How Local Rent Change and Earning Capacity Affect Natural Household Formation by Young Adults

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Abstract

Through a longitudinal survival analysis, this paper provides the first look into the long-term process of nest leaving, which is a pre-condition for natural household formation by young adults. Using the American Housing Survey (AHS) data to follow a group of young adults aged 25-34 who were living in parental homes in 1985, we found that nearly 23 percent still lived in parental homes by 1995, even at age 35-44. We also found that an increase in the local fair market rent (FMR) is detrimental to young adults' effort at achieving independent living, while a decrease in the FMR may help young adults leave their parents' house. While the adults are still young, they are more able to achieve independent living when local rent conditions change in their favor. As they become older, they are less able to achieve independent living, even when local rents go down. Concurring with Haurin et al. (1993) and Di et al. (2002), this paper finds that the potential labor earnings are important in explaining the probability of leaving parents.

Introduction

Household formation is important to housing research because it undergirds the demand for housing. Demographers predict household growth by examining household formation trends such as marriage and divorce rates, and individuals coming of age and moving away from their parents. Of particular interest is influence in age cohorts with respect to their headship rate—the share of people of given age that head a household. Demographers calculate age, race, and family type specific headship rates based on reasonable fertility, mortality and immigration assumptions, and even consider different economic environments at different times in forecasting housing tenure. Projections by Masnick and Di (2000), for example, forecast a net gain of 2.2 million households headed by 25-to-34-year-olds between 2000 and 2020. While many tasks and challenges remain for future research on household formation from a demographic perspective, this paper tries to focus on economic factors such as rent and income and their effects on household formation.

Historical data reveals that the majority of household formations occur among the young adult age group of 25- to 34-year-olds (Luallen 1996). However, significant shares of these young adults (12.5% males and 7.9% females in 2001) still live in their parents' homes (Di, Yang, & Liu, 2002). There is a rich body of literature on the living arrangements of young adults of this age group (Heer, Hodge, &Felson, 1985; Masnick 1996; Goldscheider, 1997). Personal income (both at the individual level and its distribution among all young adults) has been identified through model testing and historical statistics, respectively, as a major factor that influences whether young adults live in parental homes (Di et al. 2002).

Household formation should depend on both the cost of independent living and individuals' capabilities to pay this cost, as well as the social norm concerning the acceptability of living at home. For young adults to achieve independent living and form their own households, they must leave their parental homes. Most rent or share a rental unit or join another household (through marriage, for example), while a few may become homeowners. Local rent conditions and young individuals' income levels are important factors in this process. In this paper, we explore through logistic models how local rents,

earning capacity[1], and personal as well as household income affect the process of young adults over 25 years old leaving the parental home. Such empirical work should provide some understanding of the initial step in the process of household formation. Young adults leaving home do not necessarily form a new household but if they continue to stay in the homes of their parents, they cannot contribute to new household formations.

More interestingly, this paper includes a survival analysis that helps examine the nest-leaving process over a longer period of time. Such a longitudinal view allows us to better understand the long-term barriers that prevent certain young adults from leaving parental homes to eventually form new households. Another remarkable departure of this paper from previous studies is that by measuring the change in young adults' living arrangements every two years consecutively, we not only find out which young adults are living inside or outside parental homes, but also estimate which ones are most likely to leave their parental homes within two years. Such an intrinsic forward-looking method has not been used before. The time-lag method allows us to measure conditions and consequences more accurately.

This paper also provides more accurate measures on local rent conditions by using local area fair market rent (FMR) calculated by the Department of Housing and Urban Development (HUD). In a previous paper (Di et al. 2002), only median rent was looked at in the four geographic regions by city, suburb or non-metro, thus containing only twelve different values. Other researchers have examined local rent conditions at the county level (Haurin, Hendershott, & Kim, 1993). Haurin et al's study, however, lacks information on household incomes, focusing instead only on personal income. Since household income includes parental contributions, it allows study of the impact of generational poverty on household formation. The data source used in this paper is the American Housing Survey (AHS), where as our previous study used the Current Population Survey (CPS) and the Panel Study of Income Dynamics (PSID), providing us an opportunity to verify some of the major findings in that study.

[1] Earning capacity is arguably a better measurement than current salary. For example, the current job may be part-time (Haurin et al. 1993). In fact, formal education one received is often used as a proxy for permanent income, and we use it in this paper.

Finally, to better understand the true pattern of young adults leaving or living in parental homes over time, we ran logistic models for each of the two-year periods between 1985 and 1995, separately, allowing us to focus on the 25-34-year-olds and compare factors to see whether or not they consistently affect nest leaving over time. Such comparisons enrich our discussions based on survival analysis and more rigorously demonstrate a few significantly important factors such as local rent change and earning capacity of the young adults.

Data & Method

Conventional housing demand analysis is performed at the household level. An earlier study, however, split up households into their "true underline decision units," arguing that it is "the nuclear family or even the adult individual within a composite household [that] decides housing consumption" (Borsch-Supan 1986, p. 146). In this paper, we try to follow up on individuals and observe their behavior change in living arrangements through data collected biennially from the American Housing Survey (AHS), conducted by the Census and HUD. The AHS tracks a consistent sample of about 55,000 housing units (actual physical housing structures as opposed to households) and reports on characteristics of the unit, neighborhood and occupants.

Although AHS data are collected on a household basis, they also include detailed information for each individual residing in the household. This allows us to get information at the household level (e.g. household income, family type, and household size) as well as at the individual level (e.g. gender, personal income, marital status, ethnicity, education attainment, and relationship to the household head).

Since our focus of study is to observe and estimate individual living arrangement change among young adults, and because AHS data are collected at the household level, we first transformed each year's household data into an individual-level dataset[2]. Thus, if there

[2] Because the AHS data are sampled based on households instead of individuals, such data transformation will carry bias caused by cluster effect as household size varies. Therefore, our findings based on variables that only have marginal or nearly marginal significance require further verification by using special statistical software such as SUDDAN -- Software for the Statistical Analysis of Correlated Data.

are 4 persons in a household, the household record will yield 4 observations in our individual-level dataset. Then we merged such data sets of different years by the unique housing unit identifier (the variable CONTROL), the unique individual identifier (the variable PLINE), and by gender. We also verified the age of the individual, allowing a range of 1 to 3 in age change not only to reflect two years of aging but also to accommodate scenarios where birth dates and interview dates could cause 1 or 3 years of difference in age on AHS data record.

In the merged dataset, we only kept those observations where occupying households are living in the same physical housing units as two years ago or during the previous interview, i.e. SAMEHH=1. Only among these households could we try to identify each young adult individual and measure the change in living arrangement. Those continuing to live with parents should still be in the household record and those who left parental homes should be absent from the new household record. Those who recently moved have been dropped from the dataset. This may bring attrition data bias, however, through model testing we found that whether the young adult comes from a non-mover household in the previous stage (SAMEHH=1) does not significantly affect nest leaving two years later. Therefore, our data bias in keeping non-recent-movers should have little effect on the model results.

It is practically impossible to identify those physical housing units that have the same occupying households, due to data errors at AHS in 1997 SAMEHH variables. Therefore, we could only construct biannual datasets for 1985-87, 1987-89, 1989-91, 1991-93, and 1993-95, respectively.

We also constructed a multi-period longitudinal dataset to do a survival analysis. This dataset follows a group of young adults aged 25-34 in the 1985 AHS data who lived in parental homes to examine whether and when they left their parents' houses in the following years through 1995. There are 1941 observations in this dataset, among them 60% (1160) are males and 40% (781) are females. The average age is 28 in 1985.

Borrowing a statistical phrase used in survival analysis, these 1941 young adults in our dataset consist of our initial "risk set" (Singer 1998, Singer & Willllett, 1991), the group who will have the possibility of experiencing the event – that is, leaving their parental home.

As we follow up, nearly a quarter (449) of those in the initial group (1941) are not in the 1987 AHS data, due to sampling procedure change (retiring samples) or non-response. Meanwhile, by 1987, 41 of the initial 1941 young adults could no longer be traced because the occupying households of the physical housing units were no longer the same as those who occupied the units in 1985. In addition, 29 young adults have been identified as living in units where occupying households were the same but the young adults' relationship to the household head was no longer recorded as a child. We are not sure what caused this change in status. It could be that their parents moved out or passed away, or that they simply claimed to be the head of household in the 1987 survey. All these cases discussed above became "censored" cases. As a result, 1,422 observations survived the 1985-87 period in our dataset, among which 504 left their parental houses (the households still lived in the physical housing units as they did in 1985 but the young adults were no longer in the household record).

