Young Adults Leaving the Nest: The Role of Cost-of-Living

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1. Introduction

A recent Time magazine article, "They Just Won't Grow Up," discusses the widely-held perception that the transition to adulthood has become longer (Time Magazine, January 24, 2005). The article describes the emergence of "twixters" – young adults in their twenties who refuse to settle down. In response to the question "What makes you an adult?," people ages 18 to 29 answered having a first child (22 percent), moving out of parents' home (22 percent), getting a good job with benefits (19 percent), getting married (14 percent), and finishing school (10 percent). Despite the fact that such perceptions about adulthood are quite standard, only 61 percent of survey respondents viewed themselves as adults. Thirty-five percent of respondents who did not consider themselves adults claimed they were "just enjoying life the way it is" and one-third stated they were "not financially independent enough" to be an adult.[1]

These responses motivate a study of trends in living arrangements and the role of cost-of-living in the transition to adulthood. Many twixters who were "enjoying life" were living with their parents, and those who say they are not financially independent highlight the importance of housing costs, transportation costs, and childcare costs. The goal of this study is two-fold. First, I describe living arrangements for young adults aged 18 to 34 from 1970 to 2000. Second, I explore the role of cost-of-living, particularly housing and rental costs, in explaining various trends in living arrangements between 1980 and 2000. One reason to do so is practicality: high quality public data exists on both, spanning a large number of metropolitan areas and years. A second reason is that the analysis could shed light on the broader implications of the housing boom (and possible "housing bubble") that many local markets have experienced in recent years.

Dramatic changes in housing costs might disproportionately affect young adults, who are more mobile and usually entering the housing market for the first time.

The remainder of this paper is arranged as follows. Section 2 reviews previous work that examines young adults leaving the nest. Section 3 describes the Census data and a framework for examining living arrangements. Section 4 describes the cost-of-living variables used in empirical framework. Section 5 illustrates trends from 1970 to 2000, and Section 6 presents the empirical framework and results. Section 7 concludes.

2. Previous literature

Many existing studies on the living arrangements of youth focus on individual- and family-level determinants of living arrangements, and not on economic conditions. This section highlights some of the findings from several key publications.

Garasky, Haurin, and Haurin (2001) use the 1979 National Longitudinal Study of Youth and find that economic variables have little impact on the decision of whether to exit to a large (more than one other non-spouse / non-partner adult) versus a small (one non-spouse / non-partner adult) group setting, while socio-demographic variables matter. Avery, Goldscheider, and Speare (1992) examine the role of parental resources in influencing young adults' leaving home, using the 1984 Survey of Income and Program Participation and find the effects of parental resources differ depending on the route out of the home under consideration (marriage or premarital residential independence). Goldscheider, Thornton, and Young-DeMarco (1993) use data from the Detroit Metropolitan Area and find the transition to full residential independence is gradual. Finally, Clark and Mulder (2000) develop a choice model of owning a home, owning a

[1] See http://www.time.com/time/covers/1101050124/graphic/ .

trailer, or renting to examine the housing-market entry of young adults, and also model the choice between renting independently and sharing with roommates. Using the Panel Study of Income Dynamics, they find that independence in the housing market is closely related to the size and regional location of the housing market. In addition, the young adult's resources are an important influence on housing-market entry.

This study offers a number of innovations relative to previous work. First, the previous studies are based on relatively small samples. This analysis utilizes Census data spanning the 1970 to 2000 period, and contain millions of observations. Second, this study examines changes in market conditions over long periods whereas earlier studies examine shorter time periods. Finally, this study emphasizes macro-level variables rather than individual or family variables. In previous studies, these variables tend to be ignored or if included, are subject to serious identification problems.

3. Census Microdata

3.1 Living arrangements

The Census public use samples from 1970, 1980, 1990 and 2000 contain millions of observations.[2] In 1970, two long-form questionnaires were used – one for a 15-percent sample of the population, the other for a 5-percent sample. For each questionnaire, a 1-in-100 sample was drawn with three different geographic identifiers: county groups, states, and geographic divisions with neighborhood identifiers. I utilize the 5 percent sample with state identifiers. The 1970 sample does not easily provide MSA identifiers, so there was no compelling reason to use the sample with county-group identifiers rather

[2] See Inter-university Consortium for Political and Social Research, study numbers 18, 8101, 9952, and 13568.

than state-identifiers. Moreover, none of the relevant policy variables discussed in the next section date back as early as 1970, so young adults from 1970 are not included in the regression analysis, but rather to illustrate long-term trends.

I utilize the 1-in-20 sample for 1980, 1990 and 2000 and restrict the sample to young adults aged 18 to 34 in uniquely identified MSAs. This yields a sample size in excess of 4 million observations (before other exclusions). I created four mutually exclusive living arrangements that are comparable across the 1970 to 2000 Censuses.[3] Each young adult is assigned to one these categories:

> *Independent* – The young adult is either the head or spouse, and the only members of the household are the head, spouse, and natural/adopted/stepchildren under the age of 18. For example, a married couple with young children would be included, as would a young adult living by her/himself. A single mother would also fit into this category, but a cohabitating couple would not.
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> *Economic arrangement* – The young adult resides only with same-generation family members (siblings, cousins, and so forth), and/or non-family members. Households that have children under 18 present, or an older generation (parents, grandparents, uncles, aunts, and so forth) present are excluded. For example, two adult siblings sharing an apartment together would fall into this arrangement, as would two unrelated college students living in an apartment.[4]
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> *Not independent (Parental arrangement)* – The young adult lives in a household with only family members, and at least one of those family members is of an older generation (parents, grandparents, uncles, aunts, and so forth). For example a young man living with his parents, or his grandparents, would fall into this category.
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> *Other* – Some household arrangements seem to be a hybrid of the independent, economic, and non-independent arrangements, and are difficult to characterize in terms of transition to adulthood. For example, a married couple with children that rented out a room to an unrelated individual has a living arrangement that might be considered either independent or economic. The same would be true of a

[3] I tried classifying young adults by both living arrangements and home ownership status. For reasons discussed later, I abandoned such an approach, and focused exclusively on living arrangements.

[4] Cohabitors (without children) would fall into the "economic arrangement" group. I put cohabitors with children into the "other" category and exclude them from the analysis. If, instead, cohabitors with children are classified as "independent," then the empirical findings hardly change.

single mother with a roommate. Living arrangements for a young adult male who lives with his parents and has an unmarried female partner are likewise difficult to classify. Would the unmarried female partner be classified as living in an economic arrangement, an independent arrangement, or a non-independent arrangement?

Although this study treats independent living arrangements, economic living arrangements, and parental living arrangements as different degrees of moving into adulthood, richer microdata, if available, could be more informative. For example, a young adult with wealthy parents might receive large familial subsidies to live in his own apartment; yet such a subsidy suggests that he is not independent of his parents. Unfortunately, the Census does not provide information on intra-family transfers for individuals living in separate households, so there is no way to detect such arrangements. In the empirical analysis, I emphasize the first three arrangements, and exclude "Other" arrangements. Across the four Census decades, around 10 percent of young adults fall into this category, and there is very little variation by age.[5]

3.2 Inclusion in the sample

In addition to restricting the sample to individuals aged 18 to 34, those living in group quarters were excluded. I also exclude roughly 10 percent of the sample that does not live independently, in an economic arrangement, or with parents. Since the policy variables vary at the MSA-level, I also required that the individual live in a uniquely identified MSA for the 1980 to 2000 Census years. The remaining exclusions are due to the nature of the policy variables and computational constraints. The 1980, 1990, and 2000 Censuses identified 272, 273, and 297 MSAs, respectively, with approximately 2.2

million young adults in each of those years. For an MSA to be included, it had to be identified in all three Censuses, which narrows the sample to 224 MSAs. From there, the MSA had to have complete information on the policy variables discussed in Section 4. For example, only 139 MSAs have a house price index that dates back to 1980. Similarly, a number of MSAs were missing information on fair market rents or median house prices. Overall, 91 MSAs had complete information on house price indices, fair market rents, and median house prices, with around 1.3 million observations on young adults in each Census year.

Unfortunately, with such a large sample, I did not have the computational power to estimate the probit models in Section 6, while including MSA fixed effects. I found, however, that by eliminating smaller MSAs – those with fewer than 20,000 observations across the three Censuses, I was able to successfully estimate the models. This criteria eliminates 34 smaller MSAs, and leaves 57 MSAs.[6] While a substantial number of MSAs are eliminated, nearly 90 percent of the young adults remain in the sample, yielding a final sample size of 3,636,296.

