attention posed on the child’s accumulation of human capital. Other contributions include Ermisch (1999), and Card and Lemieux (2000). This body of literature focusses on the effects of the income of parents and children and of housing prices on the coresidence decisions of youth. Regarding the southern European experience, Manacorda and Moretti (2005) have emphasized the income of parents in Italy (who bribe their children to stay at home), whereas housing costs were examined in Giannelli and Monfardini (2003), for Italy, and in Martinez-Granado and Ruiz-Castillo (2002), for Spain. Giuliano (2004) proposes a higher desirability of living at home due to the increased freedom for young adults brought forth by the “sexual revolution” of the late 1960s.

In a companion empirical paper Becker, Bentolila, Fernandes and Ichino (2005a), we focus on one factor which has not received much attention so far, namely the degree of job

security enjoyed by youths and their parents. Using both panel data for Italy and macro data for European Union countries, we estimate the effect of perceived job security on coresidence. For Italy, we rely on the Survey of Household Income and Wealth (SHIW). Our measure of job insecurity comes from a direct question asked to the respondents of the 1995 survey regarding their assessment of the probability of remaining employed (if employed at the time) or of finding a job (if unemployed).¹ We use the complement of this probability, which we label p , and which corresponds to the probability of losing one's job or of becoming unemployed. Our empirical work provides estimates of the impact of changes in p on the child's probability of coresidence. After controlling for a variety of demographic variables, we find strong and statistically significant effects of parental perceived job insecurity on the child's probability of becoming independent, with perceived insecurity raising the probability of independence. Our macroeconomic data comes from questionnaires collected by the European Commission's Eurobarometer. At the macro level, insecurity of both young and old affects coresidence in a strong and statistically significant fashion. In the current paper, we propose a theoretical model to study the conditions under which the aforementioned empirical results hold true.

In our model, parents are partially altruistic toward their children and will provide financial help to an independent child when her income is low relative to the parents. However, if a child coresides with her parents, we assume she will have access to a greater share of total familial income than granted to her through financial transfers in the state of independence. This assumption is rooted on the difficulty of excluding the child from the consumption of public goods such as housing. Moving out is costly; in fact, in our setup, moving out is irreversible.² We consider two dimensions of income insecurity, corresponding to shifts in the distribution of income in the sense of first- and second-order stochastic dominance (abbreviated FOSD and SOSD, respectively). While one well-known implication of FOSD shifts in the income distribution is for expected

¹Endogeneity issues prevent us from using the child's perceived job insecurity measure in the SHIW as an additional regressor.

²We will argue later that this assumption carries no loss of generality as compared to finite moving costs while providing substantial tractability gains.

income to increase, under SOSD expected income is held constant and it is the variance of the income process that declines.

We show that FOSD shifts in the distribution of the child's future income (or her parents') will have ambiguous effects on the child's residential choice. For income pairs such that parents provide transfers to their independent children, higher income (either the child's or her parents') raises the child's consumption both at home and when independent. Partially altruistic parents will only provide transfers to children whose consumption is lower than their own. Therefore, when transfers are provided, if the child or the parent's income increase, while consumption at the parental home goes up by more than consumption when independent, the marginal utility of an extra unit of consumption is highest for an independent child. Consequently, for the range of income values such that transfers are positive, the impact of the child's higher income (or her parents') affects the differential utility across the two residential states in an ambiguous way. Further, while some parameter values allow us to solve this ambiguity for one family member, we show that the ambiguous effect of income on coresidence cannot be simultaneously eliminated for both parent and child.

Our analysis identifies parental altruism as the very source of the ambiguous impact of higher income on the child's residential status. Absent altruism, since transfers will no longer be given to independent children, the intuitive results that FOSD shifts in the distribution of the child's (parents') future income reduce (raise) the child's current income threshold for independence do emerge. More generally, in the presence of altruism, these results only hold true when the joint income distribution of parent and child places no mass on the region where transfers are made. The altruism driven ambiguity of income changes on the child's residential status has implications for SOSD income shifts, as well. Once again, unambiguous results only emerge for either selfish parents or by confining attention to income distributions such that positive transfers do not take place. In these cases, SOSD shifts in the distribution of the child's (parents') income reduce (raise) the child's income threshold for independence.³

³Our model also allows us to study the implications of the parent's current income and family size

To our knowledge, the first paper proposing (parental) job security as a determinant of late youth emancipation is Fogli’s (2004). Other than our work, this is also the only other reference we are aware of that explicitly considers job security as a determinant of household membership decisions. While sharing the common concern of the effects of job security on coresidence, our analysis and goals are very different. Fogli starts from the interesting realization that countries with tight credit constraints also display high coresidence rates and high degrees of employment protection. She then argues that, given the credit constraints, employment protection for the parents is the outcome of a bargaining process between the young and old generations. Using an overlapping generations model, she studies the political economy environment of her economy under general equilibrium, focusing on whether or not the institutional environment of real economies may be an optimal outcome in the context of her model. Ours is a partial equilibrium model that analyses the residential choice of one person at a time, and considers this individual in its relations with her family members.

In the next section, we present our model and results. We then argue that the empirical micro estimates in Becker *et al.* (2005a) are a valid test of the model and support its predictions. Section 3 concludes.

2 A model of job insecurity and coresidence

In this section we illustrate how coresidence decisions are related to job insecurity of parents and children using a dynamic, two-period model of residential choice. All proofs can be found in Becker *et al.* (2005b).

2.1 The family

The family in our model has n_0 parents and $n_1 + 1$ children. We assume that it has either one or two parents (“the parent” for short) and at least one child. Family size is

on coresidence. Since our main contribution concerns the effects of income security on coresidence, we choose not to mention those here. These additional results are outlined at the end of section 2, where we also discuss how they relate to the existing literature.

denoted n (with $n = n_0 + n_1 + 1$). Our focus is on the residential choice of one of the children, assuming that her siblings remain with the parents.

Direct utility is defined over consumption, only. We assume that, in the parental home, all individuals pool income and consume an equal fraction of total family income.⁴ We root this assumption on the difficulty of excluding children from the consumption of public goods in the household. If all family members are coresiding, then consumption in the parental home is given by:

$$c_p^n = \frac{y_p + y_c - \gamma_p}{n}, \quad (1)$$

where γ_p is the rent or the imputed cost of housing, y_p parental income, and y_c the income of the child who is contemplating to move out (her siblings are assumed to earn no income). We denote the child's consumption by c_c . If she stays, she gets c_p^n . If she moves out, she will consume all of her income, net of housing costs under independence, γ_c , plus a non-negative transfer t from her parents:

$$c_i = y_c + t - \gamma_c.$$

Per capita consumption of the family members of an independent child is:

$$c_p^i = \frac{y_p - t - \gamma_p}{(n - 1)}.$$

The child's residential decision affects the way resources are divided in the family. By moving out, there is one fewer person with whom to divide income in the parental home, and there is also less income to share; further, an independent child may receive a transfer from her parents. The child's choice to become independent therefore also modifies consumption of those who stay home.

In our model, parents are partially altruistic. They weigh their direct utility by a factor $\lambda \in (0.5, 1)$, and their children's utility by only $(1 - \lambda)$. Parental utility is then:

$$U_p = \lambda \left(n_0 + \frac{(1 - \lambda)}{\lambda} n_1 \right) u(c_p) + (1 - \lambda) u(c_c), \quad (2)$$

⁴Considering different sharing rules, provided that consumption of individual family members were monotonic in income, would not change our qualitative results.