Age 25-34 is a time for many young adults to form their own households and it is not surprising that a little over one-third of the young adults in our dataset left their parental homes by 1987. Still, a substantial fraction (918) of the young adults remained living with their parents in 1987. In the survival analysis they are called "survivors", and these 918 "survivors" in 1987 become the "risk set" in the next period (1987-89) of our dataset, in which we continue to observe whether they still lived in their parental homes in 1989. Among these 918 cases, 91 were censored. As for the remaining 827 young adults, 605 still lived with their parents and 222 left by 1989. Two years later, another 49 cases were censored, 436 stayed, and 120 left. By 1993, another 31 cases were censored, 353 stayed, and 52 left. By 1995, only 279 stayed after 51 left and 23 were censored. Appendix A is a summary of the number of persons who were living with their parents in 1985 that then either left their parental houses, continued staying with their parents, or were "censored."

We have information about all survivors in each of the two-year periods at the beginning of the period, such as their level of formal education (a reliable proxy for permanent earning capability), personal income, total household income, and the area fair market rent. We also have geographic information, the family structure of parents, young adults' marital status, and their race/ethnicity. Since we followed the same housing units as well as their same occupant households, we can calculate the FMR change in the same area

over a two-year period for all the young adults, including those who already left their parental homes. We then converted our dataset with this information for each individual adult into a person-period dataset following the guidance for survival analysis provided by Singer (1998). As a result, those surviving cases yield multiple observations, and for each period they survived, there would be one more observation. There are 3,540 observations in our final person-period dataset. Appendix B is a description of the variables in this dataset.

Such preparation of the data equipped us to do two types of analysis. First, in survival analysis, we can answer questions such as: Can local rent and its change, personal income or earning capacity, and household income predict the probability of leaving parental homes? Does timing or aging play a significant role in the nest-leaving or household formation process? Second, through a series of logistic regression models based on separate two-year periods data, we may learn more about the changing patterns over time for the 25-34-year-olds instead of following them up as they are aging and eventually become 35-44-year-olds. Such replication for every two-year period also provides an opportunity to examine the influence of different variables and to see how consistent they are over time.

In both the survival analysis and the separate two-year-period data analysis, logistic regression was used to model the probability of leaving the parental house on the selected variables. The general equation for the model can be written as:

$$P = 1 / (1 + \exp(-(\beta_1 * V_1 + \beta_2 * V_2 + \beta_3 * V_3 + \ldots)))$$

in which P is the probability of leaving the parental household, V_1, V_2, V_3… are the predictors or variables such as age, gender, fair market rent change, education level, or personal income, β_1, β_2, β_3 are the estimated coefficients for each of the corresponding variables. If the model shows that β_1 is significantly different from zero, we can conclude that variable V_1 has effect on predicting the likelihood of leaving the parental household controlling for the other variables in the model. The anti-Log of β_1 (i.e., $\exp^{\beta_1}$) is the odds ratio for variable V_1, which tells the ratio of the odds of leaving the parents' house vs. continuing to stay for each unit difference in V_1, with all other variables being held constant.

Based on the survival analysis dataset, Figure 1 displays the actual trend between 1985 and 1995 of the likelihood of leaving parents' households among young adults aged 25 to 34-year-old in 1985. It shows that in the first time period (by 1987), about 35% of the young adults who lived with their parents in 1985 left their parental houses. As time went by and the young people became older, the conditional probability of leaving parents' homes

Figure 2 presents the sample survivor function for the 1941 young adults. Initially (in 1985), everyone in our sample lived with his/her parents, so the survival probability was 100%. As time passed and young adults left parental houses, the survival probability dropped to about 22.7% (by 1995). Furthermore, Figure 2 tells us that an average young adult would leave their parents' house sometime between 1987 and 1989, given that s/he lived with his/her parents in 1985. That is, half of the young adults would leave their parental houses around 1988.

Figure 1. Percentage of Young Adults (aged 25-34 in 1985) Leaving Parental House Given this Person Lived with Parents Since 1985

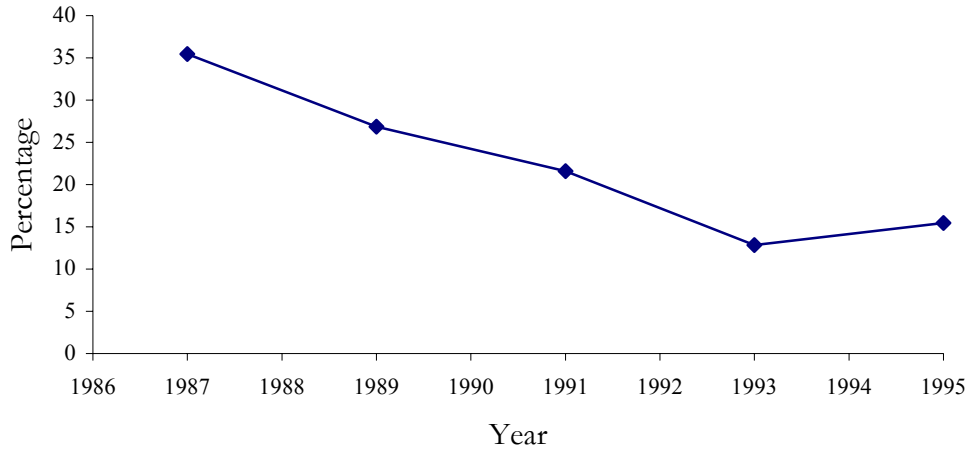
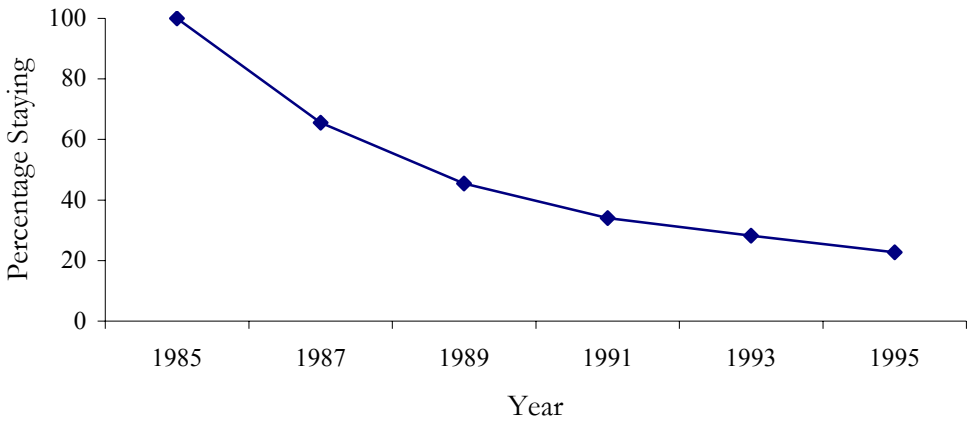


Figure 2. Survival Probability of Young Adults (age 25-34 in 1985) Who Have Continued Living with Parents Since 1985



Findings from the Survival Analysis

Figure 3 shows the parameter estimates, standard errors, and goodness-of-fit statistics from a series of models in which the conditional probability that a young adult leaves the parental house, given s/he had lived with the parents since 1985, is predicted by time, age, other demographic variables, housing cost, education, and income. Variables were gradually built into various models to help demonstrate how key variables of interest contribute to each of the previous models. While the other models in Figure 3 help show the process of our model building, our discussion below is focused on Model 8.

Figure 3.[3] Parameter Estimates and Standard Errors for a Series of Models from the Survival Analysis

Variable Name	M1	M2	M3	M4	M5	M6	M7	M8
T1	1.028 (.44*)	1.149 (.51*)	1.405 (.52**)	1.704 (.54**)	1.455 (.56*)	1.344 (.57*)	1.220 (.57*)	1.258 (.57*)
T2	.821 (.47~)	.687 (.53ns)	.318 (.59ns)	.670 (.61ns)	.450 (.63ns)	.339 (.64ns)	.227 (.64ns)	.269 (.64ns)
T3	.707 (.51ns)	.274 (.58ns)	-.694 (.68ns)	-.300 (.71ns)	-.591 (.73ns)	-.703 (.74ns)	-.822 (.74ns)	-.778 (.74ns)
T4	.233 (.54ns)	-.551 (.65ns)	-.034 (.81ns)	.265 (.82ns)	.016 (.84ns)	-.097 (.84ns)	-.208 (.85ns)	-.167 (.85ns)
T5	.632 (.57ns)	-.520 (.74ns)	.185 (.84ns)	.122 (.87ns)	-.062 (.89ns)	-.131 (.89ns)	-.339 (.90ns)	-.317 (.90ns)
Age	-.077 (.01***)	-.076 (.01***)	-.076 (.01***)	-.082 (.01***)	-.081 (.01***)	-.081 (.01***)	-.078 (.01***)	-.079 (.01***)
Sex	.029 (.08ns)	.035 (.08ns)	.037 (.08ns)	.033 (.08ns)	-.038 (.08ns)	.154 (.12ns)	.358 (.14*)	.333 (.14*)
Marry	.881 (.23***)	.897 (.23***)	.922 (.23***)	.914 (.23***)	.885 (.23***)	.860 (.24***)	.883 (.24***)	.881 (.24***)
Sex*marry	-.757 (.31*)	-.789 (.31*)	-.824 (.31**)	-.798 (.31*)	-.714 (.32*)	-.710 (.32*)	-.696 (.32*)	-.672 (.32*)
Per	.086 (.02***)	.084 (.02***)	.083 (.02***)	.090 (.02***)	.127 (.02***)	.127 (.02***)	.107 (.02***)	.110 (.02***)
South	.246 (.10*)	.292 (.11*)	.295 (.11*)	.300 (.12*)	.305 (.12*)	.330 (.12**)	.349 (.12**)	.346 (.12**)
West	.190 (.12ns)	.196 (.12ns)	.195 (.12ns)	.205 (.12~)	.189 (.12ns)	.214 (.12~)	.204 (.12ns)	.204 (.12ns)
Mwest	.139 (.10ns)	.184 (.12ns)	.188 (.12ns)	.157 (.12ns)	.134 (.13ns)	.146 (.13ns)	.150 (.13ns)	.149 (.13ns)
FMR		-.077 (.05ns)						

[3] Please see Appendix B for the descriptions of the variables.