3.3 Home ownership status

I was not able to create categories of living arrangements that combined housing tenure – owning or renting – with household composition for several reasons. First, previous studies, such as Goldscheider and DaVanzo (1985), Avery, Goldscheider, and

[5] The fraction of young adults who fall into the "other" category uniformly increases over time, from about 7 percent to 15 percent; most of the increase occurred between 1980 and 2000. Some of this change is due to cohabitors with children. This classification does not affect the empirical results, however.

[6] I have estimated the models at the MSA-Year level of aggregation, using all 91 MSA and 3 Census periods. The basic conclusions on housing prices are unchanged; the models below use the individual data in order to compare the effects based on several demographic criteria like race and education.

Speare, Jr. (1992), and Goldscheider, Thornton, and Young-DeMarco (1993) focus exclusively on household composition of young adults leaving the nest, and do not combine this with housing tenure. Even research that emphasizes economic factors like local housing costs – such as Garasky, Haurin, and Haurin (2001) – examines only living arrangements, not ownership. Clark and Mulder (2000) focus more on housing tenure, and less on household composition among nest-leavers. They model the decision of owning a home, owning a trailer, or renting among young adults who leave their parent's home. The authors also separately examine the choice of renting independently or sharing with roommates. Yet, none of these studies have examined the simultaneous decision of housing tenure and household composition.

A second possibility is to separately focus on the own-versus-rent decision among young adults. I rejected this approach because it is not always possible to assign the correct ownership status to each of the young adults in the household, especially in households where there is an economic arrangement. For example, the Census 2000 Long Form (available at http://www.census.gov/dmd/www/pdf/d02p.pdf) defines the head of household (Person 1) as "the person, or one of the people living here who owns, is buying, or rents this house, apartment, or mobile home. If there is no such person, start with any adult living or staying here." Although it is easy to assign housing tenure to those in "independent" living arrangements (married couples or single individuals living alone), assigning housing tenure to young adults in "economic" arrangements is more difficult. It is possible that two individuals – related or unrelated – either jointly own a home, or one of them is paying rent to the other. Since the Census asks these housing

questions only at the household level, not the individual level, it is impossible to tell. For this reason, it did not seem worthwhile to pursue this approach.

4. Creating Policy Variables

A key contribution of this study is to carefully incorporate policy variables that vary over time and across metropolitan areas. Given the recent real estate boom, particular attention is given to modeling the impact of housing costs. I now explain the process used to create the policy variables.

4.1 The House Price Index

The House Price Index ("HPI") is a broad measure of the movement of single-family house prices, available from the Office of Federal Housing Enterprise Oversight ("OFHEO") on a quarterly basis. The index is based on single-family detached properties using data on conventional conforming mortgage transactions obtained from the Freddie Mac and Fannie Mae. Although many housing transactions are included, there are several important exclusions. The conforming mortgage loan limit for single-family homes in 2006 is $417,000. Loans whose principal is in excess of this limit (known as "Jumbo Loans") are excluded. Mortgages on properties financed by government-insured loans, such as the Federal Housing Administration ("FHA") or Veterans Administration ("VA") mortgages, are also excluded as are mortgages on condominiums or multi-unit properties. To the extent that the excluded properties exhibit similar changes in appreciation over time, the HPI should be an accurate measure of housing prices.

The HPI has several advantages over other available indices. First, it is constructed from a sample of millions of repeat transaction pairs going back 30 years (including both home sales and refinances). In contrast, the Constant Quality Home Price Index published by the Commerce Department is based on a sample of only around 12,000 transactions annually.

Second, the HPI is available for a many metropolitan statistical areas ("MSAs"), whereas the indices published by Fannie Mae or Freddie Mac are only available at the national-level, Census-division level, or for fewer MSAs. OFHEO produces indices for 379 MSAs, with different starting points. The starting points vary because an MSA must have at least 1,000 total transactions before it may be published. Additionally, an MSA must have experienced at least 10 transactions in any given quarter for that quarterly value of the HPI to be published. In the regression analysis that follows, I restricted the sample to MSAs that had continuously available HPI data from the first quarter of 1980 to the first quarter of 2000.

Third, OFHEO describes the HPI as a "constant quality" house price index. The index for each geographic area is estimated using repeated observations of housing values for individual single-family residential properties on which at least two mortgages were originated and subsequently purchased by either Freddie Mac or Fannie Mae since January 1975. In December 1995 there were over 6.9 million repeat transactions in the database, and more recently, 30.7 million transactions. The index is updated each quarter as additional mortgages are purchased by Fannie Mae and Freddie Mac. The new mortgage acquisitions are used to identify repeat transactions for the most recent quarter and for each quarter since the first quarter of 1975. The use of repeat transactions on the

same physical property units helps to control for observed and unobserved differences in housing quality. Moreover, lack of information on property characteristics in historical government-sponsored enterprises data precludes the estimation of hedonic house price indexes. The HPI methodology is a modified version of the Case-Schiller geometric weighted repeat sales procedure (Case and Schiller, 1987, 1989).

4.2 Median House Prices

The HPI gives only relative changes, not absolute values, for housing prices. To obtain price levels, I use the National Association of Realtor's ("NAR") quarterly report on Metropolitan Area Existing-Home Prices on metropolitan area median home prices.[7] This report reflects sales prices of existing single-family homes by MSA. With both the HPI and median house prices, the MSAs are as defined according to the U.S. Office of Management and Budget, and include the specified city or cities and surrounding suburban areas. The median house price data, unlike the HPI, does not control for housing quality. To obtain nominal price levels from 1980 to 2000, I deflate median NAR house prices for the fourth quarter of 2004 by the HPI. Thus, the series of prices is of constant quality, reflecting the quality of the stock of homes sold in 2004. This series of nominal housing prices was then converted into constant 2000 dollars using the CPI-U.

4.3 Converting Housing Prices into Monthly Payments

[7] Many young adults likely buy starter homes that cost less than the median house price. Unfortunately, the NAR data does not have other percentiles in the housing distribution. Changes in house prices by percentile will be correlated with each other, so the differential responsiveness may come through socioeconomic status.

One innovation in this study is to recognize the importance of credit market conditions and the federal tax code. Although local housing prices are clearly the main driver of affordabilty, both interest rates and tax rates play important roles. According to Freddie Mac, interest rates on conforming 30-year fixed mortgage varied between 6.94 percent in 1998 and 16.63 percent in 1981; the points associated with the mortgages varied between 0.99 points in 1999 and 2.50 points in 1985. These interest rates are available at the national level only. I converted these combinations of interest rates and points into a single interest rate by assuming that 0.90 of a point translated into a 0.25 percent higher interest rate. This tradeoff between the interest rate and points is justified by casual inspection of 30-year mortgage loan combinations on www.eloan.com; making this adjustment leads to a time series of interest rates that vary between 7.25 percent and 17.21 percent.

Next, it is important to recognize that much of the interest on home mortgages is tax deductible; this deduction is more valuable the higher the individual's marginal tax rate. In the period studied, the highest federal marginal tax rate varied between 28 percent (after the Tax Reform Act of 1986) to 70 percent in 1980. Of course, it is unrealistic to assume that a typical homeowner – especially a young adult – would face such high marginal rates (and therefore face lower effective housing payments). Although I was unable to find information on marginal tax rates for the median (young) taxpayer, I did obtain information on "effective (average) tax rates" on earned income for non-elderly, childless adults from the Congressional Budget Office from 1979 onward. Although replacing marginal rates with effective rates could dramatically affect the monthly housing payments, the empirical results are fairly robust when using either the

median house price or the monthly payment computed here. Thus, it would surprising if using marginal tax rates for the median young adult would alter the conclusions. Despite large changes in the tax schedule and taxable income base, effective rates at the federal level stayed in a fairly narrow range – varying from a low of 11.4 percent in 1984 to 13.8 percent in 1981.

Given interest rates and tax rates, I then computed the time series of after-tax monthly payment per $1,000 of housing value. I relied on first-year amortization calculators from "Mortgage Professor" (see http://www.decisionaide.com/mpcalculators/ExtraPaymentsCalculator/ExtraPayments1.asp). The monthly payment nets out the tax savings from the deductibility of mortgage interest – a factor which should be fairly important during the initial years of home ownership. Based on these schedules, the after-tax monthly payment per $1000 of housing value varied between $6.08 in 1998 to $12.45 in 1981. I then applied these year-specific payments to each MSA's housing value to obtain the monthly payment.

4.4 Fair Market Rents

To control for conditions in the rental market – which may trend differently from housing prices – I obtained Housing and Urban Development's ("HUD") Fair Market Rent series for two bedroom apartments, obtainable for many metropolitan areas going back until 1983. Fair Market Rents ("FMRs") are used to determined eligibility for public housing programs and represent gross rent estimates – meaning they include the shelter rent plus the cost of all utilities except telephones. Rents are obtained from all units occupied by renters who moved to their present residence within the past 15

months. HUD combines data from the Census, the American Housing Survey, and random digit dialing telephone surveys to determine the FMR.

