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**THE LOW-INCOME DYNAMICS AND PERSISTENT POVERTY OF U.S. FAMILIES**

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(i) Title:     The Low-Income Dynamics and Persistent Poverty of U.S. Families[♦]

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(iii). Abstract:

Are those in poverty likely to remain there or can they move out of this situation without help from other sources? Our understanding of those in or near poverty is primarily based upon the analysis of either annual income or the income distribution from cross-sectional survey data. It has been argued in the literature that using this type of data can be misleading when faced with questions pertaining to transitions in and out of poverty. Studying the persistence of poverty should focus on those characteristics of individuals and their families, in conjunction with labor market situations, in order to provide an insight into why the situation continues.

Using the Survey of Income and Program Participation (SIPP) 1996 panel, it was possible to investigate low-income dynamics and model family incomes for the years 1996-1999. This paper provides a descriptive analysis that evaluates the low-income dynamics for families, their exit and re-entry rates into low-income, as well as investigating family income and poverty outcomes based upon a components-of-variance model that identifies permanent and transitory factors and provides insight into low-income dynamics.

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<center>**The Low-Income Dynamics and Persistent Poverty of U.S. Families**</center>

**Introduction**

Previous studies using longitudinal data suggest that while most spells of poverty are short-lived, a significant segment of the poor are in poverty for a long time (Lillard and Willis, 1978; Bane and Ellwood, 1986; Stevens, 1999).[1] These studies found that when controlling for race, education, and other demographic factors, actual earnings relative to expected earnings are "sticky" over time. On the other hand, Duncan, et al (1993) and Jarvis and Jenkins (1997) concluded from their research that employment events were the most important events associated with transitions both into and out of poverty for their samples of families with children.[2]

An ongoing concurrence of work and poverty runs contrary to the notion that sustained employment leads to material advancement while contradicting images of poverty emphasizing a lack of commitment to work (Levitan and Shapiro, 1987). The interest in income and poverty dynamics has a rich and lengthy history in the literature. Changes in the life-events of family members as well as changes in their socio-economic status are important factors that contribute in explaining the movement in family income and, consequently, movements in and out of poverty (Finnie and Sweetman, 2003; Duncan, et al 1993). From one year to the next, there is a significant amount of movement among both low-income leavers and entrants, however, there is a small, but significant, group of people who remain persistently poor (Jarvis, 1995; Jarvis and Jenkins, 1997). The causes and consequences of persistent poverty have been associated with possessing limited skills (Martinson and Strawn, 2002), being a single mother

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[1] In these mentioned studies being in poverty was defined as having annual earnings or income being below some money threshold. Lillard and Willis (1978) compared male earnings to a poverty threshold of one-half the median annual male earnings reported in the corresponding year in the Current Population Survey. Bane and Elwood (1986), using household income considered poverty to be 125 percent of the poverty threshold and Stevens (1999) used the ratio of family income to standard poverty thresholds, with values less than one indicating poverty.

[2] Jarvis and Jenkins (1997) prefaced their conclusion that "although we have shown that getting a job is associated with escaping low income, it should be remembered that we examined associations with short-term income changes. If the job gained were of only a short duration, then the low income escape is also likely to be temporary."

(Stevens, 1999; Boushey, 2002), being a minority (Danziger and Gottschalk, 1987), and being elderly (single adult or couple) with a fixed income (Jarvis and Jenkins, 1997). Individuals can experience several events that result in a poverty transition, such as changes in household or family structure (Kimemyi and Mbaku, 1995) and changes in either or both employment status and disability status (McKernan and Ratcliffe, 2002).

Most discussions on persistent poverty mention the issue of welfare dependency. For example, Bane and Ellwood (1986) found that while most poor will experience a short spell of poverty, a bulk of the poor are in the midst of a lengthy stay in poverty. They estimated that median lifetime welfare receipt is about 48 months. Similarly, Pavetti (1995) estimated that 76 percent of the welfare caseloads at any point in time would eventually receive welfare for at least sixty months over their lifetime. Many long-term welfare recipients have characteristics that are typically associated with being poor: 63% lacked a high school education; 39% had no work experience; 53% were younger than 25; 58% were never married; and 52% had a child less than one year old. A substantial majority of welfare mothers (60 percent) who left the rolls after 1996 reported having a family income five years later that was less than what they had while receiving public assistance/welfare (Hisnanick, 2004).

The persistence of poverty and the changes in family income are dynamic processes where heterogeneity is but one way to explain differences between families with similar characteristics. This paper, examines the dynamics of family income and the persistence of poverty from 1996 through 1999 using the Survey of Income and Program Participation (SIPP) 1996 panel.