FMR*Time		.046 (.01*)						
FMR_T1			-.082 (.04~)	-.091 (.04*)	-.130 (.04**)	-.132 (.04**)	-.144 (.04**)	-.145 (.04**)
FMR_T2			.075 (.05ns)	.070 .05ns)	.031 (.05ns)	.029 (.05ns)	.014 (.05ns)	.012 (.05ns)
FMR_T3			.210 (.06**)	.181 (.06**)	.160 (.06*)	.157 (.06*)	.142 (.06*)	.141 (.06*)
FMR_T4			.028 (.08ns)	.023 (.08ns)	-.002 (.08ns)	-.005 (.08ns)	-.021 (.08ns)	-.022 (.08ns)
FMR_T5			.052 (.08ns)	.078 (.08ns)	.046 (.08ns)	.039 (.08ns)	.038 (.08ns)	.040 (.08ns)
FMRchange				-1.774 (.96~)	-2.010 (.96*)	-2.018 (.96*)	-2.069 (.96*)	-2.065 (.96*)
High school					.130 (.13ns)	.111 (.13ns)	.079 (.13ns)	.073 (.13ns)
someCollege					.535 (.15***)	.517 (.15***)	.464 (.15**)	.455 (.15**)
College					.795 (.15***)	.779 (.15***)	.713 (.15***)	.702 (.15***)
Income						.011 (.00*)	.001 (.00ns)	
Sex* Income						-.018 (.00*)	-.008 (.00ns)	
Zinc2							.007 (.00***)	.007 (.00***)
Sex* Zinc2							-.006 (.00*)	-.008 (.00**)
-2LL	3832.35	3825.57	3814.24	3728.28	3680.72	3674.57	3662.52	3663.58
AIC	3858.35	3855.57	3850.24	3766.28	3724.72	3722.57	3714.52	3711.58
Adj. R-Square	.3297	.3316	.3349	.3523	.3657	.3674	.3708	.3705
R-square	.2473	.2487	.2512	.2642	.2743	.2756	.2781	.2779
DF	13	15	18	19	22	24	26	24
Change –2LL (DF)		6.78** (2)	11.33* (3)	85.96*** (1)	47.56*** (3)	6.15* (2)	12.05** (2)	1.06 (2)
Compared to		M1	M2	M3	M4	M5	M6	M7

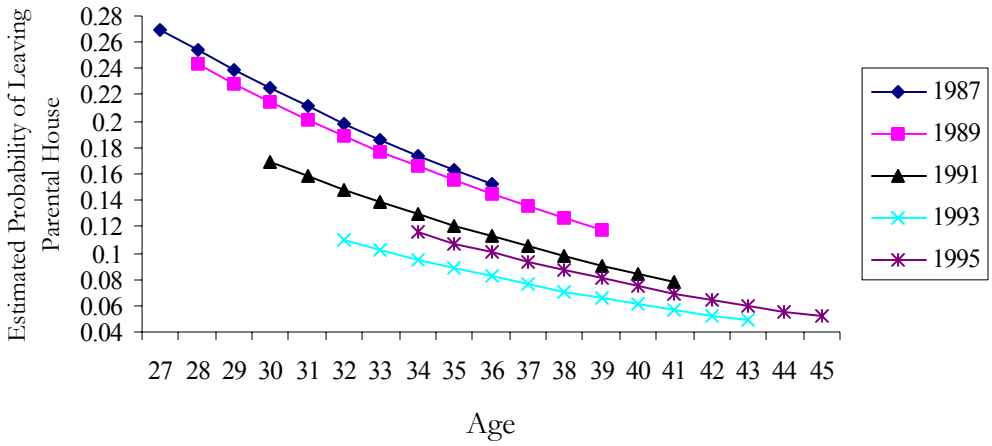
Note: 1. ~p<.10, *p<.05, **p<.01, ***p<.001, ns: non-significant at .10 level.
2. The number in parenthesis is standard error.

Time and Age

One of the advantages of survival analysis is that it allows us to simultaneously estimate the effect of age and time as factors in the process of nest leaving, given that both may have an impact on the outcome. Model 8 in Figure 3 shows that both age and time play a significant role in predicting whether or not a person will leave their parental household.

Regarding the young adults who were between 25-34 and lived with their parents in 1985, the slope for age is -.079, which indicates that holding all other variables in the model constant, the older the young adults are, the less likely they are to leave their parental household within the next two years. More specifically, the fitted odds that person A *will continue staying with parents* versus leaving the parental household are *1.08 times* the fitted odds for person B if person A is one year older than person B, given that both person A & B share the same characteristics in all other variables. As a specific example, Figure 4 shows the probability[4] of leaving parental household as a function of young adults aging as well as of time.

Figure 4. The Probability of Leaving Parental House as a Function of Age & Time



Each line in Figure 4 represents a different time period and shows the effect of age on the probability of leaving a parental house in that time period, given that the person stayed with his/her parents in the previous periods since 1985. For example, our model predicts that, holding all other variables in the model constant[5], the probability of leaving the parental house by 1987 for a 27-year old person is about 27%, while for a 34-year old person, the probability is only about 17.4%. Older young adults are less likely to leave their parental households than younger ones. This is true for each time period. This indicates that

[4] Whenever a specific probability is reported hereafter in this paper, each of the variables involved was set to a specific value (See Appendix C for details). The probabilities in this figure and the figures hereafter are calculated based on Model 8 in Figure 3 except where noted otherwise.
[5] See Appendix C for the specific values for each variable.

among those young adults who lived in their parental homes, the older ones had greater difficulties in achieving independent living than the younger ones.

Our test shows that a model with discrete time (time dummy) is better than a model with continuous time in terms of model fit. This means that the effect of time on the likelihood of leaving parental house is not linear. As shown in Model 8 (Figure 3), the slope for Time 1 (year 1987) is 1.258, which is statistically significant. This indicates that holding all other variables in the model constant, for the young adults who were between 25-34 and lived with their parents in 1985, at Time 1 (1987), the fitted odds of a person *leaving his/her parents' household* versus *continuing to stay with parents* are 3.52 times the fitted odds at other time periods, even if this person's age were to remain the same. In other words, young adults in Time 1 (1987) were more likely to leave their parents' house than in the other time periods. The slopes for the other time periods are statistically non-significant. The fact that the slopes go down from positive .269 at Time 2 (1989) to -.317 at Time 5(1995) suggests a trend that the chance of those staying in their parental homes will move out decreases over time.

The differentiation among all the lines in Figure 4 demonstrates that those who continued to live in parental homes actually had less probability to leave over time. Using the lines for 1987 and 1991 in Figure 4 as examples, the young adults aged 31 to 34 in 1987 had the probability of leaving between 17.4 (for age 34) and 21.1 (for age 31) percent, while the probability of the young adults aged 31-34 in 1991 ranged only between about 13 (for age 34) and 15.8 (for age 31) percent. Taking into consideration the aging factor, the group between 31 and 34 years old in 1987 will actually be 35 to 38 years old in 1991. The actual predicted probability for the same group in 1991 should be between 9.7 percent (for age 38) and 12 percent (for age 35). As these young adults continued to live with their parents, their probabilities of leaving the households were dwindling. By 1995, for those still staying with their parents through 1993, there was only a 5 (for age 45) to 11.5 (for age 34) percent chance that they would leave their parental homes.