FMRs are expressed as a percentile point within the distribution of standard-quality rental units. Currently, the 40th percentile of rent is used, but before 1996, the 45th percentile was used. Because HUD provided both the 40th and 45th percentile of rents for each MSA in 1995, I can convert FMRs after 1995 to the 45th percentile by multiplying that year's FMR by the MSA's ratio of rents in the 45th and 40th percentile from 1995. Across all MSAs, rents in the 45th percentile were 2.8 percent higher than in the 40th; the largest difference was 6.7 percent. Since FMRs are not available before 1983, I deflate the 1983 numbers for the years 1980 to 1982. Finally, all monthly rents are converted into constant 2000 dollars using the CPI-U.

4.5 Transportation Costs

This study controls for transportation costs by deriving commuting-time measures from the 1980 to 2000 PUMS. Although transportation costs are often thought of in terms of expenditures on vehicles, insurance, maintenance, and fuel, longer commuting times are likely to be positively correlated with more intensive vehicle use. Moreover, the opportunity cost of one's time is itself a cost of commuting. The Census has detailed information on commuting patterns. In each MSA for each Census year, I extracted all individuals who drove to work alone in a private vehicle, who worked at least 1,500 hours per year, and left their home between 6 and 10 am. These restrictions impose a more uniform measure of transportation costs across MSAs and over time. In reality, when congestion goes up, workers find alternative means to avoid these costs, including

moving closer to work, relying on public transportation or carpools, or changing their work schedules. Yet, these optimizing responses to congestion – which in turn reduce congestion – entail costs in terms of convenience for workers.

I did not measure the direct, out-of-pocket costs of transportation; I speculate that relative to congestion costs, the variation across MSAs is quite minimal.[8]

4.6 Childcare Costs

To measure of child care costs, I extracted all workers from the 1980 to 2000 PUMS who reported their occupation as child care and computed the average hourly wage rate in each MSA and year. I excluded individuals whose imputed wage rate was less than $1 per hour or greater than $100 per hour, and converted all wage rates into constant 2000 dollars.

Although the wage rate of childcare workers is admittedly a rough measure of the costs facing parents, one would expect that higher wages rates are positively correlated with higher out-of-pocket costs for parents. An advantage of using a measure derived from the Census, rather than relying on measures published elsewhere, is the wage rates vary within an MSA over time. Thus, in the empirical work that follows, I control for fixed differences across MSAs and over time. Virtually all published measures of childcare costs are either at only one point in time, at the state level rather than the metro level, or sample only a handful of MSAs.

[8] Without data on direct, out-of-pocket transportation costs by MSA, I can only speculate on how they would affect the results. Explicit transportation costs are likely positively correlated with the implicit time costs because longer commuting times involve greater fuel consumption, wear-and-tear on vehicles, and

4.7 Labor Markets

One omitted variable in models that attempt to assess the impact of housing costs (and cost-of-living more generally) on living arrangements is labor market conditions. It is possible that one could find that higher housing costs or rents lead to greater independence of young adults, but that correlation could reflect the fact that healthy labor markets tend to have greater housing demand, higher incomes, and more independence. Thus, I include the statewide unemployment rate for each MSA in each Census year. I use the statewide, rather than the MSA-wide unemployment rate, because the latter were not easily obtainable prior to 1990.

5. Trends in living arrangements from 1970 to 2000

I begin by examining how each of the four living arrangements discussed in Section 3 has evolved between 1970 and 2000 by age. The broad results are summarized in Figure 1.

[INSERT FIGURE 1 HERE]

The red line in Figure 1 shows that the percentage of young adults who live independently has declined dramatically during the last thirty years. Further tabulations reveal that it has also declined from one decade to the next, and for all ages. Most notable is the decline in independent living among those in their middle twenties. Among 24-year-olds, for example, the percentage living independently fell by more than 30 percentage points. One hypothesis that could explain this age pattern and time pattern

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higher insurance costs. The inclusion of MSA fixed effects will eliminate permanent fixed differences in commuting costs across localities.

is that a greater percentage of those in their early twenties are going to college and staying in school longer.

This hypothesis is also consistent with the patterns illustrated the black line, which shows the percentage of young adults in "economic arrangements." The fraction living with either unrelated individuals, or family members of the same generation, peaks in the early twenties, and then declines. Over time, these patterns get more dramatic. For example, the percentage of 21-year-olds in "economic arrangements" doubled in the last thirty years, from 10 percent to 21 percent.

Figure 1 also scrutinizes one of the key points of the Time magazine article – that more children live with their parents (or other older family members) for longer periods of time. As young adults grow older, there is a steep decline in this living arrangement (illustrated in green). By age 34, for example, fewer than 10 percent of children live with their parents; further tabulations reveal there is little variation across decade. Those same tabulations do reveal that at earlier ages, however, there is some support for the idea that more recent cohorts of young adults live with their parents at later ages. The age patterns in 1970 and 1980 look very similar, as do the patterns for 1990 and 2000. Most of the increase comes for 23 to 27 year-olds, between 1980 and 1990, when the percentage living with parents increased from 18 to 25 percent. This suggests that the Time magazine article is somewhat misguided – today's "twixters" are not much different than other cohorts of young adults since 1990.

Finally, Figure 1 shows a steady rise over time in "other living arrangements." Between 1970 and 2000, the percentage in this arrangement roughly doubled from 7 to

15 percent. Yet fraction in this arrangement remained fairly low – even in 2000 – and there is no obvious trend by age.

6. Results from empirical model from 1980 to 2000

6.1 Model and Identification Strategy

The basic model estimates an equation of the form:

(1)

$$LIVING\_ARR^{*}_{imt} = \beta_0 + \beta_1 HOUSE\_PAY_{imt} + \beta_2 FMR_{imt} + \beta_3 TRAV_{imt} + \beta_4 CCARE_{imt} + \beta_5 ST\_URATE_{imt} + \beta_6 X_{imt} + \beta_7 D_{im} + \beta_8 D_{it} + \varepsilon_{imt}$$

where (1) is the underlying index function for the probit model (and *i* indexes individuals, *m* indexes MSAs, and *t* indexes time). In the model, $LIVING\_ARR_{imt}$ is the young adult's living arrangement (independent, economic, or non-independent), $HOUSE\_PAY_{imt}$ is either the monthly house payment or median house price, FMR_{imt} is the fair market rent, $TRAV_{imt}$ is the travel time in minutes, $CCARE_{imt}$ is the average wage of childcare workers, and ST_URATE_{imt} is the statewide unemployment rate. Each of the policy variables varies by geographic area and time, but not by individual circumstances. X_{imt} contains other covariates that are hypothesized to affect living arrangements. This includes controls for age (dummy variables for single years of age), sex, race/ethnicity, educational attainment, current school enrollment, U.S. citizenship, current marital status, whether the individual lived in the same state 5 years prior to the Census, and prior year's earnings. The vectors D_{im} and D_{it} are dummy variables for MSA (57 separate localities, as shown in Appendix Table 1) and year (1980, 1990, and 2000). In practice, we do not observe the underlying value of $LIVING\_ARR^{*}_{imt}$, but instead only observe the discrete outcome:

(2)

$$LIVING\_ARR_{imt} = 1 \text{ if } LIVING\_ARR^{*}_{imt} \geq 0$$

$$LIVING\_ARR_{imt} = 0 \text{ if } LIVING\_ARR^{*}_{imt} < 0$$

Assuming that $\varepsilon_{imt} \sim N(0,1)$ and denoting $\Phi(\bullet)$ as the cumulative normal function gives the following probability:

(3)

$$prob(LIVING\_ARR_{imt}) = \Phi\begin{pmatrix} \beta_0 + \beta_1 HOUSE\_PAY_{imt} + \beta_2 FMR_{imt} + \beta_3 TRAV_{imt} + \beta_4 CCARE_{imt} \\ + \beta_5 ST\_URATE_{imt} + \beta_6 X_{imt} + \beta_7 D_{im} + \beta_8 D_{it} \end{pmatrix}$$

When the policy variables and additionally D_{im} and D_{it} are included, the coefficients on $\beta_1 - \beta_5$ provide the "differences-in-differences" estimate of the impact of the cost-of-living on living arrangements. The dummy variables for metropolitan area account for long-standing, time-invariant differences between the different metropolitan areas. For example, some areas – such as San Francisco or Boston – persistently have high cost of living and also tend to have high-paying job opportunities for young adults. Unless these long-standing differences in job opportunities can be adequately controlled for in the empirical models, the likely impact is to bias the impact of housing costs on the deterring independent living. That is, good job opportunities – which in this instance are positively correlated with housing costs – also facilitate independent living arrangements. Although the statewide unemployment rate may partially control for these long-standing differences, it is unlikely to fully control for the differences. Thus, without MSA fixed effects, it is possible that the expected negative effect of housing costs on independent living arrangements may not emerge.