In what follows, we will in fact use the slightly modified functional form:

$$U_p = \lambda(n_0 + n_1)u(c_p) + (1 - \lambda)u(c_c) = \lambda(n - 1)u(c_p) + (1 - \lambda)u(c_c), \quad (3)$$

which puts more weight on the utility of the n_1 children who always remain at home and simplifies the algebra significantly, while leaving our results qualitatively unchanged.

To obtain sharper results, we conduct our analysis using Constant Relative Risk Aversion (CRRA) for the direct utility from consumption: $u(c) = (1 - \alpha)^{-1}c^{1-\alpha}$, with $\alpha > 0$.⁵

2.2 Timing

There are two periods. In period 1, parent and child observe their income realizations, y_{p1} and y_{c1} . To ensure nonnegative consumption, we assume there is a lower bound on income realizations given by the housing costs, γ_p and γ_c . A positive income realization for the parent, interpreted as a draw of $y_{p1} > \gamma_p$, is equivalent to a job offer, and similarly for the child. Since there is no disutility from work, job offers are always accepted.⁶ The child then decides whether or not to move out. Finally, consumption takes place as a function of the residential choice of the child.

The main difference across periods comes from assuming that moving out is irreversible. This can be justified on the grounds that the direct costs from moving, as well as the social stigma attached to going back to the parental house, tend to make independence a rather permanent state. While qualitatively similar results would emerge from considering finite costs instead, irreversibility is of great analytical convenience. For a child who stayed with her parents in period 1, the period 2 timing of events and choices repeats itself. If the child has moved out in period 1, however, she faces no residential choice in period 2.

⁵The results generalize to other commonly used families of functions (such as the Constant Absolute Risk Aversion case).

⁶Family member j would require a positive income threshold above γ_j before accepting a job offer if there were disutility from work or if individuals were productive while unemployed (through household production, say). We are ignoring these cases.

2.3 Period 2

We now characterize the resource allocation and residential decision in period 2. Assuming that the incomes of parent and child have taken the values y_{p2} and y_{c2} , the optimal transfer the parent would give the child if she decided to move out solves the following problem:

$$\max_{t_2 \geq 0} \left\{ \lambda (n-1) u \left(\frac{y_{p2} - t_2 - \gamma_p}{(n-1)} \right) + (1-\lambda) u (y_{c2} + t_2 - \gamma_c) \right\}. \quad (4)$$

First-order conditions yield:

$$\lambda u' (c_{p2}^i) \geq (1-\lambda) u' (c_{i2}),$$

holding with equality when $t_2 > 0$. Since $\lambda > 0.5$, this implies that a transfer-receiving child has lower consumption than the remaining family members. If she has not moved out in period 1, a child whose income is low enough to trigger transfers will therefore prefer not to move out. For such a child, consumption at home will be higher for two reasons. At home she gets the higher fraction $1/n$ of total familial income compared to a smaller fraction when independent.⁷ In fact, the sharing rule in place at the parental home, where each individual gets the fraction $1/n$ of total income net of rent, corresponds to the case of full altruism ($\lambda = 0.5$). By staying home, children are able to secure consumption of certain goods since parents cannot limit the child's consumption of those goods; when the child leaves, on the other hand, parental transfers represent fully voluntary payments to the child and, as such, reflect the partial nature of altruism. The second reason why the child's consumption will be higher if she stays home is the fact that, by doing so, the family's aggregate resources net of housing costs are higher as only one rental payment is made.

We now address the moving out decision for the child who decided to stay at home in period 1. Define Δ_2 as the excess utility level when independent relative to coresiding, for period 2:

$$\Delta_2 (y_{c2}, y_{p2}) \equiv u (c_{i2}) - u (c_{p2}^n).$$

⁷When independent, she gets the fraction $(\Gamma(n-1) + 1)^{-1}$ of total familial income, with $\Gamma = (\lambda/(1-\lambda))^{\frac{1}{\alpha}} > 1$. It can be shown that $1/n > (\Gamma(n-1) + 1)^{-1}$.

Δ_2 is a function of the income realizations of parent and child in the current period.⁸ The child moves out if $\Delta_2 > 0$. If indifferent, $\Delta_2 = 0$, we assume she stays.⁹ Understanding the child's residential choice and how it is affected by changes in y_{p2} and y_{c2} crucially hinges on the properties of this function. We first address how different values of y_{c2} impact the child's residential choice and later address the effects of parental income.

How does Δ_2 change as a function of y_{c2} ? To answer this question, it is important to define two income thresholds. Define \tilde{y}_{c2} as the value such that parental transfers are zero, $t_2(\tilde{y}_{c2}) = 0$,¹⁰ and let \bar{y}_{c2} be the income value that makes the child indifferent between staying at the parental home or moving out, $\Delta_2(\bar{y}_{c2}) = 0$. Under CRRA preferences,

$$\tilde{y}_{c2} = \frac{y_{p2} - \gamma_p}{\Gamma(n-1)} + \gamma_c, \quad \bar{y}_{c2} = \frac{y_{p2} - \gamma_p}{n-1} + \frac{n}{n-1}\gamma_c, \quad (5)$$

with $\Gamma = (\lambda/(1-\lambda))^{\frac{1}{\alpha}} > 1$. It is easy to see that \bar{y}_{c2} exceeds \tilde{y}_{c2} .

Lemma 1 below characterizes formally how Δ_2 depends on the child's income.

Lemma 1 (Utility differential and the child's income) *The function $\Delta_2(y_{c2})$ is strictly negative for $y_{c2} \in [\gamma_c, \bar{y}_{c2})$ and strictly positive for $y_{c2} > \bar{y}_{c2}$. Further, $\Delta_2(y_{c2})$ is strictly increasing in the range $(\tilde{y}_{c2}, \bar{y}_{c2})$. When the relative-risk aversion parameter α exceeds 1, $\Delta_2(y_{c2})$ is strictly increasing for $y_{c2} \in (\gamma_c, \tilde{y}_{c2})$. When α is below 1, $\Delta_2(y_{c2})$ is strictly increasing for $y_{c2} > \bar{y}_{c2}$.*

Figure 1A depicts a possible configuration of $\Delta_2(y_{c2})$. As Lemma 1 shows, utility

⁸As such, $\Delta_2(\cdot)$ is defined over $[\gamma_c, \infty) \times [\gamma_p, \infty)$.

⁹It can be shown that, at the child's independence threshold, $y_{c2} = \bar{y}_{c2}$, the consumption of her family members is strictly lower if she becomes independent relative to the child staying home. As such, her family members would like to persuade the child to stay home. We choose not to consider this possibility for two reasons. First, the quantitative difference in consumption for the family members across the child's residential states, which totals $\gamma_c/(p(n-1))$, is likely to be small; for small γ_c and large n , it will be negligible. Further, as the child's income and corresponding independence surplus increase, the benefits to the remaining family members from persuading the child to stay will decrease. Second, we take the view that compensating the child who threatens to leave may be difficult or even impossible. In fact, consumption entails sharing a house and possibly other public goods, as well. It may not be possible to give the child a larger share of the family's resources, or it may be too costly to do so (consider tearing down walls to make the child's room bigger...). In this sense, the sharing rule prevailing at the parental home is understood as a technology for sharing income.