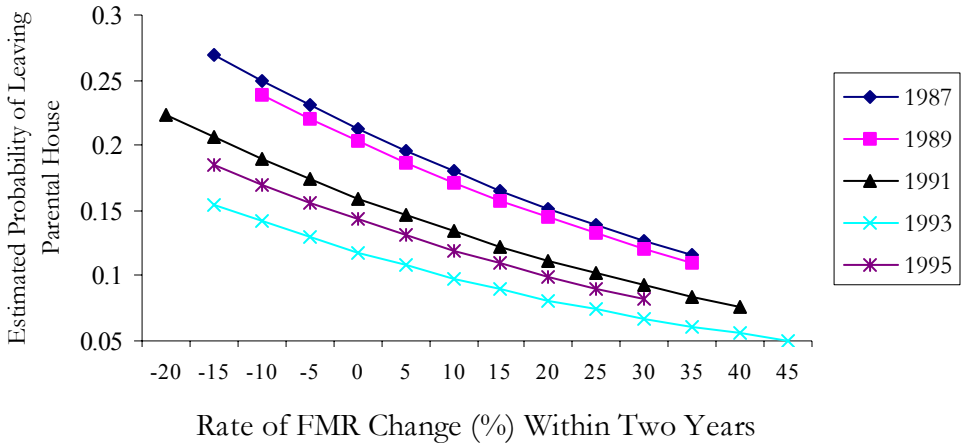
On average, the probability of leaving the parental house in 1993 is lower than in 1995, as shown in Figure 4. This difference is not statistically significantand there is no interaction between time and age. The effect of age and time together indicates an

accumulative negative effect over time. As those who were capable of achieving independent living left, the remaining are those who encountered more difficulties in leaving. Thus it becomes interesting to investigate the nature of those difficulties to see how they hinder the nest leaving process.

Housing Costs

While people's capability to pay for housing is relevant, housing cost and its change over time are undoubtedly important factors that affect young adults' achieving housing independence. As shown in Model 8 (Figure 3), the change in local fair market rent (FMR) over time is statistically significant in predicting whether a young adult left the parental house or not, with a slope of –2.065 for the change in FMR. In an area where the FMR increases in a two-year period, young adults are less likely to leave their parental houses, compared to an area where FMR decreases, holding all other variables constant. In addition, as the increase in FMR in an area grows, so does the likelihood of a young adult remaining in their parent's home. Translating this slope into an odds ratio, we can say that for every 10 percent increase in FMR in a two-year period, the fitted odds of a person continuing to stay with parents versus leaving the parental household will be 1.23 times, controlling for all other variables.

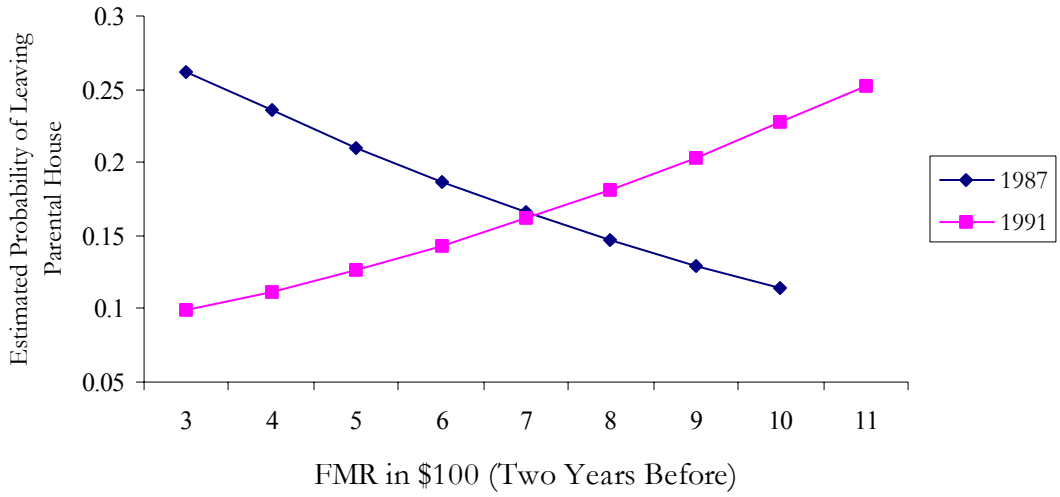
Figure 5. The Probability of Leaving Parental House as a Function of Time and the Rate of FMR Change



The lines in Figure 5 depict the effect of FMR change in each time period. Clearly, controlling for all other variables in the model, decreasing local rent is related to higher likelihood of leaving the parental house. Using 1987 as an example, for those areas where FMR experienced a 10 percent reduction between 1985 and 1987 (FMR change rate= -10%), our model predicts that by 1987 the probability for a young adult to leave his/her parental home would be 24.9 percent. On the other hand, for those areas where FMR increased 10 percent between 1985 and 1987 (FMR change rate=10%), we expect only an 18 percent probability of a young adult leaving home by 1987. A similar trend also holds for other time periods. While areas with *10 percent reduction* in FMR have probabilities of leaving parents' houses in the range of 17% (in 1995) to 24.9% (in 1987), those areas where FMR *increased 10 percent* have the probabilities in a range of 12% (in 1995) to about 18% (in 1987).

Our study also found that differences in fair market rent (FMR) *levels* between areas within a given time frame is also related to the likelihood of leaving, and that this effect differs by time. Our model shows that at Time 1 (1987) and Time 3 (1991), FMR is significantly related to whether one left parents' house or not, while at the other three time periods, the effect of FMR on the outcome is not significant. The slope for FMR at Time 1 is -.145 with an odds ratio of .865. At Time 1, FMR is negatively related to the probability of leaving -- the areas with higher FMR have a lower probability of young adults leaving their parents' houses two years later. The slope for FMR at Time 3 is .141 with an odds ratio of 1.15. At Time 3, FMR is positively related to the probability of leaving -- the areas with higher FMR have a higher probability of young adults leaving their parents' houses two years later. These effects are displayed graphically in Figure 6.

Figure 6. The Probability of Leaving Parental House as a Function of Time and FMR



As shown by the line representing 1987, areas with a higher cost of living imposed a detrimental effect on the nest leaving process. While those living in areas where FMR was only $300 in 1985, the probability of leaving parents' houses by 1987 is about 26 percent. Those who lived in areas with an FMR of $900 in 1985 (given such FMR, these areas are more likely to be major metropolitan centers) had an only 13 percent chance of achieving independent living by 1987. In contrast, as shown by the line representing 1991, for those living in areas where FMR was $300 in 1989, the probability of leaving parents' houses by 1991 is about 10 percent, and those who lived in areas with FMR at $900 in 1989 had a 20 percent probability of achieving independent living by 1991. As those who continued to live with parents were aging themselves, metro areas with higher cost of living actually had higher probabilities of young adults leaving their parents' homes. No obvious reasons can explain such counter intuitive trend except that housing supply might have an impact, as large metropolitan areas with higher rents may actually have more rental units to accommodate the nest leaving needs, while rural areas with lower rents do not have the same level of rental unit supply. On the other hand, large metropolitan cities with higher rents might have a culture that puts more psychological pressure on young adults to leave their parental homes, whereas places on the fringe of metro areas or in rural areas might have an indifferent attitude towards young adults continuing to stay at home. In the other three time periods, FMR has no predictive power on whether one left the parental house or not, after

controlling for the rate of FMR change and other variables. If graphed, the lines for the other three time periods will be almost flat.

In general, by using FMR as an index of local rent, this study does not find that higher FMR is consistently related to a lower likelihood for young adults to leave their parental homes. We also checked the distribution of FMR over time to examine whether any changes made in FMR definitions could have diminished the effect of FMR level in our models. The result shows that FMR increased over time and almost linearly within each region (see Appendix D). In addition, we tested the interactions of FMR with time, region, age, and gender, and none of these interactions was significant.

All being said and done, our study shows that the impact of local rent as measured in dollar amount levels is not as great as the impact of a dramatic local rent change. This is similar to the effects of weather on residents in a place very cold or hot that may not necessarily make them less productive, as people have already developed the appropriate attitude and means to deal with it. However, an unusually hot summer or bitter cold winter in a particular year is more likely to have notably detrimental impact on the productivity. Therefore, it is not surprising that it is the local rent change instead of rent level that significantly affects the process of young adults leaving the parental house.

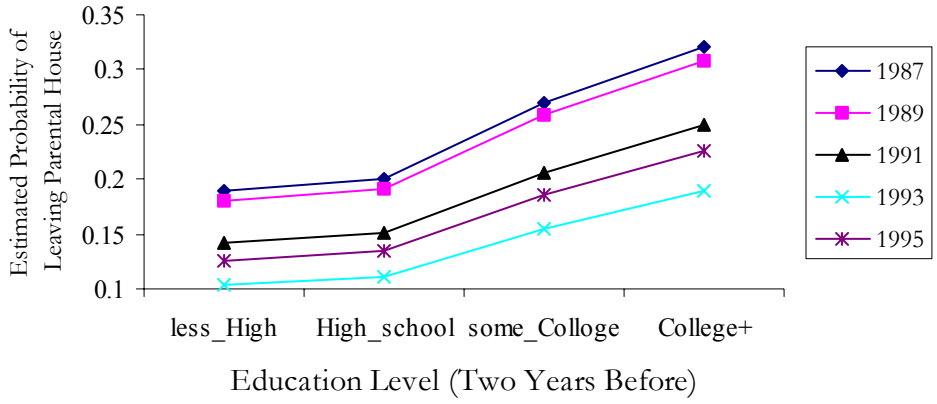
Permanent and Current Personal Income

Education Level:

In line with the literature, our study also found that young people's earning capacities, represented by their educational attainment, exert a significant effect on their achieving independent living. We included a series of education dummy variables in our model as the index of education level. As shown in Model 8 of Figure 3 , the slope for high school education is only .073 ($p=.59$), while the slopes for some college and college graduates are, respectively, .455 ($p<.01$) and .702 ($p<.001$). This tells us that there is no difference between people with a high school education and those with less than a high school education. However, compared to less than a high school education, some college or higher education makes a difference in terms of housing independence. Specifically, the estimated odds that a person who received some college education would leave his/her parental house versus continuing to stay with parents are 1.58 times the odds that a person

who did not finish high school, given that all the other characteristics are the same for the two persons. Similarly, the estimated odds that a person who received college or higher education would leave his/her parental house versus continuing to stay with parents are 2.02 times the odds that a person who did not finish high school, given that all the other characteristics are the same for the two persons. In other words, controlling for all other variables in the model, for the young adults who were between 25-34 and lived with their parents in 1985, people who had some college or higher education are more likely to leave their parental household than those who had only less than a high school education. This relationship is graphically demonstrated in Figure 7.