The same sorts of arguments could be made about the inclusion time dummies. For example, national-level credit market conditions have changed over the twenty-year analysis period. The Federal Reserve Bank of San Francisco reports that subprime mortgage lending grew tremendously since the early 1990s, and now constitutes a significant fraction of the overall mortgage market.[9] Since young adults may be high credit risks due to their short credit histories, this is a potentially significant change that could facilitate greater independence. In the analysis, real housing prices trended upward by 16 percent from 1980 to 2000; as a result fewer young adults may be able to afford living independently (and, this is borne out). Yet, one would expect that the drop in independent living would be even more dramatic if the changing credit market conditions at the national level were accounted for. The inclusion of time dummies accounts for unobserved or hard-to-measure national factors such as this.

With the inclusion of both MSA and time dummies, the estimated impact of cost-of-living comes from within-MSA changes in housing costs (and other policy variables) over time. An analysis of variance reveals that roughly 15 percent of the variation in median housing costs comes from the within-MSA variation over time; the remainder is subsumed by MSA and time dummies. A similar analysis reveals that roughly 11 percent of the variation in monthly housing payments comes the within-MSA variation over time, and 15 percent of the variation in fair market rents.

Although much of the variation is subsumed by the fixed effects, it is likely that such variation is inappropriate to identify the effects of cost of living on living arrangements in the first place. For example, when I estimate the impact of median

[9] See http://www.frbsf.org/publications/economics/letter/2001/e12001-38.pdf .

house prices on independent living, I find the coefficient estimate is around one-third smaller without the inclusion of MSA and time dummies.

Although a difference-in-difference estimator provides more compelling evidence than either cross-sectional or time-series estimates, it does have limitations. In particular, if there are factors that change differently across MSAs over time, then it will be difficult to separately identify the effect of cost-of-living from those other factors. There is no perfect way to address this problem, but as a specification check I modify the model. In particular, for young adults aged 25 to 34, I consider how the housing market conditions when they turned 25 affect their current living arrangement. This approach can only be estimated for 1990 and 2000 since housing market information is not available prior to 1980. In this case, the variation in cost-of-living comes from MSA, year, and age. The motivation for this exercise is two-fold. First, other authors, in particular Garasky, Haurin, and Haurin (2001), have noted that there appears to be an interaction between housing costs and age on living arrangements. They state that "for older youths (25+), we expect both economic and socio-demographic variables to play significant roles" in living arrangements (Garasky, Haurin, and Haurin, 2001 p.333). Most young adults turning 25 have completed their schooling, so it is likely that they would be in a position to become independent. Second, I restrict my attention to 13 of the 57 MSAs that experienced rapid bursts in housing prices, defined as real increases of 30 percent or more in median house prices over a three-year-period. Appendix Table 1 indicates these MSAs with an asterisk. Many of these localities are in the northeast or California.

[INSERT FIGURE 2 HERE]

Figure 2 shows the trajectories for six of the thirteen MSAs. Some MSAs – such as Honolulu – experienced rapid appreciation and then steep declines in housing prices.[10] Others – like Philadelphia – experienced a burst of appreciation and relatively flat prices thereafter. Notice that these bursts of appreciation occurred at different times in different locations.

Another key point – the intuition behind this identification strategy – is that some young adults might be "in the right place at the right time." Consider a 25-year-old living in San Francisco in 1986 who was deciding whether to live independently, in an economic arrangement, or with his parents. He would face a market where the median house price of $260,991. A similar 25-year-old in 1989 would face a market where the median house price was $399,916 – a 50 percent increase. If cost-of-living is an important factor for living arrangements, it is likely that we would observe higher percentages of independent living for the cohorts that happened to face dramatically lower housing prices when they turned 25.

By using housing conditions at age 25, rather than during the Census year, equation (1) is now modified as:

(1')

$$LIVING\_ARR^{*}_{imt} = \beta_0 + \beta_1 HOUSE\_PAY\_25_{imt} + \beta_2 FMR\_25_{imt} + \beta_3 X_{imt} + \beta_4 D_{im} D_{it} + \beta_5 D_{it} D_{ia} + \beta_6 D_{it} D_{ia} + \varepsilon_{imt}$$

This specification includes MSA*time interactions, as well as MSA*age and time*age interactions (D_{ia} represents age dummies). The variation in travel time, child care costs and the unemployment rate are subsumed by the MSA*time interactions. The

[10] Although Honolulu may be different than other localities for a variety of reasons, the specifications include MSA fixed effects to account for those differences.

coefficients $\beta_1 - \beta_2$ now represent the "triple differences" estimate of the impact of the cost-of-living.

6.2 Main Results

Table 1 presents summary statistics for the full sample of 3.6 million young adults, as well as breaking out the sample by Census year and age. On average, 55 percent of young adults lived in "independent" arrangements, but there was a 10 percentage point drop between 1980 and 2000, with roughly equal percentage point rises in "economic" living arrangements and "non-independent" arrangements. Age plays a critical factor: those aged 25 to 34 are nearly 50 percentage points more likely to be living independently than those aged 18 to 24 (72 and 25 percent, respectively). More than half of the sample is female, and nearly seventy percent are white. Many changes occurred over the 20 year horizon. For example, the percentage of individuals of Hispanic ethnicity doubled from 8 to 17 percent. The number of dropouts remained fairly constant at about 17 percent, but there was a decrease in individuals with a high school diploma from 32 to 24 percent and an increase in individuals with at least some college from 51 to 59 percent. By 2000, nearly one-quarter of young adults were still enrolled in school.

Individual annual earnings (which includes non-workers) went up in real terms from about $18,000 to about $22,000 between 1980 and 2000 and the unemployment rate fell from 7.2 to 4.1 percent. The percentage who were U.S. citizens declined from 94 to 87 percent and the percentage who were married fell from 48 to 41 percent. Mobility

increased dramatically over this period. The fraction who lived in the same state five years earlier fell from one-half to one-third.

Over the entire period, the median house price was $157,320. It rose in real terms between 1980 and 1990, and then declined. The monthly housing payment – which accounts for credit market conditions, tax deductibility, and keeps housing quality constant – fell dramatically from $1476 to $1092, a 26 percent drop.[11] In contrast, monthly rental payments went up slightly during this period, from $726 to $741. Commuting increased from 23 to 27 minutes, but there is not a clear trend in child care costs.

Results using the two different measures of housing costs on living arrangements are shown in Table 2. Despite the fact that the trends in house values and monthly payments diverge in the time series, the regression results are remarkably consistent.

[INSERT TABLE 2 HERE]

The first three columns examine housing values, which are measured in $10,000 increments. As the first cell shows, there is a statistically significant, negative relationship between house values and independent living arrangements. The probability derivative, in brackets, shows that every $10,000 increase in house value leads to a 0.61 percentage point decline in independent living. The next two columns show a significant positive relationship between housing costs and living in an economic arrangement or living non-independently.

Higher rents seem to have no impact on living independently; perhaps surprisingly higher rent levels lead to fewer young adults living with parents (non-

independent) and more young adults living in economic arrangements. Higher commuting costs slow the transition to adulthood: the likelihood of living non-independently goes up one percentage point for every two additional commuting minutes.[12]

The results for childcare costs are not intuitive: higher childcare costs lead to movements away from non-independent living. This may suggest that the measure being used – childcare wages – is reflecting characteristics besides the childcare market. For example, it may be the case that markets with higher childcare wages also have higher wage levels in general. If this is the case, then those higher wage levels may foster independence.[13]

Finally, adverse labor market conditions delay the transition to adulthood. A one percentage point increase in the unemployment rate raises the probability of living independently by 0.9 percentage points.

The individual characteristics show that males, Hispanics (relative to whites), other non-whites (relative to whites), students, and individuals who lived in the same state 5 years prior are all significantly less likely to be in an independent living arrangement.[14] In contrast, African-Americans, the currently married, the college-

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[11] It may appear surprising that housing payments fell, given the rise in nominal house prices, but interest rates fell from 14.2 percent in 1980 to 8.3 percent in 2000. In addition, *real* housing prices went up only modestly over the period.

[12] The results on commuting time appear to be implausibly large. A $15,000 increase in house prices has the same effect on independence as a 2 minute increase in commuting time. The results on housing prices are unaffected by excluding commuting time, however. For example, a $10,000 change in median house price leads to a 0.64 percentage point decline in independent living, rather than 0.61 percentage points.

[13] It could also be the case that the unemployment rate, commuting times, and child care wages all tend to be correlated with each other in a way that affects living arrangements of young adults.

[14] Although same-state of residence is arguably endogenous, the results on house prices actually get larger by excluding it. A $10,000 change in house price leads to a 0.70 percentage point decline in independent living.

educated, citizens, and high earners are all significantly more likely to be living independently.