## DATA, DEFINITIONS AND METHODOLOGY

Data:

This research is based on data from the 1996 panel of the U.S. Census Bureau's Survey of Income and Program Participation (SIPP). SIPP is a longitudinal survey of households who are asked monthly

questions on their demographic and economic characteristics. Special attention is given to collecting monthly data on income sources and amounts, program participation and eligibility, and paid labor force experience. The sample for the 1996 SIPP panel consists of 36,700 households. The universe for this paper is the two-thirds of households that were interviewed 12 times from April 1996 through March 2000 (U.S. Census Bureau, 2002; Citro and Kalton, 1993).

All surveys experience some degree of nonresponse and attrition, and SIPP is no exception. In SIPP, as the number of interviews (waves) increases, nonresponse and attrition increase as well. The rate of attrition in SIPP generally declines from one interview to the next, but the number of non-interviews increases over time. In the 1996 SIPP panel, which covered four years for a total of 12 interviews, sample attrition was just over one-third at the completion of the last round of interviews.

The Census Bureau distinguishes between household, person, and item nonresponse. Household nonresponse occurs either when the interviewer cannot locate the household or when the interviewer locates the household but cannot interview any adult household members. Person- level nonresponse occurs when at least one person in the household is interviewed and at least one other person is not, usually because that person refuses to answer the questions, or is unavailable and no proxy is taken. Item nonresponse is an additional source of missing data; it occurs when a respondent does not answer one or more questions, even though most of the questionnaire is completed. SIPP handles item nonresponse by imputation, that is, by assigning values for the missing items.[3]

Definitions:

This paper focuses on the dynamics of family income. In SIPP, family income is derived as the aggregation of all income payments received by members in a family. At the individual level, income is made up of three components: earned income; unearned or property income; and transfer program

income.  Earned income is comprised of wage and salary income, self-employed earnings, and earnings from other work arrangements.  Unearned or property income refers to all income generated from interest, dividends, lump-sum payments from insurance claims, payments from annuities and retirement, as well as payments received from trusts, estates, and royalties.  The third component of income, transfer program income, refers to any cash payments received from social welfare programs, such as elderly, disability, and dependent payments from social security, Supplemental Security Income (SSI), and Temporary Assistance to Needy Families (TANF) and general assistance.

This paper focuses on families with children, 18 years old or younger at the beginning of the survey, who were interviewed in all 12 waves of the 1996 SIPP panel.  Then, for purposes of comparison the families are divided into two groups, married-couple and single-parent families.  Throughout the following discussion the characteristics of married-couple families refer to those of the husband, who was between 25-60 years old and indicated that he was married in the first interview of the survey. [4] On the other hand, the characteristics for single-parent families are for the lone parent, irrespective of their gender, between 25-60 years old who replied that they were not married in the first interview of the survey.[5]  Table 1 provides summary statistics for selected demographic characteristics of these two groups compared to what is known about all families.[6]

There are a handful of families that reported zero average monthly family income for an entire year and these respondents are omitted for the following reasons.  First, the estimated variable is the

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[3] In the 1996 SIPP panel, value imputation rates ranged from less than 5 percent for demographic characteristics, to as high as 40 percent for data regarding sources and amounts of income received from assets and property.

[4] For each interview, the SIPP identifies the "type" of family that the subject is a member as well as the relationships between multiple members of the same household.  The family type denotes whether the family contains a single person or multiple people, the sex of the householder of the family, and so on.  If the SIPP reported that the husband and wife headed the family together, it was decided to use the husband as the householder of the family for two reasons.  One, much of the literature treats husbands as the de facto head or householder of the family.  To make comparisons to these studies the definitions were kept consistent.  Second, husbands tend to have higher earnings, in general, and are a major source of a family's income.  Therefore, the husband's characteristics will be a better signal of the demographic and income for the family.

[5] A single parent that reported in their first interview that they were never married, divorced, widowed, or separated are included in this group.

logarithm of family income, which is undefined for values of zero. Introducing a "fix" will inject a bias that may be worse than the bias from omitting the respondents. Second, there are a few records that report zero income—less than 1% of either group reports zero income for a year—leading to the conclusion that bias from omitting the records would be small. In addition, the SIPP asks a series of questions designed to detail multiple sources of income and their respective magnitudes. It is unlikely that a family (truly) has zero annual income and that the type of error associated with a report of zero income is intrinsically different from the standard notion of sampling error. Since there is a lack of good predictors of reporting zero income that are independent of family income and the unbalanced nature of the zero-income response, dropping the records seemed to be the best choice.