Figure 7. The Probability of Leaving Parental House as a Function of Time and Education Level



Each line in Figure 7 represents a different time period and shows the effect of education level on the probability of leaving the parental house in that time period given that a person stayed with his/her parents in the previous periods since 1985. For example, our model predicts that, holding all other variables at their respective specific values[6], the probability for an unmarried 31-year-old male who had less than high school education by 1987 to leave his parental house by 1989 is about 18.1%, while for a male with the same values in all the other variables except having some college education by 1987, the probability of achieving independent living by 1989 surges to 25.8%. This trend is true for other time periods as well. While the probabilities for those with less than a high school

[6] See Appendix C for the specific values for each variable.

education to leave parental homes range from 12.6 (in 1995) to 19 (in 1987), those with some college education are much more likely to achieve independent living (probability ranges from 18.6% in 1995 to 27% in 1987). Those with college or higher education have even higher probabilities, up to nearly 22.6% in 1995 and 32.1% in 1987.

Considering that it is possible that years of education (or education level) may have different meanings to people at different ages or in different periods, we tested the interactions of education level with time and age, respectively. The interaction between a high school education (vs. less than high school) and age was found to be significant in predicting the probability of nest leaving[7] (Appendix E). It is possible that dropouts from high school still have potential to complete high school when they are relatively young. But as they became older, such opportunities close. Therefore, their chance of independent living decreases. In other words, less than a high school education level at relatively younger age may be only a temporary measure, but at an elder age, it is pretty much permanent. Age doesn't matter in terms of the effect of college or some college on young adults' leaving the parental home.

The interaction between education and time is non-significant, suggesting that the effect of education level is stable over time. In addition, the distribution of education level over time for those still staying with parents is fairly flat and stable (Appendix F), meaning that not all adults at home have lower education levels. In other words, although education has an important affect on nest leaving, it is not the only constraint for achieving independent living.

Personal Income:

Although the reported annual personal income at this age period is understandably unstable as young adults may transfer jobs often and therefore not be earning the maximum for their capacities, or are only taking part-time jobs to accommodate education schedules, our study shows that, ***without*** *controlling for household income*, personal income in the current year is significantly related to the probability of leaving the parental household two years later and that this relationship differs by gender, as shown in Model 6 (Figure 3). The slope of personal income is .011 for males and -.007 for females. That is, without controlling for

[7] The interaction between high school education and age does not change other effects in Model 8 in Figure 3, so the rest discussion is still based on Model 8.

household income, males with higher personal income are more likely to leave the parental house than males with lower personal income. However, females not living with parents are slightly more likely to have higher personal income. The fact that females have a different pattern must be caused by many reasons, including the possible contributing factor that many married women do not work or only work part-time, and that the welfare system has more female recipients.

Figure 8a. The Probability of Leaving Parental House as a Function of Personal Income, Gender, & Marital Status (1989)

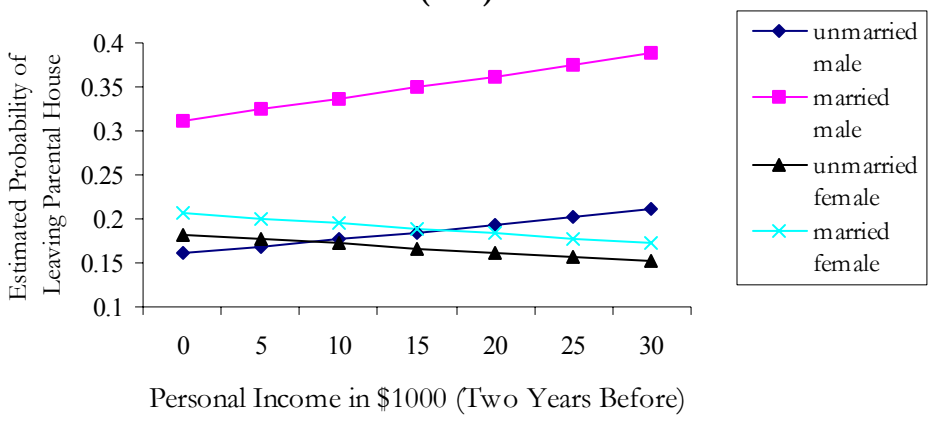
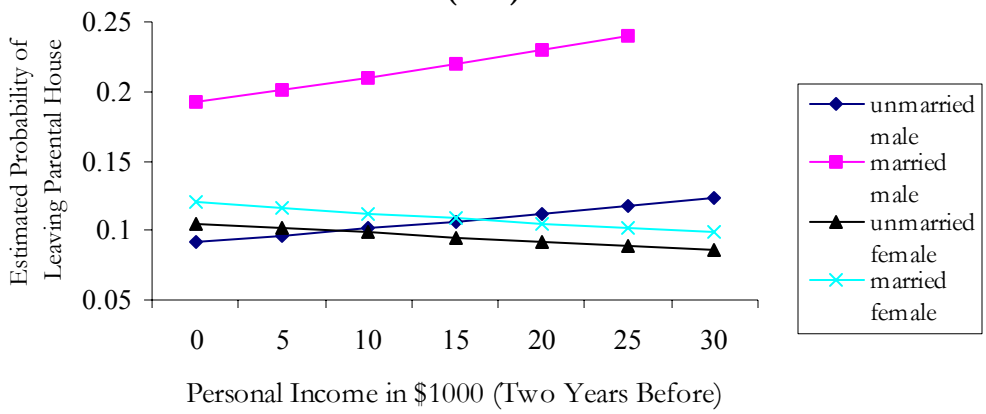


Figure 8a (based on Model 6 in Figure 3) shows the effect of personal income on the probability of leaving parents' houses as a function of gender in 1989. The upward lines represent the effect for males and the slightly downward lines for females. Setting other variables at their corresponding specific values, the probability of leaving parental houses in 1989 for unmarried males with personal income at $5000 in 1987 is about 16.9%. This probability becomes 19.3% if this person's 1987 personal income reaches $20,000. As a comparison, the probability of leaving parents' houses in 1989 for unmarried females with personal income at $5,000 in 1987 is about 17.7%. This probability will decrease to about 16.2% if this female's 1987 personal income is $20,000 (Note that a 300% increase in personal income only predicts about a 1.5% decrease in the probability of leaving). The cross lines in Figure 8a also indicate that at lower income level unmarried males are less likely to leave parents' houses than are females, while at higher income level males are more likely to leave parents' houses than are females. Figure 8a also shows that controlling for all other

variables, married persons are more likely to leave parents' houses than unmarried persons. All the above patterns hold for other time periods. Figure 8b is an example for year 1993.

Figure 8b. The Probability of Leaving Parental House as a Function of Time, Personal Income, Gender, & Marital Status (1993)



Household Income

Total household income, which is related to personal earning capacity and includes parental income during the year, is found to be significantly related to the likelihood of leaving the parents' households within two years .This relationship differs by gender also, as shown in Model 8 (Figure 3). That is, controlling for education level and all other variables, males from a household with higher total income in the current year are more likely to leave the household two years later than males from households with lower total household income. For females the relational direction is reverse, but the magnitude of this relationship is negligible (only -.001). Figures 9a & 9b demonstrate such effect in 1989 & 1993. For example, unmarried males from households with annual income of $20,000 in 1987 had a 15.8 percent probability of leaving their parental homes in 1989, while those from households with $50,000 in annual income in 1987 had a 19.1 percent probability of achieving independent living, when all other variables are held at the constant values as in Appendix C. While the effect of household income is visible as shown above, our model indicates that this effect is really small. The slope of household income is .007 for males and -.001 for females.