The results in the next three columns – using housing payments rather than housing values – show a similar story. Every $100 increase in the monthly housing payment leads to a 0.58 percentage point decline in living independently. In contrast to housing values, monthly housing payments seem to have no effect on living in a parent's house, but rather increases the likelihood of living in an economic arrangement. In this specification, higher rents significantly increase the likelihood of living in an economic arrangement, but have insignificant effects on the other living arrangements. Other than those differences, the results are similar to the specification with housing values.

A number of variables in the previous specification could be criticized on the grounds that they are endogenous. One could argue that location is endogenous – that is, when an individual wants to "settle down" and live independently, she moves to a more affordable MSA. If one believes that this is a serious issue, then it is likely that the approach taken here will not be viewed as credible.[15] Some of the individual characteristics could also be viewed problematic – especially school enrollment, marital status, and earnings. The role of earnings has been addressed in previous studies. Garasky, Haurin and Haurin (2001, p. 332) argue that "Participation in the paid labor force is a decision that occurs jointly with the decision on household formation. For example, a youth may not work because he or she is subsidized in the parental household." As a result, they use a predicted wage. I re-estimated the models excluding individual earnings. The results on the policy variables are similar to the main

specification. For example, a $10,000 increase in house prices leads to a statistically significant 0.49 percentage point drop in independent living rather than the 0.61 percentage point drop in Table 2.[16] The statistical significance disappears for non-independent living arrangements, but all of the directions are similar to the full specification.

An important question about the main results is whether the impact of the policy variables is economically meaningful. To figure this out, Table 3 show the results of two exercises. The first exercise is moving each policy variable from the 25th percentile to the 75th percentile. The second is examining the actual change in each policy variable between 1980 and 2000.

[INSERT TABLE 3 HERE]

The first exercise shows that housing prices or monthly housing payments have the potential to affect living arrangements. Moving from an MSA with the first to the third quartile of housing costs leads to a fall in independent living of 5 percentage points, from a baseline of 55 percent. Although housing costs matter, they explain only a small part of the 9.3 point decline in independent living between 1980 and 2000. Increasing housing costs from the 1980 to the 2000 value leads to a 1.4 percentage point drop in independent living.

The other two noteworthy policy variables are transportation costs and labor market conditions. Moving from the first to third quartile in travel time leads to a 2.5 percentage point decline in independent living; a similar movement in the unemployment

[15] One approach to dealing with the endogeneity of location is to construct an instrumental variable based on the person's birthplace. Unfortunately, this is hard to do in my analysis since I would need to know the MSA, not the state, that the individual was born in. The Census only asks state of birth, not city of birth.
[16] The results for all alternative specifications are available from the author.

rate leads to a 2.2 percentage point decline. However, labor market conditions do a poor job at explaining the time series trends because the labor market improved between 1980 and 2000 at the same time that independent living decreased. On the other hand, increased travel times can explain 2 percentage points of the 9.3 percentage point decline in independent living – a larger share than housing costs.

I then estimated the model by dividing it first by gender, then by age and then by race (Results available on request). For example, the motivation for dividing the sample into white and non-white subsamples is that changes in credit markets may have differently affected minorities, and interacted with the included policy variables. Specifically, one might expect that the greater reliance by lenders on credit scoring – where race and ethnicity are not factors – would lead to relatively greater opportunities for minorities to live independently and a greater responsiveness to changing market conditions.[17]

I found virtually identical marginal effects for males and females. The results by age show more responsiveness for those older than 25 than for those younger, which should be expected since those aged 25 and older are more likely to have completed their schooling. Nonetheless, the difference is relatively modest. A $10,000 increase in house price leads to a 4.3 percentage point decline in independent living for older individuals, and a 3.6 percentage point decline for younger ones.

Non-whites are considerably more responsive to changing market conditions than whites. A $10,000 increase in the price of housing leads to a 0.9 drop in independent living for non-whites, an effect that is more than double that for whites. In addition, the

[17] According to www.myfico.com, credit scores do not explicitly incorporate race, color, religion, national origin, sex, marital status, or age.

effects of housing costs on living with parents (non-independent living) show up significantly for non-whites, but not for whites.

Finally, one needs to recognize that marriage, fertility, and living arrangements may be jointly determined, and that the direction of causation is not clear. Living independently could facilitate marriage or children. In defining the "independent," "non-independent," "other," and "economic" living arrangements, a household with children could only fall into the first three categories.

I reran the basic specifications, attempting to more carefully control for marriage and childbearing. In particular, I reestimated the models including the number of children as an additional control, and also estimated models separately for young adults with any children or no children. The first exercise – including number of children as an additional control – led to estimates that were virtually identical to the baseline specification. Perhaps more interesting, the response to housing prices was virtually identical for young adults with or without children. Among those without children, the probability of independent living fell by 0.58 percentage points for every $10,000 increase in house value. For those with children, it fell by 0.62 percentage points. If anything, one would expect young adults without children to be more responsive to changes in housing prices since they are less constrained by issues like overcrowding, schools, and neighborhood quality. The fact that the responses are the same suggests family structure does not interact with housing prices in an important way to bias the results.

[INSERT TABLE 4 HERE]

Table 4 presents the "differences-in-differences-in-differences" (DDD) specification for the sample restricted to the residents of thirteen MSAs that experienced a great deal of volatility in housing prices. Although one could characterize the primary results as statistically significant, housing costs are rather limited in explaining the time series trends. The DDD estimator is marginally significant for housing costs, and insignificant for housing payments. The probability derivatives suggest that the impact of a $10,000 change in housing prices in about one-tenth that found in the main specification.

Before dismissing the idea that housing costs matter based on the DDD results, however, two important counter-arguments suggest that the DDD results could be biased. First, the housing cost measure used here uses market conditions at age 25, yet measures living arrangements at the time of the Census. Recall from the summary statistics that two-thirds of all young adults in the 2000 Census lived in a different state in 1995 (the same is true for young adults in the 1990 Census). Thus, many individuals did not live in the same MSA during the Census year as they did at age 25. This measurement error will tend to bias the coefficient estimates toward zero.

Second, the sample examines MSAs with rapid rises in housing appreciation. It is possible that individuals based their decision to live independently on both current housing costs and their expectation of future housing costs. When housing prices rise rapidly in a short time period, individuals may be concerned about getting "priced-out" of the market and might respond by quickly purchasing a home. Overall, the DDD results lend support to the idea that the role of housing costs is relatively minor, but because

some severe measurement error issues, it seems like the primary specification is more compelling.

7. Conclusions and Extensions

This study explored the role of cost of living on the living arrangements of young adults. Between 1970 and 2000, there was a dramatic decline in the percentage of young adults living independently, and increases in the percentage living with parents, in economic arrangements, or in other arrangements. The differences across decade are most dramatic in the mid-twenties, but even at older ages, the percentage living independently has decline. A number of factors unrelated to cost-of-living – such as marital status and school enrollment – changed over time, and may be helpful in explaining the time series trends.

The main goal of this paper, however, is to assess how changes in the costs of housing, transportation, and childcare affect these living decisions. I find statistically significant effects of housing costs and transportation costs in the expected direction, but the effects of childcare costs are counter-intuitive. Nonetheless, these factors appear to explain little of the aggregate changes over time. In the preferred specification, rising real housing costs can explain perhaps 15 percent of the total change in independent living arrangements between 1980 and 2000.

However, it is possible that housing costs will play a far greater role in future analysis.

[INSERT TABLE 5 HERE]

Between 2000 and 2005, many areas experienced a real estate boom. In 25 MSAs – almost all in California and Florida – nominal housing prices went up by at least 100 percent, while general prices increased by just 13 percent. The parameter estimates in this paper would suggest that such large changes in housing costs could lead to fairly sizable changes in living arrangements among young adults. In many respects, the ideal "experiment" will utilize these more recent changes and the 2010 Census.