¹⁰The notation $t_j(x)$ omits, for simplicity, other arguments of the function $t_j(\cdot)$. Similar simplifications will be used for $\Delta_2(\cdot)$ and other functions, throughout.

from independence exceeds that under coresidence for $y_{c2} \geq \bar{y}_{c2}$. Thus, a child who did not move out in period 1, will now leave if her income exceeds \bar{y}_{c2} ; otherwise she will stay. The set of income values $[\gamma_c, \bar{y}_{c2}]$ is a *regret region*: the child would prefer to go back home. As explained above, the sources of regret are the rental cost γ_c and partial altruism.

The dependence of the residential choice on y_{p2} is also of interest. Define \tilde{y}_{p2} as the level of parental income such that $t_2(\tilde{y}_{p2}) = 0$, and \bar{y}_{p2} as the parental income level that leaves the child indifferent between moving out and coresiding, $\Delta_2(\bar{y}_{p2}) = 0$. It is straightforward to show that $\bar{y}_{p2} < \tilde{y}_{p2}$. Then,

Lemma 2 (Utility differential and the parent's income) *The function $\Delta_2(y_{p2})$ is strictly decreasing for $y_{p2} \in [\gamma_p, \tilde{y}_{p2})$ and strictly negative for $y_{p2} > \bar{y}_{p2}$. For $y_{p2} \geq \tilde{y}_{p2}$, when the relative-risk aversion parameter α exceeds unity, $\Delta_2(y_{p2})$ is strictly increasing.*

In Figure 1B we depict a possible configuration for $\Delta_2(y_{p2})$. Whether or not $\Delta_2(\gamma_p)$ is positive depends on parameter values (specifically, a large number of family members n and a small rental cost γ_c make $\Delta_2(\gamma_p)$ positive). As Lemma 2 shows, however, for $y_{p2} > \bar{y}_{p2}$, $\Delta_2(y_{p2}) < 0$ holds unambiguously, and children of wealthy parents who stayed home will not move out. Just as with $\Delta_2(y_{c2})$, higher parental income does not necessarily raise the child's willingness to stay home.

The potential lack of monotonicity of the function $\Delta_2(\cdot)$ and the general configuration of this function are of great relevance for our results. In section 2.4, we discuss these properties in great detail and provide some intuition for the general results of Lemmas 1 and 2.

In Figure 2, we plot the curves \tilde{y}_{c2} and \bar{y}_{c2} in (y_c, y_p) space. To the right of the $\bar{y}_{c2}(y_{p2})$ schedule, the child moves out; to the left she stays. From the point of view of the moving-out decision taken in period 1, we can also divide the coresidence area into two parts. To the left of $\tilde{y}_{c2}(y_{p2})$, children who became independent in period 1 will receive a transfer, i.e. $t_2(y_{c2}, y_{p2}) > 0$, while to the right they will not. Recall that the coresidence area is a regret area.

2.4 Period 1

A simplified presentation of the model's structure is given in Figure 3. In period 1 the residential choice is more involved than in period 2 due to irreversibility and the possibility of regret. Naturally, the latter depends on the likelihood that period 2 incomes will fall to the left of the schedule $\bar{y}_{c2}(y_{p2})$, in the regret region. We assume that $(y_{c2}, y_{p2}) \sim F(y_{c2}, y_{p2})$, where $F(\cdot)$ is the joint cumulative distribution function (cdf) of period 2 income (y_{c2}, y_{p2}) , with marginal cdfs $F_c(y_{c2})$ and $F_p(y_{p2})$. $F(\cdot)$ has support over $[\gamma_c, \infty) \times [\gamma_p, \infty)$.

Let R denote the regret region.¹¹ If $F(\cdot)$ assigns positive probability to R , staying home in period 1 has an *option value*, the value associated with waiting to see the realization of the period 2 income and deciding then whether or not to move out. Just like with any real option, this value has to be weighted against the potential gains from moving out early on.

Define Δ_1 as the expected excess utility from moving out relative to staying home in period 1, conditional on making the optimal residential choice in period 2:

$$\Delta_1(y_{c1}, y_{p1}) \equiv u(c_{i1}) + \int_{\gamma_p} \int_{\gamma_c} u(c_{i2}) dF(y_{c2}, y_{p2}) - \left\{ u(c_{p1}^n) + \int_{\gamma_p} \left[\int_{\gamma_c}^{\bar{y}_{c2}(y_{p2})} u(c_{p2}^n) dF_c(y_{c2}|y_{p2}) + \int_{\bar{y}_{c2}(y_{p2})}^{\infty} u(c_{i2}) dF_c(y_{c2}|y_{p2}) \right] dF_p(y_{p2}) \right\}.$$

Δ_1 is defined over the period one incomes of parent and child.¹²

The first two terms in Δ_1 represent the expected utility from moving out in period 1. Given that the child becomes independent in period 1, period 2 utility is also computed for $c_{c2} = c_{i2}$. The terms preceded by a minus sign represent the expected utility from staying home in period 1. In this case, the child retains the possibility of choosing the best residential arrangement in period 2. Thus, given y_{p2} , for $y_{c2} \leq \bar{y}_{c2}(y_{p2})$, the child

¹¹The regret region is formally defined as:

$$R \equiv \{(y_{c2}, y_{p2}) \in [\gamma_c, \infty) \times [\gamma_p, \infty) : y_{c2} \leq \bar{y}_{c2}(y_{p2})\}.$$

¹²As such, it is defined over the same domain as Δ_2 , the set $[\gamma_c, \infty) \times [\gamma_p, \infty)$.

remains with her parents and $c_{c2} = c_{p2}^n$; otherwise she moves out and $c_{c2} = c_{i2}$. The child will move out if $\Delta_1 > 0$. When $y_{c2} > \bar{y}_{c2}(y_{p2})$, having moved out in period 1 does not carry any utility loss; therefore, in this range, the terms concerning period 2 utility while independent cancel out and the moving out condition $-\Delta_1 > 0$ simplifies to:

$$u(c_{i1}) - u(c_{p1}^n) > \int_{\gamma_p} \left[\int_{\gamma_c}^{\bar{y}_{c2}(y_{p2})} (u(c_{p2}^n) - u(c_{i2})) dF_c(y_{c2}|y_{p2}) \right] dF_p(y_{p2}). \quad (6)$$

It is worth examining equation (6) in detail. First of all, the right-hand side is nonnegative. It represents the difference between expected utility under coresidence and under independence, i.e. the gain in expected utility associated with waiting for period 2 before choosing whether or not to move out. This is the option value. It will be strictly positive if the cdf $F(\cdot)$ places strictly positive mass on the regret region. The left-hand side represents the difference in period 1 utility from being independent relative to moving out. The child will move out when this gain exceeds the expected benefit from waiting. Note that the left-hand side is a difference between the within-period utility across residential states. It can be shown that this difference corresponds exactly to the function $\Delta_2(\cdot)$, only now the arguments of Δ_2 are the *first-period* incomes of child and parent.¹³ The results outlined in Lemmas 1 and 2, showed how $\Delta_2(\cdot)$ varied with second-period incomes. Those results carry over to period 1, establishing how the left-hand side of equation (6) varies with first-period incomes.

Define \bar{R} as the expected value of regret, the difference in expected utility between the best residential state (coresidence) and independence over the regret area. (\bar{R} is a notational shortcut to represent the right-hand side of (6)). Let \bar{y}_{c1} denote the first-period income threshold such that the child is exactly indifferent between staying at the parental income or moving out. This income level is such that (6) holds at equality:

$$\Delta_2(\bar{y}_{c1}, y_{p1}) = \bar{R}. \quad (7)$$

¹³The equivalence between the left-hand side of (6) and $\Delta_2(\cdot)$ follows from noticing that the transfer function that governs transfers from parents to children in period 1, $t(y_{c1}, y_{p1})$, is identical to the function previously derived for period 2, $t(y_{c2}, y_{p2})$, once period-two incomes are replaced with period-one income values.