Figure9a. The Probability of Leaving Parental House as a Function of Time, Household Income, & Gender (1989)

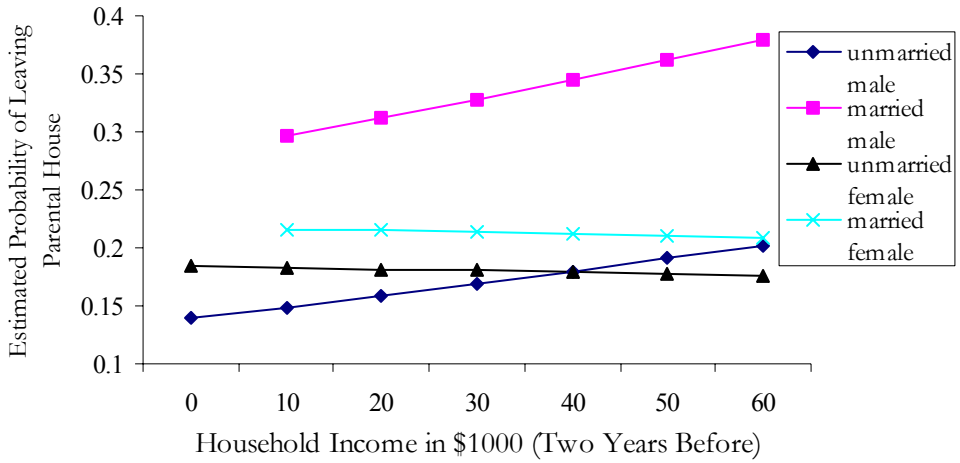
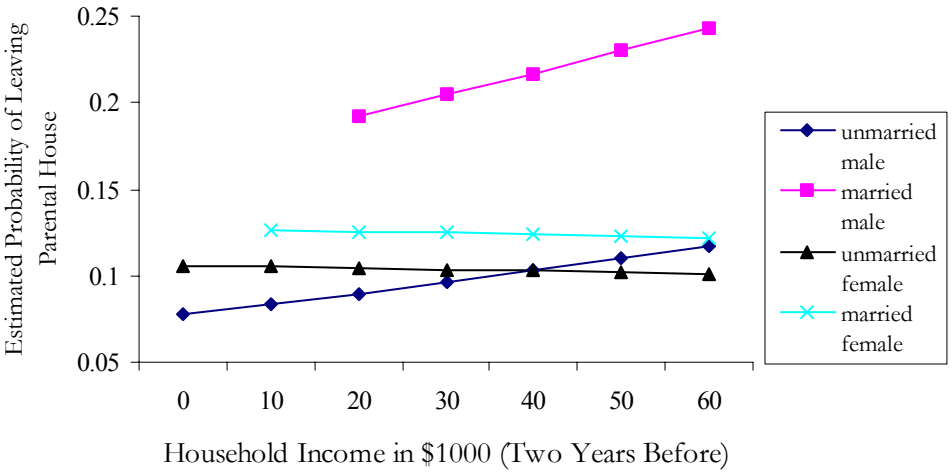


Figure 9b. The Probability of Leaving Parental House as a Function of Time, Household Income, & Gender (1993)



When household income was included in the model, personal income was not significant, most likely because personal income is included as part of the household income. We therefore tested additional models in which parents' income instead of household income was used. The results show that, similar to the household income, the effect of

parents' income on nest leaving is significant. In addition, personal income and its interaction with gender become marginally significant ($p<.10$).[8]

Household Size

Unlike other studies that use static data, our analysis did not find much significance in variables such as housing tenure, urbanity, race, and family type in predicting young adults' household formation. However, household size has a significant impact on the process of nest leaving. Young adults from households with larger size in 1985 are more likely to leave in 1987, for example. As Figure 10 shows, the difference between a family of two and a family of four in 1985 results in a difference between 16.1 and 19.3 percent in the probability of nest leaving in 1987.

Figure 10. The Probability of Leaving Parental House as a Function of Time and Household Size

As a final note on our survival analysis, the probability of leaving the parental home is estimated from our dataset that uses year 1985 as the baseline year. To test the vigor of our findings, we also tried another round of analysis using year 1987 as the beginning year, and the main findings still hold true.

[8] The other effects in Model 8 still hold, although there are small changes in slope coefficients.

Findings from Separate Two-Year Datasets

In addition to survival analysis, we also performed a logistic regression analysis examining how key variables are related to the likelihood of leaving parental household by looking at each of the two-year period datasets between 1985 and 1995. The major difference between these models and that of survival analysis is that these two-year models focus on a sample of 25 to 34-year-old young adults instead of following them as they became 35 to 44-year-old. Although the findings from these models cannot be directly compared to the findings from our survival analysis due to sample differences, such a shift allows us to examine both whether there are any differences in the patterns over time and which variables have a more consistent influence over time. Figure 11 assembles all of the results from our logistic models based on each two-year period between 1985 and 1995.

As shown in the models in Figure 11, both age and years of education[9] are consistently statistically significant in affecting nest leaving throughout all the models. The directions of these effects are also the same as reported in the survival analysis. This reinforces the conclusion from the survival analysis that the earning capacity of young adults is very important. Only those who can make a living can afford to live on their own. Also, for those still living with parents, time is not on their side. As the clock ticks, the chance of achieving independent living becomes smaller.

On the housing cost side, all of the models indicate a significant effect of changes to FMR on the probability of leaving.[10] The direction of this effect is the same as that found in the survival analysis.

[9] Since our interest here is to show that education does matter in terms of leaving the parental house, instead of using several dummy variables as an index of education level as we did in the survival analysis, for simplicity, we used a continuous variable, years of education, as an index of education in the models in Figure 11.
[10] For the 1985-1987 model, this effect is only marginally significant

Figure 11.[11] The Parameters and Standard Errors for the Two-Year Logistic Models

	Model85_87	Model87_89	Model89_91	Model91_93	Model93_95
Intercept	-1.26 (.77 ns)	.809 (.72 ns)	.131 (.7 ns)	.511 (.71 ns)	-.225 (.82 ns)
Age	-.061 (.02**)	-.102 (.02***)	-.078 (.02***)	-.089 (.02***)	-.053 (.02*)
Sex	.167 (.17 ns)	n.s.	.329 (.19~)	-.438 (.19*)	-.872 (.45~)
Marry	.331 (.23 ns)	.763 (.22***)	n.s.	.569 (.23*)	.547 (.25*)
Per	.124 (.04***)	n.s.	n.s.	.109 (.04**)	n.s.
Tenure	.346 (.19~)	-.319 (.17~)	n.s.	n.s.	n.s.
Black	n.s.	n.s.	n.s.	-.181 (.15 ns)	-.301 (.16~)
Hispanic	n.s.	n.s.	n.s.	-.335 (.19~)	-.371 (.21~)
Other race	n.s.	n.s.	n.s.	-.719 (.29*)	-.233 (.27 ns)
Fmarryc	n.s.	.168 (.22 ns)	n.s.	n.s.	.454 (.22*)
Fotherc	n.s.	-.663 (.38~)	n.s.	n.s.	-.043 (.35 ns)
fotherno	n.s.	-.275 (.13*)	n.s.	n.s.	-.349 (.13**)
South	.539 (.16***)	.096 (.15 ns)	.383 (.14**)	.199 (.14 ns)	.40 (.18*)
West	.231 (.18ns)	.314 (.16*)	.217 (.16 ns)	.439 (.16**)	.467 (.18**)
Mwest	.279 (.16~)	.15 (.15 ns)	.028 (.15 ns)	.281 (.15~)	.475 (.18**)
Urban	-.396 (.15**)	-.274 (.14~)	-.458 (.14**)	n.s.	n.s.
Suburban	-.314 (.15*)	-.178 (.14 ns)	-.394 (.13**)	n.s.	n.s.
YearEd	.116 (.02***)	.156 (.03***)	.082 (.02**)	.066 (.02**)	.10 (.02***)
Personal Income	.005 (.007 ns)	n.s.	n.s.	n.s.	.019 (.007**)
Household Income		n.s.	.009 (.002***)	.0003 (.002 ns)	n.s.
FMR	n.s.	n.s.	n.s.	n.s.	-.071 (.05 ns)
FMR change	-1.141 (.59~)	-1.907 (.60**)	-1.292 (.49**)	-1.587 (.59**)	-2.036 (.61***)
Sex * Personal income	-.028 (.01*)	n.s.	n.s.		-.016 (.01~)
Sex * Household Income			-.006 (.003*)	.009 (.003**)	n.s.
Sex * FMR	n.s.	n.s.	n.s.	n.s.	.149 (.06*)
R-square	5.7%	7.15%	5.27%	5.92%	6.2%
Adj. R-square	7.86%	9.75%	7.26%	8.13%	8.55%

Note:

1. ~p<.10, *p<.05, **p<.01, ***p<.001, ns:non-significant at .10 level
2. The number in parenthesis is standard error.
3. For M8785, if zinc285 is in the model, income85 and its interaction with gender will be non-significant. When zinc285 in the model, the slope for zinc285 is -.008 with p-value=.005; the slope for interaction zinc285*sex is .011 with p-value=.014.
4. For M9593, if income93 is not in the model, zinc293 will be significant with slope -.0038 and p-value=.015.
5. For each model, current year's income is always significant with negative slope.