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TABLE 1
Summary statistics for young adult sample used in regression analysis

	1980	1990	2000	Age<25	Age≥25
Independent	0.60	0.53	0.50	0.25	0.72
Economic	0.12	0.15	0.17	0.17	0.13
Not independent	0.29	0.33	0.32	0.58	0.15
Age	25.9	26.6	26.5	21.1	29.5
	(4.8)	(4.8)	(4.9)	(2.0)	(2.8)
Male	0.49	0.49	0.49	0.49	0.49
White	0.75	0.71	0.60	0.66	0.70
African-American or Black	0.14	0.13	0.14	0.15	0.13
Hispanic	0.08	0.12	0.17	0.13	0.11
Other, non-white	0.03	0.05	0.09	0.05	0.05
High school dropout	0.17	0.16	0.17	0.23	0.12
High school graduate	0.32	0.27	0.24	0.31	0.26
Some college	0.51	0.57	0.59	0.46	0.61
Enrolled in school	0.19	0.23	0.24	0.38	0.12
U.S. citizen	0.94	0.92	0.87	0.92	0.91
Currently married	0.48	0.44	0.41	0.21	0.60
Lived in same state 5 years ago	0.50	0.35	0.33	0.46	0.36
Individual earnings in prior year, including non-workers	17,985	20,843	22,266	10,954	25,850
	(18,395)	(22,736)	(28,099)	(12,638)	(26,151)
Year is 1980	1.00	0.00	0.00	0.41	0.35
Year is 1990	0.00	1.00	0.00	0.30	0.34
Median house price	141,387	169,370	163,984	155,994	158,125
	(42,548)	(83,809)	(65,809)	(65,149)	(67,174)
Monthly house payment based on market conditions	1,476	1,399	1,092	1,337	1,330
	(444)	(692)	(438)	(553)	(563)
Monthly fair market rent	726	734	741	731	734
	(113)	(156)	(162)	(141)	(145)
Average travel time in MSA in minutes	22.9	24.0	26.9	24.4	24.6
	(2.6)	(2.5)	(3.0)	(3.1)	(3.2)
Average hourly wage of childcare workers in MSA	8.81	8.04	9.15	8.68	8.66
	(1.06)	(1.26)	(0.85)	(1.15)	(1.17)
Statewide unemployment rate	7.2	5.6	4.1	5.8	5.7
	(1.5)	(0.8)	(0.7)	(1.7)	(1.7)
Median house price at age 25		149,900	155,038		152,396
		(61,859)	(62,392)		(62,172)
Monthly house payment at age 25		1,444	1,049		1,252
		(557)	(434)		(539)
Monthly fair market rent at age 25		731	743		737
		(130)	(165)		(148)
Sample size - All ages	1,350,065	1,164,891	1,121,340	1,374,110	2,262,186
Sample size - Age≥25		758,512	716,400		1,474,912

Notes: Standard deviations in parentheses. "Independent" is defined as a living arrangement where the young adult is either living alone or with a spouse and/or natural, adopted, or step-children under 18 only. "Economic" is defined as a living arrangement where the young adult is living with unrelated individuals and/or same-generation family members (for example, a spouse, siblings, cousins, etc.), but no older generations (for example, parents, grandparents, uncles/aunts, etc.). In addition, no children under 18 are present. "Dependent" is defined as a living arrangement where the young adult is living in a household with only family members, and at least one of those family members is an older generation (for example, parents, grandparents, uncles/aunts, etc.). If a young adult did not fit into one of these three categories (for example, a single mother with roommates), s/he was excluded from the regression analysis. All dollar amounts (individual earnings, median house price, monthly house payment, monthly fair market rent, average wage of childcare workers, and their equivalents at age 25) are expressed in constant 2000 dollars. The MSA-level measures of housing market conditions at age 25 are only calculated in the 1990 and 2000 Census years. Sample includes metropolitan statistical areas that meet the following criteria: 1) The MSA was defined in the 1980, 1990, and 2000 Census PUMS, 2) Median house price data was available from recent National Association of Realtors publications (see www.realtor.org), 3) House price index data was available from 1980 onward from the Office of Federal Housing and Enterprise Oversight (www.ofheo.gov) , 4) Fair market rent data was available from U.S. Department of Housing and Urban Development (www.huduser.org), and 5) The MSA had more than 20,000 individual observations on young adults from the 1980 to 2000 period.

TABLE 2
Probit models on living arrangements
"Differences-in-differences" specification

	Independent	Economic	Not independent	Independent	Economic	Not independent
Median house price	-0.0156	0.0076	0.0072	---	---	---
	(0.0020)	(0.0021)	(0.0028)			
	[-0.0061]	[0.0011]	[0.0021]			
Monthly house payment	---	---	---	-0.1493	0.1570	0.0139
				(0.0303)	(0.0234)	(0.0396)
				[-0.0584]	[0.0221]	[0.0041]
Monthly fair market rent	0.0184	0.3215	-0.2794	-0.1169	0.2567	-0.1259
	(0.0944)	(0.1007)	(0.1309)	(0.1198)	(0.0831)	(0.1367)
	[0.0072]	[0.0453]	[-0.0824]	[-0.0457]	[0.0362]	[-0.0371]
Average travel time in minutes	-0.0127	-0.0185	0.0163	-0.0166	-0.0164	0.0178
	(0.0051)	(0.0047)	(0.0080)	(0.0053)	(0.0044)	(0.0081)
	[-0.005]	[-0.0026]	[0.0048]	[-0.0065]	[-0.0023]	[0.0052]
Average wage of childcare workers	0.0149	0.0105	-0.0238	0.0146	0.0049	-0.0200
	(0.0065)	(0.0071)	(0.0094)	(0.0077)	(0.0068)	(0.0101)
	[0.0058]	[0.0015]	[-0.007]	[0.0057]	[0.0007]	[-0.0059]
Statewide unemployment rate	-0.0231	-0.0205	0.0331	-0.0258	-0.0128	0.0304
	(0.0064)	(0.0053)	(0.0082)	(0.0072)	(0.0047)	(0.0084)
	[-0.0091]	[-0.0029]	[0.0098]	[-0.0101]	[-0.0018]	[0.009]
Male	-0.3949	0.1248	0.2786	-0.3946	0.1248	0.2784
	(0.0068)	(0.0083)	(0.0099)	(0.0069)	(0.0083)	(0.0099)
	[-0.1536]	[0.0176]	[0.0823]	[-0.1535]	[0.0176]	[0.0822]
Hispanic	-0.1566	-0.0644	0.2252	-0.1577	-0.0640	0.2260
	(0.0290)	(0.0275)	(0.0386)	(0.0290)	(0.0275)	(0.0386)
	[-0.0618]	[-0.0088]	[0.0707]	[-0.0622]	[-0.0087]	[0.0709]
African-American or Black	0.1323	-0.3955	0.1784	0.1325	-0.3960	0.1786
	(0.0145)	(0.0143)	(0.0182)	(0.0146)	(0.0144)	(0.0182)
	[0.0512]	[-0.0453]	[0.0552]	[0.0512]	[-0.0453]	[0.0553]
Other, non-white	-0.1950	-0.1547	0.3093	-0.1977	-0.1535	0.3110
	(0.0216)	(0.0223)	(0.0334)	(0.0217)	(0.0223)	(0.0335)
	[-0.0772]	[-0.0197]	[0.1004]	[-0.0782]	[-0.0196]	[0.101]
Currently married	1.9048	-1.6005	-1.2476	1.9042	-1.6007	-1.2473
	(0.0196)	(0.0237)	(0.0318)	(0.0197)	(0.0237)	(0.0318)
	[0.6381]	[-0.2244]	[-0.3426]	[0.638]	[-0.2244]	[-0.3426]
High school dropout	-0.0108	-0.0367	0.0230	-0.0109	-0.0366	0.0231
	(0.0112)	(0.0112)	(0.0119)	(0.0113)	(0.0112)	(0.0119)
	[-0.0042]	[-0.0051]	[0.0068]	[-0.0043]	[-0.0051]	[0.0069]
Some college	0.0781	0.1630	-0.2165	0.0784	0.1632	-0.2168
	(0.0042)	(0.009)	(0.0084)	(0.0041)	(0.0090)	(0.0083)
	[0.0306]	[0.0227]	[-0.0644]	[0.0307]	[0.0227]	[-0.0645]
Enrolled in school	-0.1263	-0.0558	0.1211	-0.1264	-0.0557	0.1213
	(0.0064)	(0.0101)	(0.0115)	(0.0064)	(0.0101)	(0.0115)
	[-0.0497]	[-0.0077]	[0.0367]	[-0.0497]	[-0.0077]	[0.0367]
Lived in same state 5 years ago	-0.3650	-0.5981	0.7473	-0.3654	-0.5986	0.7479
	(0.0348)	(0.0575)	(0.0655)	(0.0348)	(0.0574)	(0.0654)
	[-0.1429]	[-0.0785]	[0.2304]	[-0.1431]	[-0.0786]	[0.2306]
U.S. citizen	0.2198	-0.4846	0.1905	0.2203	-0.4836	0.1893
	(0.0203)	(0.0190)	(0.0198)	(0.0203)	(0.019)	(0.0198)
	[0.0870]	[-0.0898]	[0.0527]	[0.0872]	[-0.0895]	[0.0524]
Individual earnings	7.5313	1.5193	-12.3256	7.5025	1.5073	-12.2892
	(0.4220)	(0.1877)	(0.4609)	(0.4218)	(0.1859)	(0.4609)
	[2.9453]	[0.2141]	[-3.6365]	[2.9341]	[0.2124]	[-3.6261]

Notes: Sample size in all specifications is 3,636,296. All models estimated as probit models. Standard errors in parentheses and marginal effects in brackets. In addition to the variables shown, all models include single-year-of-age dummies, MSA dummies, year dummies, a constant term, and correct for clustering at the MSA-year level. Median house price divided by 10,000, monthly house payment and fair market rent divided by 1,000, and individual earnings divided by 1,000,000.