We now discuss the determination of \bar{y}_{c1} .

It is useful to begin by recalling how the child's second period indifference threshold \bar{y}_{c2} was determined and comparing it to (7). In the second period, the child simply evaluates the differential in utilities across residential states and, if she has not moved out in period 1, chooses to live where utility is highest. If $\Delta_2(y_{c2}, y_{p2}) > 0$, she moves out, otherwise she stays, and \bar{y}_{c2} is such that she is just indifferent: $\Delta_2(\bar{y}_{c2}) = 0$. In period 1, as illustrated in (7), she will require that utility while independent exceed coresidence utility by a strictly positive amount, \bar{R} . Therefore, while \bar{y}_{c2} was determined as the child's second period income that set Δ_2 equal to zero, \bar{y}_{c1} is now the value of the child's first-period income that sets Δ_2 equal to \bar{R} . In view of the possibility of regret, in the first-period the child will demand that independence be strictly better than coresidence. Graphically, if we go back to Figure 1A, \bar{y}_{c2} was found by identifying the intercept of Δ_2 with the horizontal axis while \bar{y}_{c1} is now given by the intersection of Δ_2 with a horizontal line lying strictly above that axis. This discussion intuitively shows that the child's first-period moving out threshold will exceed \bar{y}_{c2} if and only if \bar{R} is positive. Further, according to Lemma 1, if $\alpha < 1$, the function Δ_2 is monotonically increasing for y_{c1} values that exceed \bar{y}_{c2} , and there is only one income value \bar{y}_{c1} that satisfies $\Delta_2(\bar{y}_{c1}) = \bar{R}$. This discussion informally establishes the following result:

Proposition 3 (Expected regret and moving-out decision) *The period 1 moving-out threshold correspondence $\bar{y}_{c1}(y_{p1})$, on (y_{c1}, y_{p1}) space, lies strictly to the right of the corresponding period 2 schedule $\bar{y}_{c2}(y_{p2})$ if and only if $F(R) > 0$. When $\alpha < 1$, $\bar{y}_{c1}(y_{p1})$ is single-valued.*

In what follows, we assume $\alpha < 1$. Below, we discuss alternative ways of ensuring that $\Delta_2(\cdot, y_{p2})$ is strictly monotone for $y_{c2} \geq \bar{y}_{c2}$. Further, we also confine attention to the case when \bar{R} is strictly positive (for otherwise the moving-out decision in period 1 would be identical to that of period 2).

Our next step is to characterize how the child's residential choice depends on future income, hers and her parent's. For example, if the child suddenly received the good

news that her expected income in period 2 were going to be higher, would \bar{y}_1 increase or decrease? What if the good news were about her parent's income instead? We will consider two types of changes in the distribution of future income values; specifically, we will allow the distributions of future income to shift in the sense of first- and second-order stochastic dominance.

First-Order Stochastic Dominance Shifts in the distribution of future incomes affect the residential choice as described in (7) to the extent that they modify the expected value of regret, \bar{R} . In turn, \bar{R} is the (negative of the) expected value of the values of Δ_2 over income pairs (y_{c2}, y_{p2}) in the regret area. For example, say that y_{p2} is in fact constant. Then, \bar{R} equals (minus) the expectation of the values of Δ_2 for y_{c2} in the interval $[\gamma_c, \bar{y}_{c2}]$. Figure 1A shows one configuration for Δ_2 . While in that Figure Δ_2 is strictly monotonic over the relevant interval, this need not be the case at all, as Lemma 1 illustrates. If Δ_2 were monotonically increasing over the regret area, it would be straightforward to show that a shift in the distribution of the child's future income in the first-order stochastic sense would reduce \bar{R} and, as a consequence, reduce \bar{y}_{c1} , as well. Since our results hinge crucially on the lack of monotonicity of $\Delta_2(\cdot)$ in the range $y_c \in [\gamma_c, \bar{y}_{c2}]$, we next go over the factors that determine the slope of Δ_2 in some detail.

Since Δ_2 corresponds to a difference in utility levels, changes in income affect this difference in two ways. First, income modifies consumption differently depending on the residential state. For example, for y_{c2} values such that no transfers would be provided to the child (i.e. above \tilde{y}_{c2}), higher y_{c2} implies that c_{i2} is changing by the same amount as income whereas the increment in consumption at the parental home is only the fraction $1/n$ of the change in income. We label the impact of income changes on the child's consumption as the *sharing effect*. This, however, is not sufficient to ensure that Δ_2 varies positively with y_{c2} . The impact on Δ_2 depends also on the marginal utility that these changes in consumption entail. If, for example, $c_{i2} > c_{p2}^n$, the marginal utility of consumption at home is higher than under independence. In the range $y_{c2} > \bar{y}_{c2}$, this *marginal utility effect* counteracts the greater change in c_{i2} relative to c_{p2}^n . Consequently,

although we know that c_{i2} will always exceed c_{p2}^n provided $y_{c2} > \bar{y}_{c2}$, we cannot be certain that Δ_2 is always positively sloped in this range. When $y_{c2} \in (\tilde{y}_{c2}, \bar{y}_{c2})$, by contrast, both effects go in the same direction, ensuring that Δ_2 is positively sloped. As discussed above, $\alpha < 1$ is a sufficient condition to obtain the strict monotonicity of Δ_2 with respect to y_{c2} , when $y_{c2} > \bar{y}_{c2}$. More generally, what is needed is that, for high consumption values – high enough to justify independence – the income effect outweighs the marginal utility effect. This is a plausible assumption since marginal utility from consumption at home is likely to be close to that under independence when consumption is high in both residential states.

For $y_{c2} < \tilde{y}_{c2}$, parents give transfers to independent children. Given partial altruism and housing costs, we know the child experiences lower consumption while independent relative to coresidence. Further, an extra dollar of the child’s income will be shared with her family through a reduction in parental transfers. Under partial altruism, consumption while independent will increase by less than the consumption the child would attain if she were at the parental home. However, since the child is worse off when independent, the marginal utility effect indicates that one unit of extra consumption will raise the utility of an independent child the most. For $y_{c2} \in [\gamma_c, \tilde{y}_{c2}]$, we have sharing and marginal utility effects going in opposite directions.

There are reasonable assumptions that would allow us to solve the ambiguity from the effects of higher income over Δ_2 , in the positive transfer region. For example, we could assume that the marginal utility effect dominates for low income values. In fact, for low income, it is likely that the marginal utility effect will assume an important role in the comparison of utilities across residential states since CRRA preferences satisfy Inada conditions. This assumption does ensure that $\Delta_2(y_{c2})$ is monotonically increasing and, as a consequence, that \bar{R} decreases for a first-order shift in the child’s second period income distribution. As a function of the child’s income, $\Delta_2(\cdot)$ would qualitatively look like Figure 1A. Interestingly, this assumption coupled with altruism then causes monotonicity to fail when we consider $\Delta_2(\cdot)$ as a function of parental income, as depicted in Figure 1B. The reason is that, for altruistic parents, higher parental income will

also affect the child's independence utility provided the child is poor enough to receive transfers. For income low enough to trigger transfers, an extra dollar of parental income will have exactly the same impact over the utility differential – independence minus coresidence – as an extra dollar of the child's income. In fact, when transfers are positive, parents effectively choose the child's consumption by selecting the amount of the transfer they are giving her. The optimal choice of consumption, for y_c and y_p values that trigger transfers, depends only on the sum $y_c + y_p$ and not on its individual parcels. This is an instance of Ricardian Equivalence type of neutrality results. This implies that, while for $y_{p2} < \tilde{y}_{p2}$, higher parental income will unambiguously reduce the utility differential from independence (as a function of y_{p2} , Δ_2 is strictly decreasing as illustrated in Figure 1B), for values of y_{p2} that exceed \tilde{y}_{p2} so that positive transfers occur, the slope of $\Delta_2(y_{p2})$ will equal the slope of $\Delta_2(y_{c2})$ and, according to the configuration displayed in Figure 1A, raise it.