[11] Please see Appendix G for the descriptions of the variables.

There are noteworthy changes in significance levels for several other variables. First, the variable of FMR, which represents the local rent levels, does not appear to be significant in any of our two-years models, contrary to our survival analysis model. This difference is not surprising, however, given that in the survival analysis model the influences of FMR differ from time to time. In the models based on each of the two-year datasets, time is not a variable, and therefore FMR appears to have no significant effect. This reinforces our conclusion earlier that it is the local rent change rather than rent level that affects young adults leaving parental households in a significant way.

Second, household size and young adults' marital status remain significant factors in some but not all of our two-year dataset models, indicating their importance is secondary to age, local rent change, and earning capacity. The personal income of the young adults and the total household income appear significant in some but not all models. Given that years of education, the proxy of earning capacity, is consistently significant in each model, it is possible that in certain years when education is highly correlated to personal income, personal income will not show its effect after controlling for the effect of earning capacity. [12] In addition, housing tenure and family structure are significant in some but not all years.

Findings From Descriptive Statistics

Finally, contrary to our previous findings using the CPS and PSID data (Di et al. 2002), the AHS data did not show an obvious increasing pattern in the share of young adults (25-34) living in parental homes between 1985 and 1995. The trend is basically flat, as shown in Figure 12. However, this difference between data sources does not alter another major finding in Di et al. (2002), namely the trend of young adults living at home over time is associated with or affected by the distribution of young adults' personal income. As Figure 13 shows, the personal income distribution among young adults, according to the AHS data, also has a flat trend over time during the same period. Those who lived with parents

[12] When the variable of years of education was not included in the models in Figure 11, personal income or household income become significant in all but the 1991-93 models.

consistently had lower personal income than those no longer living with parents. Figure 14 and Figure 15 reported their income by means and medians, respectively.

Figure 12. Share of Living with Parents (age 25-34)

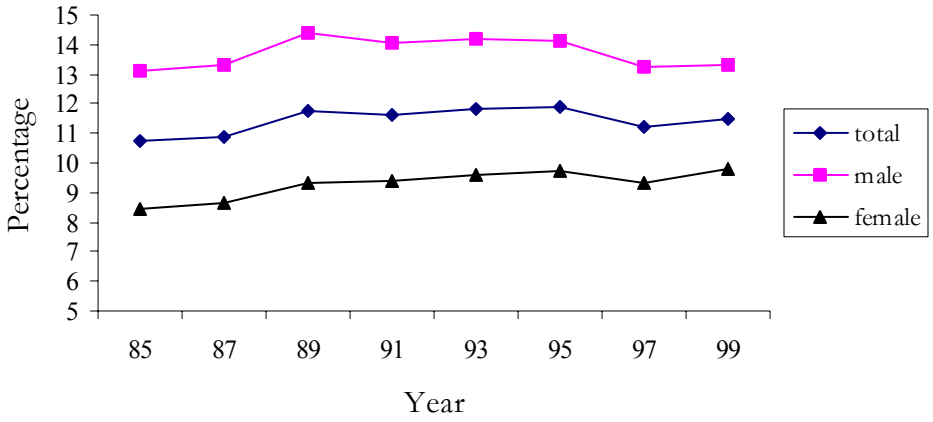


Figure 13. Share of Low-Income Individuals (age 25-34)

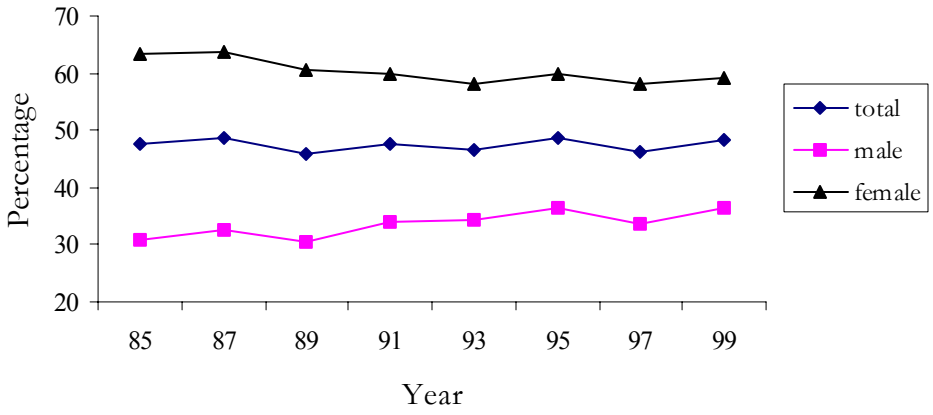


Figure 14. Mean Personal Income (age 25-34)

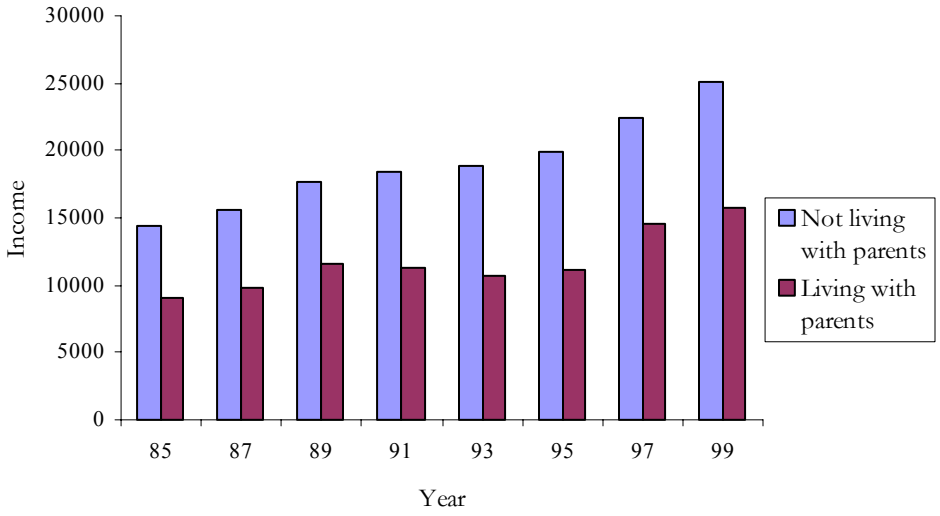
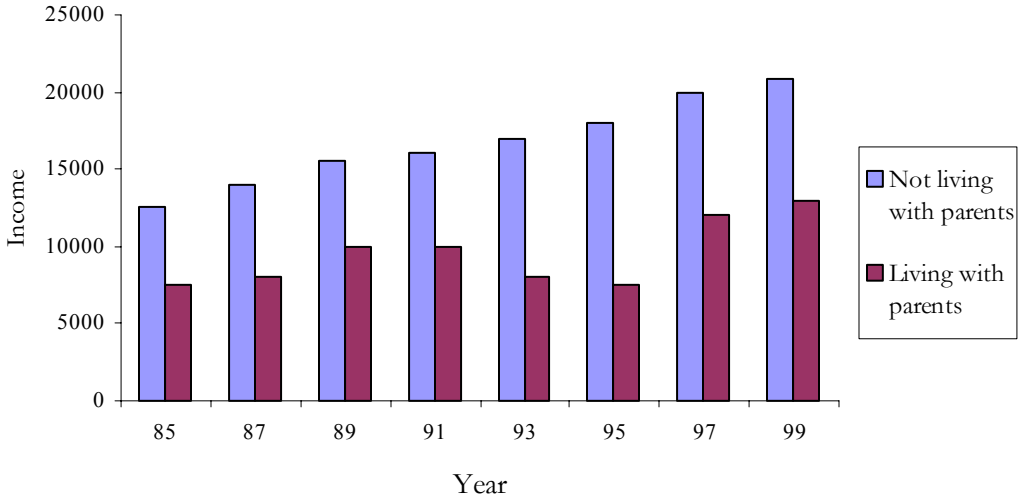


Figure 15. Median Personal Income (age 25-34)



Conclusions

Studies on household formation have been done from both demographic and economic perspectives. While demographic projections are always time specific and related, economic studies about the impact of income and housing cost on household formation are primarily done in a static manner. This study, using a longitudinal survival analysis, provides the first look into the long-term process of nest leaving, which is a pre-condition for natural household formation by young adults. We followed up a group of young adults aged 25-34 in 1985 who were living in parental homes, and during the following ten years many of them left their parents. However, excluding the censored cases due to sampling procedure or coding issues, nearly 23 percent still lived in parental homes by 1995, even at age 35-44!