TABLE 3
Evaluating the effects using the main specification

	Are the coefficients meaningful? Move from 25th to 75th percentile for each independent variable					
	Independent	Economic	Not Independent	Independent	Economic	Not Independent
Median house price	-0.051	0.009	0.018	---	---	---
Monthly house payment	---	---	---	-0.044	0.017	0.003
Monthly fair market rent	0.001	0.007	-0.013	-0.007	0.006	-0.006
Avg travel time in minutes	-0.025	-0.013	0.024	-0.033	-0.012	0.026
Avg wage of childcare workers	0.009	0.002	-0.011	0.009	0.001	-0.009
Statewide unemployment rate	-0.022	-0.007	0.023	-0.024	-0.004	0.021
Mean of dependent variable	0.545	0.143	0.312	0.545	0.143	0.312
	Can cost of living explain the time series trends? Change 1980 values to 2000 values					
	Independent	Economic	Not Independent	Independent	Economic	Not Independent
Median house price	-0.014	0.002	0.005	---	---	---
Monthly house payment	---	---	---	0.022	-0.008	-0.002
Monthly fair market rent	0.000	0.001	-0.001	-0.001	0.001	-0.001
Avg travel time in minutes	-0.020	-0.010	0.019	-0.026	-0.009	0.021
Avg wage of childcare workers	0.002	0.000	-0.002	0.002	0.000	-0.002
Statewide unemployment rate	0.028	0.009	-0.031	0.032	0.006	-0.028
Dependent variable, 1980	0.597	0.116	0.287	0.597	0.116	0.287
Dependent variable, 2000	0.504	0.173	0.324	0.504	0.173	0.324
Change over time	-0.093	0.057	0.037	-0.093	0.057	0.037

TABLE 4
Housing market conditions at age 25
Rapid appreciation
"Differences-in-differences-in-differences" specification

	Independent	Economic	Not independent	Independent	Economic	Not independent
Median house price at age 25	-0.0013	0.0010	-0.0010	---	---	---
	(0.0009)	(0.0011)	(0.0011)			
	[-0.0005]	[0.0002]	[-0.0002]			
Monthly house payment at age 25	---	---	---	-0.0085	-0.0116	0.0043
				(0.0115)	(0.0130)	(0.0128)
				[-0.0031]	[-0.002]	[0.0009]
Monthly fair market rent at age 25	0.0619	0.1099	-0.2075	0.0550	0.1267	-0.2175
	(0.0374)	(0.0594)	(0.0524)	(0.0372)	(0.0573)	(0.0503)
	[0.0222]	[0.0187]	[-0.044]	[0.0198]	[0.0215]	[-0.0461]
Male	-0.3806	0.2266	0.2659	-0.3806	0.2266	0.2659
	(0.0076)	(0.0088)	(0.0083)	(0.0076)	(0.0088)	(0.0083)
	[-0.1363]	[0.0387]	[0.0566]	[-0.1363]	[0.0387]	[0.0566]
Hispanic	-0.1466	-0.0808	0.2782	-0.1466	-0.0807	0.2781
	(0.0147)	(0.0148)	(0.0212)	(0.0147)	(0.0148)	(0.0212)
	[-0.0537]	[-0.0133]	[0.0650]	[-0.0537]	[-0.0133]	[0.0649]
African-American or Black	0.0750	-0.3839	0.2642	0.0750	-0.3839	0.2642
	(0.0172)	(0.0120)	(0.0138)	(0.0172)	(0.0120)	(0.0138)
	[0.0266]	[-0.0531]	[0.0628]	[0.0266]	[-0.0531]	[0.0628]
Other, non-white	-0.2957	-0.0988	0.4605	-0.2957	-0.0988	0.4604
	(0.0115)	(0.0165)	(0.0172)	(0.0115)	(0.0165)	(0.0172)
	[-0.1109]	[-0.016]	[0.1175]	[-0.1109]	[-0.016]	[0.1175]
Currently married	1.765	-1.6213	-0.9954	1.765	-1.6213	-0.9954
	(0.0185)	(0.0203)	(0.0175)	(0.0185)	(0.0203)	(0.0175)
	[0.5837]	[-0.3067]	[-0.2192]	[0.5837]	[-0.3067]	[-0.2192]
High school dropout	-0.0221	-0.0001	0.0155	-0.0221	-0.0001	0.0155
	(0.0103)	(0.0118)	(0.0106)	(0.0103)	(0.0118)	(0.0106)
	[-0.008]	[-0.0001]	[0.0033]	[-0.008]	[-0.0001]	[0.0033]
Some college	0.0944	0.1277	-0.2026	0.0944	0.1277	-0.2026
	(0.0073)	(0.0092)	(0.0081)	(0.0073)	(0.0092)	(0.0081)
	[0.0341]	[0.0212]	[-0.0445]	[0.0341]	[0.0212]	[-0.0445]
Enrolled in school	-0.0459	0.0101	0.0267	-0.0459	0.0101	0.0268
	(0.0069)	(0.0075)	(0.0096)	(0.0069)	(0.0075)	(0.0096)
	[-0.0166]	[0.0017]	[0.0057]	[-0.0166]	[0.0017]	[0.0057]
Lived in same state 5 years ago	-0.4748	-0.7996	1.0341	-0.4748	-0.7996	1.0341
	(0.0199)	(0.03)	(0.0308)	(0.0199)	(0.03)	(0.0308)
	[-0.1755]	[-0.114]	[0.2653]	[-0.1755]	[-0.114]	[0.2653]
U.S. citizen	0.2087	-0.4081	0.1055	0.2087	-0.4081	0.1055
	(0.0152)	(0.0137)	(0.0128)	(0.0152)	(0.0137)	(0.0128)
	[0.0771]	[-0.0824]	[0.0215]	[0.0771]	[-0.0824]	[0.0215]
Individual earnings in prior year	4.8308	-0.0066	-9.0739	4.8308	-0.0066	-9.0739
	(0.1662)	(0.1212)	(0.2665)	(0.1662)	(0.1212)	(0.2665)
	[1.7355]	[-0.0011]	[-1.9252]	[1.7355]	[-0.0011]	[-1.9252]

Notes: Sample size in all specifications is 509,593. Sample is restricted to young adults who are aged 25 to 34 in one of the thirteen MSAs that experienced rapid price appreciation (30% or more in real terms over three years), and are in the 1990 or 2000 Census PUMS. The MSAs include Boston-Quincy, MA, Honolulu, HI, Los Angeles-Long Beach-Glendale, CA, Nassau-Suffolk, NY, New York-Wayne-White Plains, NY-NJ, Newark-Union, NJ-PA, Philadelphia, PA, Austin-Round Rock, TX, Sacramento-Arden-Arcade-Roseville, CA, Salt Lake City, UT, San Diego-Carlsbad-San Marcos, CA, San Francisco-San Mateo-Redwood City, CA and Seattle-Bellevue-Everett, WA. Standard errors in parentheses and marginal effects in brackets. In addition to the variables shown, all models include MSA*Year interactions, MSA*Age interactions, Year*Age interactions, a constant term, and correct for clustering at the MSA*Year*Age level. Median house price divided by 10,000, and monthly house payment and fair market rent divided by 1,000. The average travel time to work, average wage of childcare workers, and state unemployment rates are not included because the specification already includes MSA*Year interactions.

TABLE 5

Could cost of living matter more in the future?