This discussion informally establishes the result that, if $\Delta_2(\cdot)$ is monotonic in the child's income, such monotonicity will fail when we consider $\Delta_2(\cdot)$ as a function of parental income. We formalize this result as follows:

Lemma 4 (Altruism and the lack of monotonicity in differential utility) *For $\lambda \in [0.5, 1)$, if the function $\Delta_2(\cdot, y_{p2})$ is strictly monotonic with respect to the child's income, then $\Delta_2(y_{c2}, \cdot)$ cannot be strictly monotonic with respect to the parent's income. The converse is also true: if $\Delta_2(y_{c2}, \cdot)$ is strictly monotonic with respect to the parent's income, then $\Delta_2(\cdot, y_{p2})$ cannot be strictly monotonic with respect to the child's income.*

When $\lambda = 1$, parents are selfish and place no value on the child's utility. This is one instance where the monotonicity of $\Delta_2(\cdot)$ with respect to both the child and the parent's income can be obtained and we discuss this case below.

Given Lemma 4, unambiguous results concerning the impact of shifts in the distribution of future incomes in the first-order stochastic sense can only be obtained by considering the subset of distributions of (y_{c2}, y_{p2}) that place no mass on the subset of R where transfers are positive. This is summarized in the following propositions.

Let \mathcal{F} be the set of all pairs of independent distributions functions (F_c, F_p) with support over $([y_c, \infty), [y_p, \infty))$, such that no mass is placed on the positive-transfer subset of the regret region. Then:

Proposition 5 (FOSD in the child's income) *Let (F_p^1, F_c) and (F_p^2, F_c) be two elements of \mathcal{F} , and assume that F_p^1 first-order stochastically dominates F_p^2 . Let the period 1 moving-out threshold corresponding to F_p^j be denoted $\bar{y}_{c1}(F_p^j)$. Then, when $\alpha < 1$, $\bar{y}_{c1}(F_p^1) \geq \bar{y}_{c1}(F_p^2)$.*

Proposition 6 (FOSD in the parent's income) *Let (F_p, F_c^1) and (F_p, F_c^2) be two elements of \mathcal{F} , and assume that F_c^1 first-order stochastically dominates F_c^2 . Let the period 1 moving-out threshold corresponding to F_c^j be denoted $\bar{y}_{c1}(F_c^j)$. Then, when $\alpha < 1$, $\bar{y}_{c1}(F_c^1) \leq \bar{y}_{c1}(F_c^2)$.*

Next, we briefly sketch how our results would change in two scenarios, the opposing cases of full altruism ($\lambda = 0.5$), and of no altruism ($\lambda = 1$). Under full altruism, an extra dollar of income (either the parent's or the child's) would have the same impact on the child's consumption irrespective of her residential choice.¹⁴ As such, there is no differential sharing effect. This ensures that $\Delta_2(y_{c2})$ is unambiguously positively sloped for $y_{c2} \leq \tilde{y}_{c2}$, and that $\Delta_2(y_{p2})$ is also positively sloped for $y_{p2} \geq \tilde{y}_{p2}$. While proposition 6 could be generalized to consider any joint distribution $F(\cdot)$ (and not only those who place no mass over the positive-transfer subset of the regret area), the same ambiguity as above would emerge when considering the effects of parental income on coresidence. Therefore, results in this case would be qualitatively similar to those in Propositions 5 and 6, above.

If parents were completely selfish, transfers would never be given out and the child would only be able to share the income of her family members under coresidence. In the case of selfish parents, the transfer region vanishes and \tilde{y}_{c2} coincides with γ_c . From the point of view of Figure 1A, the interval $[\gamma_c, \tilde{y}_{c2})$ ceases to exist and, from Lemma 1, it

¹⁴As mentioned earlier, the sharing rule prevailing at the parental home is equivalent to full altruism.

follows that $\Delta_2(y_{c2})$ is strictly increasing for $y_{c2} \in [\tilde{y}_{c2}, \bar{y}_{c2}]$ (sharing and marginal utility effects work in the same direction, here). Further, $\Delta_2(y_{p2})$ would also be monotonically decreasing everywhere (the threshold \tilde{y}_{p2} becomes infinity, now). An unintuitive conclusion follows from the comparison of the altruism versus nonaltruism cases, the fact that altruism is the source of the potential ambiguity in the effects of shifts in the distribution of future incomes of parent and child. Absent altruism, the intuitive result that higher expected income of the child makes her more willing to leave (lower \bar{y}_{c1}) and that higher expected income of the parent has the opposite effect (higher \bar{y}_{c1}) would follow.

An additional comparison concerning the intensity of parental altruism is possible. Children of more altruistic parents will receive higher transfers when independent than children of less altruistic progenitors. Consequently, consumption while independent in the positive-transfer income region will always be negatively related to λ , the degree of parental selfishness, and the utility differential between independence and staying home will be less negative for children of more altruistic parents, in this region. (For income pairs outside the positive-transfer region, the utility differential across residential states is independent of λ .) Consequently, for children of more altruistic parents, regret will be less severe. It follows that the income threshold for independence for these children is lower than for those with more selfish progenitors.

Second-Order Stochastic Dominance We have seen how income insecurity, as measured by FOSD, affects the child's residential choice. One well-known implication of FOSD is higher expected income (but possibly also higher income variance). By looking now at second-order stochastic dominance shifts (SOSD) in the income distribution, we hold the expected value of income constant and see instead what happens when only the variance changes. We say that $F_c^1(y)$ dominates distribution $F_c^2(y)$ in the second-order stochastic sense if: i) $\int y F_c^1(y) dy = \int y F_c^2(y) dy$, and ii) $\int_{\gamma_c}^{y_c} [F_c^1(z) - F_c^2(z)] dz \leq 0$, with the inequality holding for all y_c in the domain of the child's income.¹⁵ Once again,

¹⁵The results associated with first- and second-order stochastic dominance require the additional assumption that income is bounded. That is, $y_{p2} \leq y_p^* < \infty$ and $y_{c2} \leq y_c^* < \infty$, so that $F_p(\gamma_p) = F_c(\gamma_c) = 0$ and $F_p(y_p^*) = F_c(y_c^*) = 1$. We omit making this assumption explicit for simplicity.

the lack of monotonicity in $\Delta_2(y_c)$ and $\Delta_2(y_c)$ has implications for the concavity of these functions over the positive-transfer region. In order to get unambiguous results, we are forced to restrict our results to income distributions that place no mass on that part of the income domain. For the child, we get the following result:

Proposition 7 (SOSD in the child's income) *Let (F_p, F_c^1) and (F_p, F_c^2) be two elements of \mathcal{F} such that F_c^1 dominates F_c^2 in the second-order stochastic sense. Then, when $\alpha < 1$, $\bar{y}_{c1}(F_c^1) \leq \bar{y}_{c1}(F_c^2)$.*