Concurring with the findings of Haurin et al. (1993) and Di et al. (2002), this study finds that the potential labor earnings and housing costs are important variables in explaining the probability of leaving parents. But this study has a few new findings of its own. First, this study shows that controlling for other variables, local rent changes are significantly related to the likelihood of young adults' leaving parental houses. Specifically, this study shows that an increase in the FMR is detrimental to young adults' effort at achieving independent living, while a decrease in the FMR may help young adults leave their parents' house. Further, the findings from the survival analysis indicate that while the adults are still young, they are more able to achieve independent living when local rent conditions change in their favor. As they become older, however, those who could not manage to leave parental homes earlier may not be able to achieve housing independence even when local rents go down.

Second, our models show that the earning capacity of young adults (measured by formal education) is an important predictor of whether a young adult can achieve independent living. Models using every two-year-period data show that the more years of education a young adult has, the more likely that s/he will leave his/her parental house within the next two years, holding all other variables constant. This is further supported by our survival analysis, which shows that controlling for age, gender, marital status, region, and housing cost, young adults who have some college or higher education are more likely to leave their parental household within two years than those who did not finish high school.

Also, household size and young adults' marital status are found to be significant factors in some but not all of our two-year models, indicating that their importance is secondary to local rent change, age difference, and earning capacity. In addition, variables traditionally examined, such as housing tenure, race, and family type, are either only marginally influential or not consistently significant over time.

Finally, despite the difference in the data sources used, this study concurs with our previous finding (Di et al. 2002) that the distribution of personal income among young adults affects the pattern of young adults' living arrangements. But the share of low-income young adults and of those who continued living with parents has not dramatically increased between 1985 and 1995, according to the AHS data we used in this study.

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Appendix A

The Number of Persons Who Continued Staying with Their Parents or Left Their Parental Houses, Given that They Were Living with Their Parents in 1985.

	# of leaving	# of staying	# of censored	Total
1985		1941		1941
1987	504	918	519	1941
1989	222	605	91	918
1991	120	436	49	605
1993	52	353	31	436
1995	51	279	23	353

Appendix B

The Descriptions of the Variables Used in the Survival Analysis
(N=3540)

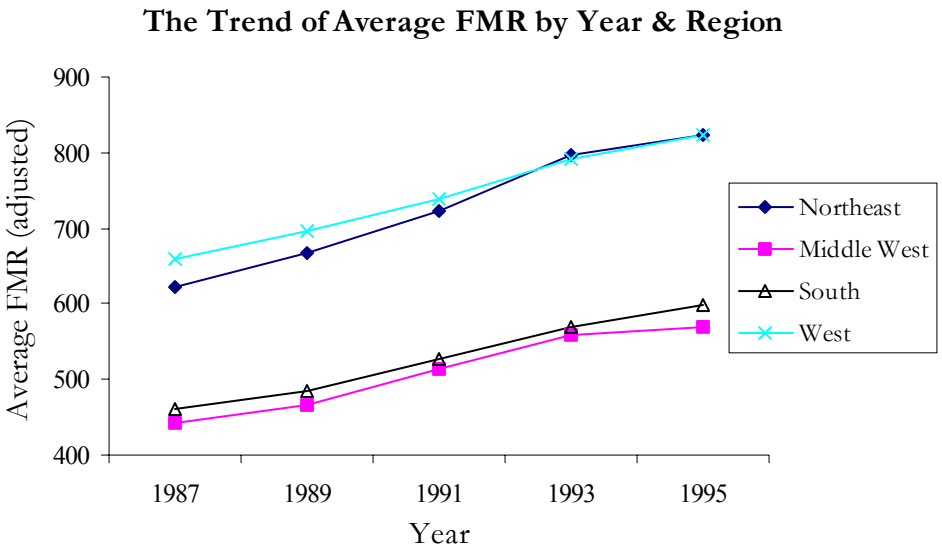
Variable	Description	mean	Std dev	range
T1 – T5	Time dummy variables			
Age		30.7	3.95	25 - 43
Sex	0=male, 1=female			40.6% female
Marry	1=Married with spouse present			5.82%
Per	Number of persons in household	3.78	1.58	2 - 14
South	Region: South			29.3%
West	Region: West			15.4%
Mwest	Region: Mid-west			24.4%
FMR	Unified average FMR in $100	5.88	1.68	2.96 – 12.56
FMRchange	Rate of FMR change (%)	7	4.8	-22.3 – 45.2
Less High	Education: Less High School			13.02%
High school	Education: High School			47.23%
SomeCollege	Education: Some College			21.36%
College	Education: College & above			18.39%
Income	Personal income in $1000	10.36	10.48	0 - 100
Zinc2	Household income in $1000	41.45	29.25	-10 - 250

Appendix C

The Specific Values Used in Calculating the Probabilities in Figure 4 – Through Figure 10.

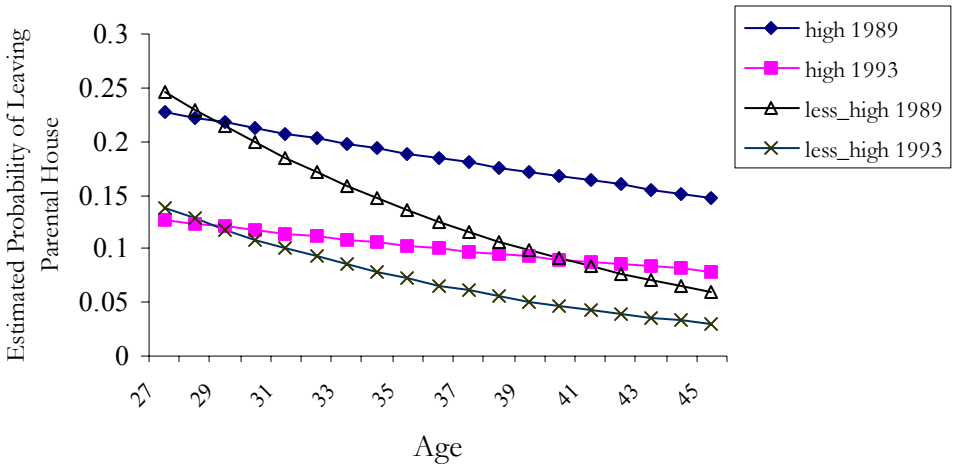
Variable	Value	Description
age	30.7	
marry	0	Unmarried or married but spouse absent
sex	0	Male
per	3.78	Average household size
south	0	Not living in South
west	0	Not living in West
mwest	0	Not living in Midwest
		So this person living in Northeast
High school	0	
someCollege	0	
College	0	
income	10	Personal income in $1000
zinc2	41.45	Household income in $1000
FMR	5.88	Average FMR in $100
FMRchange	7	Average rate of FMR change (%)

Appendix D


The Trend of Average FMR by Year & Region
Average FMR (adjusted)
900
800
700
600
500
400
1987
1989
1991
1993
1995
Year
Northeast
Middle West
South
West

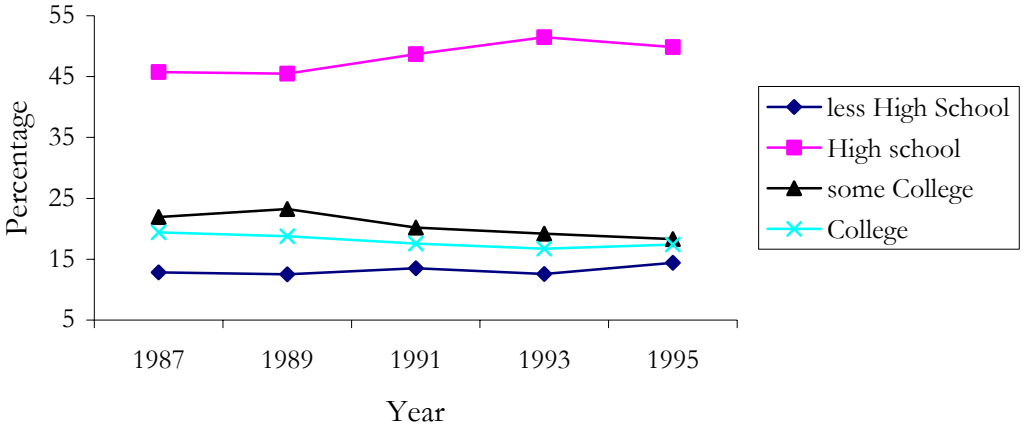
Appendix E

The Probability of Leaving Parental House as a Function of Time, Age, & Education Level



Appendix F

The Distribution of Education Level of Young Adults Staying in Parental Homes Overtime



Appendix G

The Descriptions of the Variables in Figure 11.

Variable	Description
Age	
Sex	0=male, 1=female
Marry	1=Married with spouse present
Per	Number of persons in household
Tenure	1=owner
Black	Race dummy
Hispanic	Race dummy
Otherrace	Race dummy
fmarryc	Married with child(ren)<18
fotherc	Single parent with child(ren) <18
fotherno	Other family type
South	Area dummy
West	Area dummy
Mwest	Area dummy
Urban	Region dummy
Suburban	Region dummy
yearEd	Years of education
Personal income	Personal income in $1000
Household income	Household income in $1000
FMR	Unified average FMR in $100
FMRchange	Average rate of FMR change (%)