House appreciation from 2000-Q1 to 2005-Q1

1 Santa Barbara-Santa Maria-Goleta, CA	125%	26 Palm Bay-Melbourne-Titusville, FL	99%
2 Yuba City, CA	124%	27 Miami-Miami Beach-Kendall, FL	98%
3 Merced, CA	120%	28 Naples-Marco Island, FL	97%
4 Modesto, CA	120%	29 Punta Gorda, FL	95%
5 San Diego-Carlsbad-San Marcos, CA	119%	30 Washington-Arlington-Alexandria, DC-VA-MD-WV	95%
6 Salinas, CA	119%	31 Providence-New Bedford-Fall River, RI-MA	94%
7 Riverside-San Bernardino-Ontario, CA	118%	32 Vero Beach, FL	93%
8 Sacramento-Arden-Arcade-Roseville, CA	114%	33 Nassau-Suffolk, NY	92%
9 Stockton, CA	113%	34 Cape Coral-Fort Myers, FL	92%
10 Fresno, CA	112%	35 Sarasota-Bradenton-Venice, FL	91%
11 Port St. Lucie-Fort Pierce, FL	111%	36 Las Vegas-Paradise, NV	91%
12 Vallejo-Fairfield, CA	110%	37 Kingston, NY	91%
13 San Luis Obispo-Paso Robles, CA	109%	38 Bethesda-Frederick-Gaithersburg, MD	90%
14 Santa Ana-Anaheim-Irvine, CA	109%	39 Oakland-Fremont-Hayward, CA	89%
15 Los Angeles-Long Beach-Glendale, CA	108%	40 Carson City, NV	88%
16 Chico, CA	107%	41 Santa Rosa-Petaluma, CA	88%
17 Oxnard-Thousand Oaks-Ventura, CA	107%	42 Edison, NJ	87%
18 Fort Lauderdale-Pompano Beach-Deerfield Beach, FL	107%	43 Reno-Sparks, NV	87%
19 Madera, CA	107%	44 Poughkeepsie-Newburgh-Middletown, NY	86%
20 Napa, CA	106%	45 Hanford-Corcoran, CA	85%
21 Redding, CA	104%	46 Deltona-Daytona Beach-Ormond Beach, FL	84%
22 Bakersfield, CA	104%	47 Atlantic City, NJ	83%
23 West Palm Beach-Boca Raton-Boynton Beach, FL	104%	48 Winchester, VA-WV	80%
24 Ocean City, NJ	103%	49 Visalia-Porterville, CA	80%
25 Barnstable Town, MA	102%	50 Fort Walton Beach-Crestview-Destin, FL	79%
CPI over same period	13%		

APPENDIX TABLE 1 - MSAs used in regression analysis

80 - Akron, OH
520 - Atlanta-Sandy Springs-Marietta, GA
* 640 - Austin-Round Rock, TX
720 - Baltimore-Towson, MD
1000 - Birmingham-Hoover, AL
* 1120 - Boston-Quincy, MA
1280 - Buffalo-Niagara Falls, NY
1520 - Charlotte-Gastonia-Concord, NC-SC
1600 - Chicago-Naperville-Joliet, IL
1640 - Cincinnati-Middletown, OH-KY-IN
1680 - Cleveland-Elyria-Mentor, OH
1840 - Columbus, OH
1920 - Dallas-Plano-Irving, TX
2000 - Dayton, OH
2080 - Denver-Aurora, CO
2160 - Detroit-Livonia-Dearborn, MI
3000 - Grand Rapids-Wyoming, MI
3120 - Greensboro-High Point, NC
* 3320 - Honolulu, HI
3360 - Houston-Baytown-Sugar Land, TX
3480 - Indianapolis, IN
3600 - Jacksonville, FL
3760 - Kansas City, MO-KS
4120 - Las Vegas-Paradise, NV
* 4480 - Los Angeles-Long Beach-Glendale, CA
4520 - Louisville, KY-IN
4920 - Memphis, TN-MS-AR
5000 - Miami-Miami Beach-Kendall, FL
5080 - Milwaukee-Waukesha-West Allis, WI
5120 - Minneapolis-St. Paul-Bloomington, MN-WI
5360 - Nashville-Davidson-Murfreesboro, TN
* 5380 - Nassau-Suffolk, NY
5560 - New Orleans-Metairie-Kenner, LA
* 5600 - New York-Wayne-White Plains, NY-NJ
* 5640 - Newark-Union, NJ-PA
5720 - Virginia Beach-Norfolk-Newport News, VA-NC
5880 - Oklahoma City, OK
5960 - Orlando, FL
* 6160 - Philadelphia, PA
6200 - Phoenix-Mesa-Scottdale, AZ
6280 - Pittsburgh, PA
6440 - Portland-Vancouver-Beaverton, OR-WA
6760 - Richmond, VA
6780 - Riverside-San Bernardino-Ontario, CA
6840 - Rochester, NY
* 6920 - Sacramento-Arden-Arcade-Roseville, CA
7040 - St. Louis, MO-IL
* 7160 - Salt Lake City, UT
7240 - San Antonio, TX
* 7320 - San Diego-Carlsbad-San Marcos, CA
* 7360 - San Francisco-San Mateo-Redwood City, CA
* 7600 - Seattle-Bellevue-Everett, WA
8160 - Syracuse, NY
8280 - Tampa-St. Petersburg-Clearwater, FL
8400 - Toledo, OH
8520 - Tucson, AZ
8840 - Washington-Arlington-Alexandria, DC-VA-MD-WV

Notes: * indicates rapidly rising housing prices in MSA over a 3-year period. Overall, of the 91 MSAs that satisfied other criteria, these MSAs also had at least 20,000 young adults in them when combining the 1980 to 2000 Census PUMS files.

Figure 1: Changes from 1970 to 2000 in living arrangement, by age
Large decline in independent living

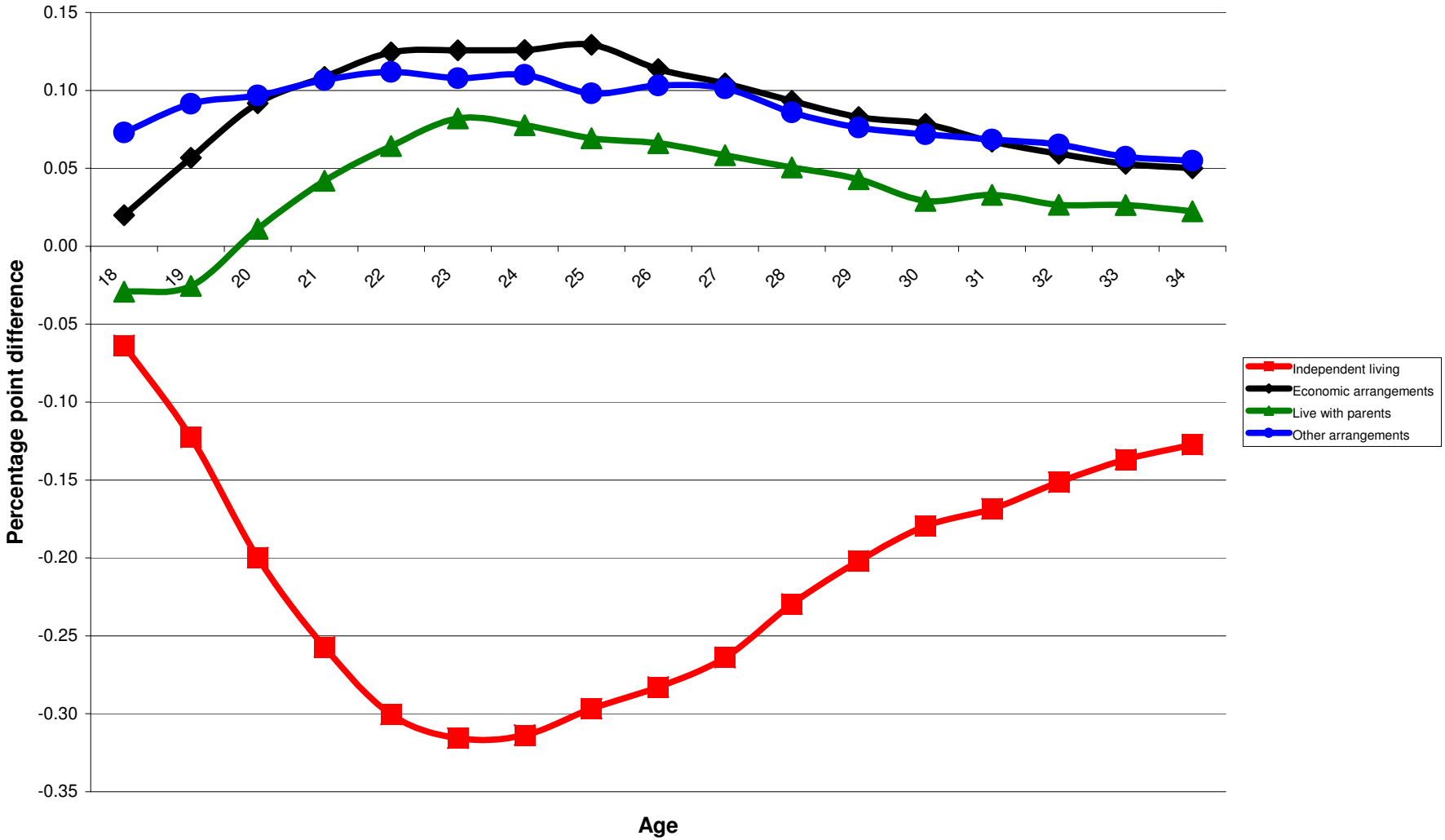

Figure 2: Examples of rapid escalation in housing prices
(30% or more real appreciation over 3 years)