Under some conditions, a similar result can be obtained for SOSD shifts of parental income. However, since changes in the distribution of income affect the period 1 moving out threshold only to the extent that they affect period 2 income values within the regret area, for the parent's income we need to ensure that the distribution of his income shifts so as to lower the variance of income values in that region specifically, as opposed to the requirement that it becomes less volatile over its global range.¹⁶ That is, if F_p^1 dominates F_p^2 in the second-order stochastic sense, we need additionally to impose that, for all values of the child's income y_{c2} ,

$$\int_{\gamma_p}^{\bar{y}_{p2}(y_{c2})} F_p^1(y_{p2}) dy_{p2} = \int_{\gamma_p}^{\bar{y}_{p2}(y_{c2})} F_p^2(y_{p2}) dy_{p2} = 0, \quad (8)$$

which, together with the conditions that ensure the second-order stochastic dominance of F_p^1 over F_p^2 , implies:

$$\int_{\bar{y}_{p2}(y_{c2})}^{y_{p2}} [F_p^1 - F_p^2] dy_{p2} \leq 0,$$

for all $y_{p2} \geq \bar{y}_{p2}(y_{c2})$.

We may then state:

¹⁶For the child, the SOSD requirement that income becomes less volatile over its entire domain necessarily implies that it also becomes less volatile over the no-transfer part of the regret region. The reason is that, for the child, the no transfer region coincides with the lowest possible realizations of the child's income. As such, the requirement that $\int_{\gamma_c}^{y_c} [F^1(y_c) - F^2(y_c)] dy_c \leq 0$ must also hold for any income value y_c in the regret region. For the parent, the regret region occurs for high y_p values. Therefore, the requirement $\int_{\gamma_p}^{y_p} [F^1(y_p) - F^2(y_p)] dy_p \leq 0$ does *not* imply that the latter condition holds within the regret region. That is, SOSD does not imply, for y within the regret region, that $\int_{\bar{y}_p}^y [F^1(y_p) - F^2(y_p)] dy_p \leq 0$ holds.

Proposition 8 (SOSD in the parent’s income) *Let (F_p^1, F_c) and (F_p^2, F_c) be two elements of \mathcal{F} satisfying equation (8), such that F_p^1 dominates F_p^2 in the second-order stochastic sense. Then, when $\alpha < 1$, $\bar{y}_{c1}(F_p^1) \geq \bar{y}_{c1}(F_p^2)$.*

The same generalizations concerning the degree of altruism stated for FOSD carry over to SOSD. Specifically, under full altruism, the results would be qualitatively similar to propositions 7 and 8 (and income distributions would have to be restricted so as to place no mass on the positive transfer region). If the parents were selfish, provided condition (8) held, then shifts in the SOSD sense of the child’s (parents’) income distribution would unambiguously lower (raise) the first-period income moving-out threshold.

Additional Results While the main focus of the paper is the impact of income insecurity on the child’s residential decision, our model allows us to make additional predictions. We list below comparative static results concerning the impact of first-period parental income, y_{p1} , and family size, n , on the child’s first-period moving-out threshold.¹⁷

Lemma 9 (Parental income and coresidence) *When $\alpha < 1$, higher period 1 parental income y_{p1} raises the child’s moving-out threshold $\bar{y}_{c1}(y_{p1})$.*

Lemma 10 (Family size and coresidence) *When $\alpha < 1$ and $\lambda = 0.5$ (very altruistic parents), for $n^+ > n$, the first period moving-out threshold is lower for a member of a more numerous family than the corresponding threshold for a child belonging to a smaller family:*

$$\bar{y}_1^{n^+} < \bar{y}_1^n.$$

¹⁷Concerning the effects of parental income, our results relate to Ermisch (1999) as follows. He studies coresidence choices under a static model, and considers both selfish and altruistic parents. Under the former case, parents charge the child for living at home. Coresidence is beneficial for the child since she gets to share housing, a public good. The child’s utility when independent limits the amount of “rent” that the parents can charge her. When parental income increases, parents consume more of both direct consumption goods and housing. Since they provide a bigger house to the child, they also raise the rent they charge her. This reduces the probability of the child remaining at home. In our setup, Lemma 9 would go through even in the case of selfish parents: given our the technology for sharing resources at home, the child still benefits from higher consumption when coresiding if her parents’ income goes up. The predictions of our model and those in Ermisch coincide when altruistic parents are considered.

Reversible Independence (or Finite Moving Costs) We assumed independence to be an irreversible state. An alternative but fully equivalent interpretation is for the cost of moving back home to be infinite. How would our results change if the child could pay some finite cost ϕ in order to go back to the parental home?

Second-period decisions would not change, naturally. As for the first-period, the possibility of going back home would imply that the child would not wish to remain independent for second-period income realizations associated with a very negative value of Δ_2 . Under the configuration of Δ_2 displayed in Figure 1A, these would be associated with the lowest income realizations for the child. Given that the child could exercise her option of returning home (and would do so for ϕ sufficiently small and y_{c2} sufficiently low), expected regret \bar{R} would now be strictly lower than before. FOSD and SOSD results would follow just as before, also with the same caveats as before – caveats that have to do with the lack of strict monotonicity in both $\Delta_2(\cdot, y_{p2})$ and $\Delta_2(y_{c2}, \cdot)$. Our algebra and analysis could therefore fully accommodate ϕ . We choose to stick to infinite moving costs only for the sake of analytical simplicity.

Companion Empirical Analysis As mentioned earlier, in Becker *et al.* (2005a), we estimate the effect of perceived parental income insecurity on the child’s probability of staying home. We explore the panel dimension of the Survey of Household Income and Wealth (SHIW) and follow families in two consecutive sample dates, 1995 and 1998. In 1995, respondents were asked to state the probability they assigned to keeping their current job, if they were employed, or of finding a new job, if unemployed. We use the complement of this probability, which we label p . Our empirical work provides estimates of the impact of changes in p on the child’s probability of coresidence. The dependent variable is a 0-1 indicator of whether a child was still home in 1998, given that she was home in 1995. In the regressions, we use other controls as well: father’s age and schooling, gender of the child, number of siblings, and measures of housing prices, among others.

The model presented in the current paper predicts that, provided financial transfers

do not take place between parents and their adult children, shifts in the FOSD sense of the distribution of parental income will raise the child's independence threshold. Therefore, the empirical estimates in Becker *et al.* (2005) would approximate a test of the model provided, in the data, transfers took place among a small fraction of parent and independent child pairs, and provided additionally that our inclusion of p in the regressions were a valid way of controlling for FOSD. Regarding transfers, data from Guiso and Japelli (2002) for the 1991 wave of the SHIW indicate that 25.9% of households in their sample reported receiving a transfer from their parents or other relatives. This total is split up into gifts – 5.6% – and bequests – 20.3%. The relevant number for our analysis would correspond to the percentage of *inter-vivos* transfers or gifts, which is indeed low.¹⁸

Concerning the validity of p as a control for FOSD, to the extent that father's age and schooling control for the father's income level when employed, and since unemployment benefits are proportional to previous wages in Italy, the degree of perceived job insecurity measures (the complement of) the probability that the parent will get his full wages, as opposed to the corresponding unemployment benefits. For this two-point support distribution of parental income (employment wages versus unemployment benefits), a reduction in perceived job insecurity exactly captures the notion of first-order stochastic dominance used in the model.

We find strong and statistically significant effects of perceived parental insecurity on the probability of independence. Specifically, if the parent's perceived probability of becoming (or remaining) unemployed went from 0 (full job security) to 1 (full job insecurity), the child's probability of becoming independent would increase between 3.6 to 9.9 percentage points. Taking into account that the average probability of independence in our sample is only 4%, these are considerable effects.

The micro data further allows us to test the model's predictions concerning SOSD

¹⁸In the US, according to Altonji, Hayashi and Kotlikoff (1996) who use the 1988 wave of the Panel Study of Income Dynamics, the percentage of parent-child pairs for which transfers are given to children varies between 20.3% to 24% (tables 1b and 1a, respectively).

shifts in the distribution of parental income.¹⁹ The coefficient of variation of the distribution of parental income has a strong and statistically significant effect over the probability of coresidence, as our model predicts. If the coefficient of variation went from 0 to 50% of the mean, the child's probability of coresidence would increase by 4.25 percentage points.

In our companion paper, we additionally test the impact of job insecurity on coresidence at the macro level for a sample of European Union countries. Data on job insecurity comes from the European Commission's Eurobarometer. Once again, we find strong and statistically significant effects of job insecurity on coresidence. If the percentage of youth feeling insecure went from 0 to 100, the coresidence rate would increase by 13.6 to 18.2 percentage points; an identical change in the share of old workers feeling insecure would generate a decrease in the coresidence rate of 16.3 to 19 percentage points. These are sizable effects when compared to the average coresidence rate in our sample of 16%. We interpret these results as broadly validating the model.

3 Conclusion

We have analyzed the effects of parental insecurity on the child's residential choice under a model of partial altruism and costly independence. Our results show that first- and second-order stochastic dominance shifts in the distribution of the child's (or the parents') future income do not necessarily produce the intuitive result of reducing (raising) the child's income threshold for independence. Paradoxically, altruism is the very source of this ambiguity. For selfish parents or if financial transfers between parents and their adult children occur with very low probability (the latter effectively shutting down the range of income values where altruism is operative), these results do emerge. Similar conclusions follow for second-order stochastic dominance shifts in the income distribution: lower variance in the child's (parents') future income raises (reduces) the child's threshold for independence provided transfers are not operative. Empirical esti-

¹⁹We get our measures of income uncertainty from Guiso, Jappelli and Pistaferri (2002).

mates using panel data for Italy and macroeconomic data for European Union countries broadly confirm our predictions.

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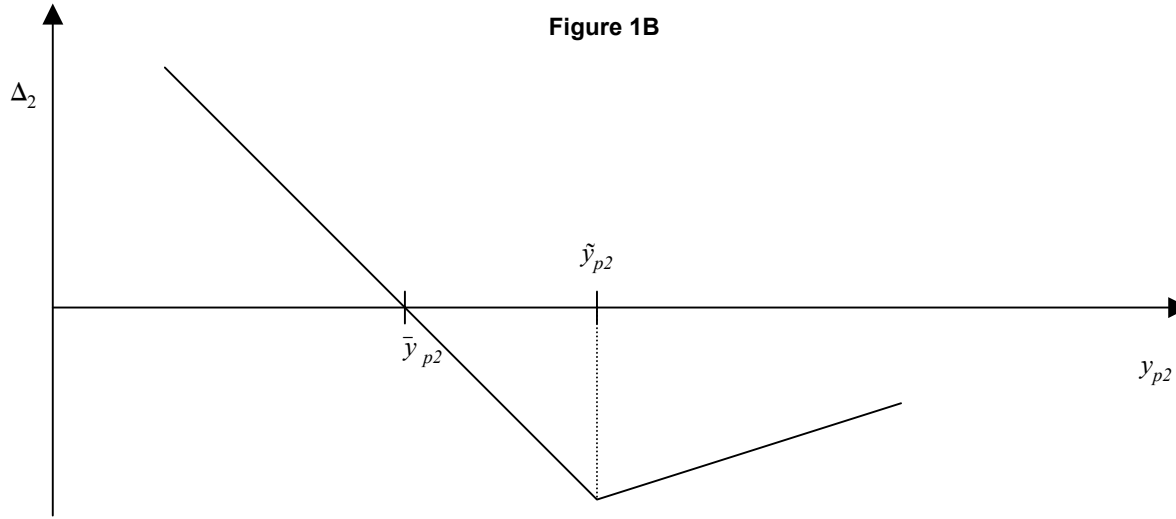
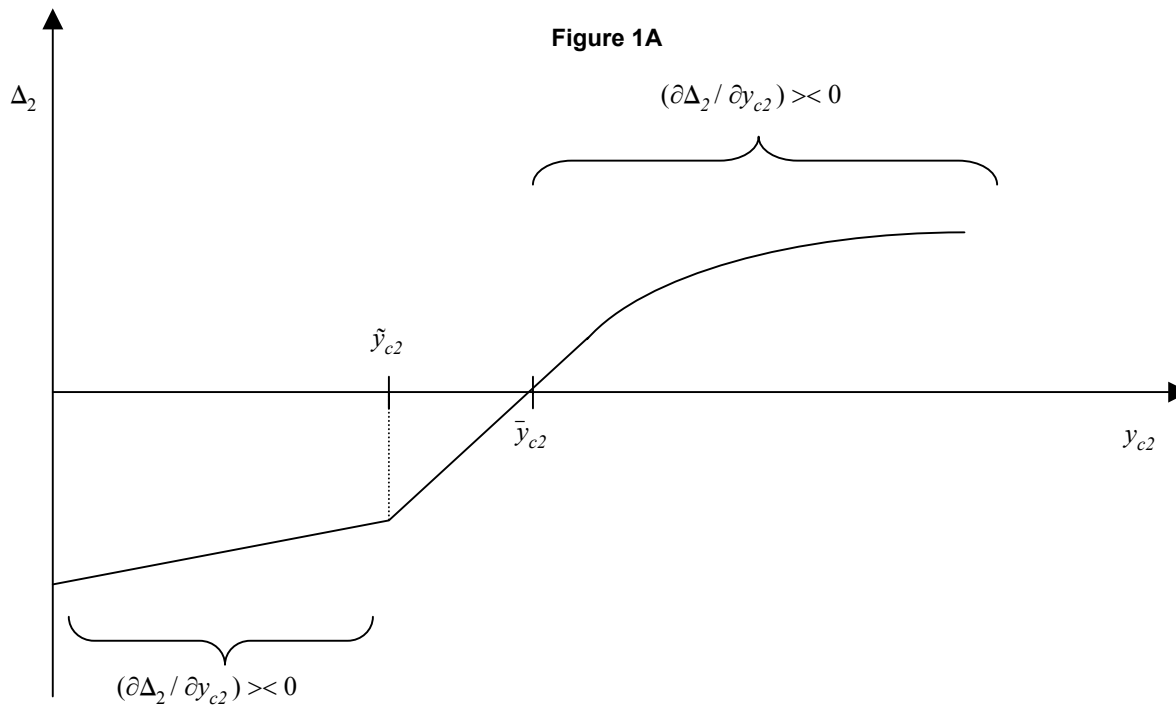


Figure 1. The moving out decision in period 2

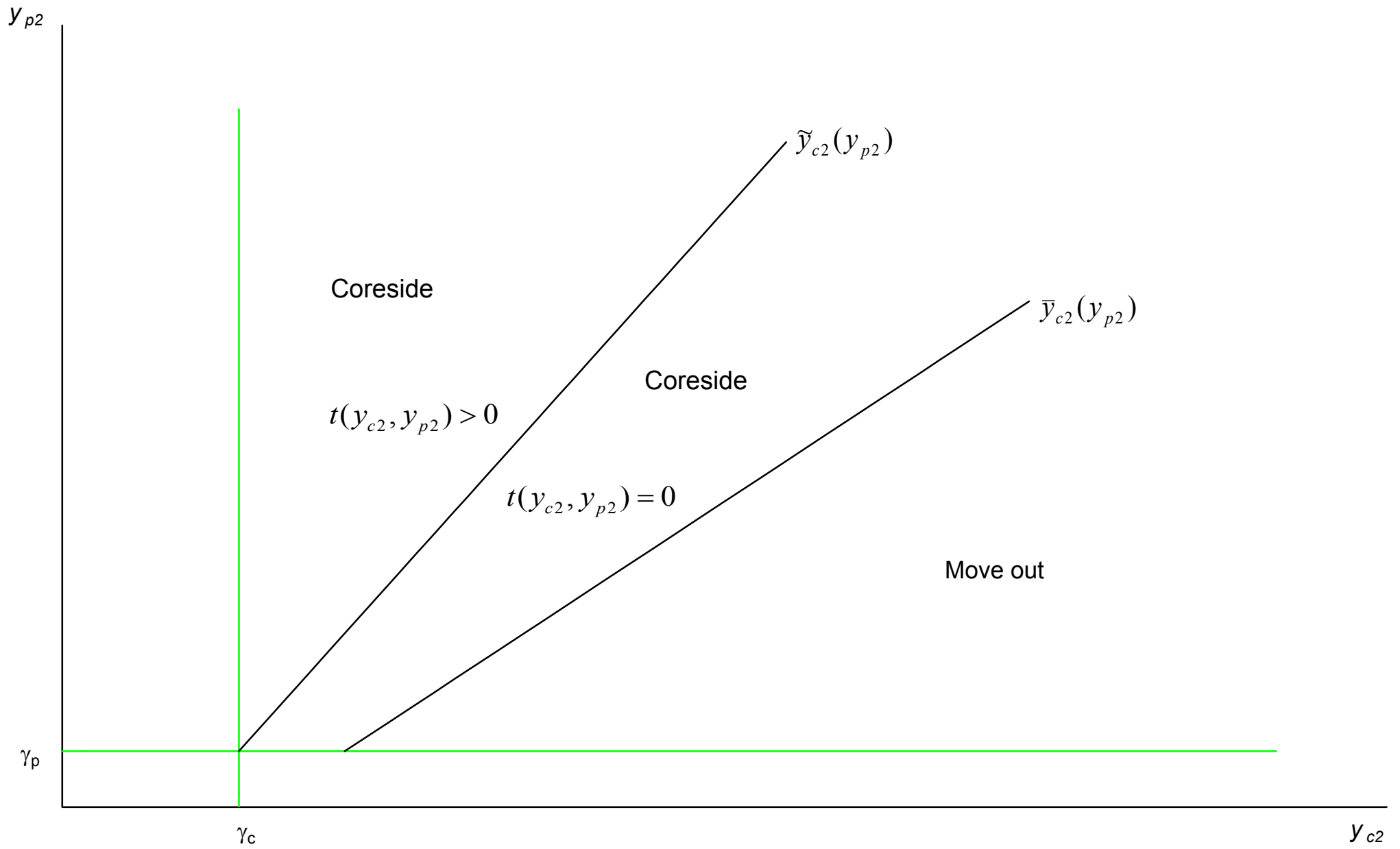


Figure 2. Period 2 residential regimes

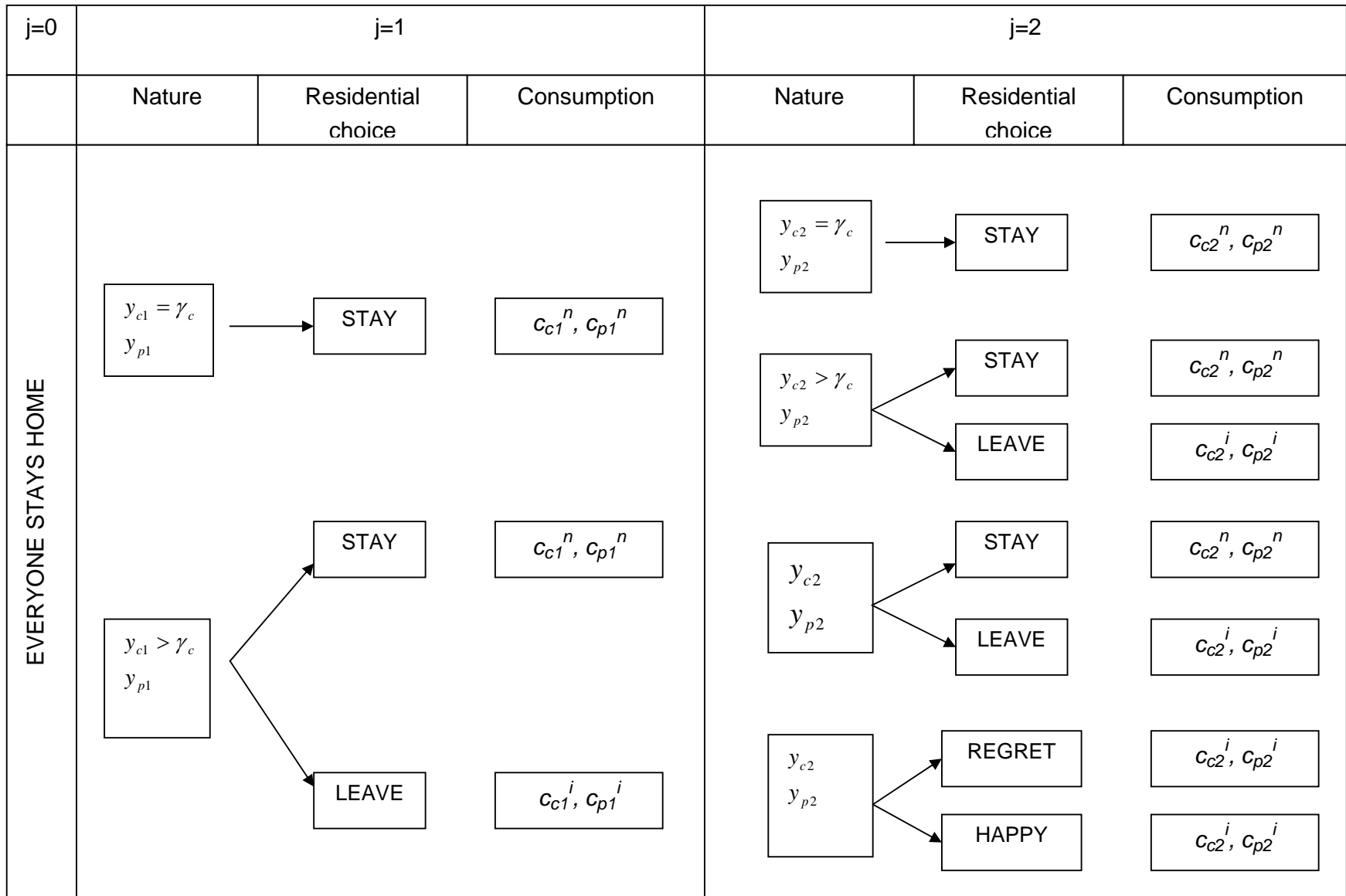


Figure 3. Structure of the model