Model:

The literature on modeling income is extensive and exhaustive. Over time there has been an expansion of effort to explain causality between income and a host of demographic, economic, and environmental factors. This expansion of effort includes such things as accounting for sample selectivity (Heckman, 1979), time and cross-sectional variation (MaCurdy, 1982; Amemiya and MaCurdy, 1986; Abowd and Card, 1989) and heterogeneity (Lillard and Willis, 1978; Baker, 1997; Stevens, 1999). Following the suggestions of earlier work (Lillard and Willis, 1978; Stevens, 1999), total family income is modeled with a components-of-variance specification because such a model provides a more consistent representation of the data (Baker, 1997). Modeling family income using this approach allows for addressing the effects of new policies on families. Measures of social welfare such as the poverty threshold are, in fact, dependent upon family income as opposed to individual earnings. An advantage of using the components-of-variance approach is that it can account for an individual's unobserved heterogeneity that influences the income-based poverty/non-poverty sequence. These sources are the

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[6] Respondents in the military and those with incomplete, missing, or inconsistent data were excluded. Due to fluctuations in the monthly income data, it was aggregated into annual amounts.

ability of an individual to obtain income at a specific time period and the way this ability evolves over time (Giraldo, Rettore, and Trevellato, 2002).

Modeling family income is described by the following equations:

(1) $Y_{irt} = X_{it}\beta + \alpha_{ir} + u_{it}$

(2) $u_{it} = \rho u_{i,t-1} + v_{it}$

$Y$ is the log of annual total family income; $X$ is a vector of the family householder's characteristics, as well as time, family and region effects; $\beta$ is a vector of fixed slope parameters; $\alpha$ is a time independent individual random effect; $v$ is the stochastic or transitory error; and $\rho$ is the serial correlation coefficient. The subscripts $i$, $r$, and $t$ denote the individual family householder, the race of the family householder, and the year within the panel, respectively. The individual random effect is i.i.d. normal with mean zero and a variance dependent upon the respondent's race. The remaining error, $u$, is distributed normal and follows an AR(1) specification.

The error structure captures many of the interesting dynamics of income. For example, the individual random effect, $\alpha$, captures the unobserved but persistent heterogeneity among the population of racial subgroups. If the variance component were large, it would explain why families with identical observable characteristics could experience very different income profiles and spells of poverty over time. The serial correlation term, $\rho$, can be interpreted in several ways. One that fits nicely within the context of economic theory is that it reflects random shocks in the labor market that persist longer than one year, but eventually fade away over time. Of course, this explanation can be applied to any external, random shock to the individual.

Given the assumptions of a normal distribution, the parameter estimates, and a given set of characteristics (the vector $X$), the probability of poverty can be estimated by integrating the area under the multivariate normal distribution of the errors that is less than the poverty threshold. Because of the

relative computational complexity of this approach, it was decided to simulate the probabilities for several subgroups of interest.[7]

In the following section a discussion is presented of both the descriptive analysis and results from the model for family incomes, comparing and contrasting married-couple and single-parent families.

## FINDINGS

Since the majority of people spend most of their adult lives in multi-person families, family income should be an appropriate index of their well-being. The following discussion focuses on married and single-parent families, comparing and contrasting their incomes and characteristics, in the hope of gaining insight into why some families are persistently in poverty and other not. Two metrics for poverty are used in the following discussion. The first measure is the U.S. poverty thresholds[8] that vary by family size and composition, and the second is the threshold of the poorest quintile for family income, a value that varies in real income terms.[9]

Given the growth in two-earner families it is not surprising that the incomes of married-couple families are consistently twice as high as the family incomes for single-parent families. Because of this income disparity it should further not be surprising that single-parent families experienced annual poverty rates at least three times higher than those experienced by married-couple families, irrespective of the poverty metric used. In addition to the income disparities between the two groups, there are also notable differences in the race composition and level of educational attainment for the respective family

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[7] The proposed simulation strategy has two steps. Step one is to compare the observed and simulated poverty status for several subgroups of the sample. If the simulations resemble the direct observations, then there is more confidence in the simulations of step two. In step two we simulate the annual probabilities of being poor and years of poverty during the four-year period for an hypothetical individuals.

[8] Following the Office of Management and Budget's (OMB) Statistical Policy Directive 14, a set of income thresholds that vary by family size and composition was used to determine which families were in poverty. Guidelines are available at the following Census Bureau website <www.census.gov/hhes/www/poverty.html>

[9] By using these two measures it is possible to sidestep the issue of an appropriate definition of what 'low income' is or should be.

householders.  For example, compared to married-couple family householders, single-parent family householders are twice as likely to be non-white (32 percent versus 13.7 percent), as well as being twice as likely not to have at least a college degree (12 percent versus 28 percent).  On the other hand, there is no difference in the average age (approximately 38 years old) for the family householders of the two groups and there are a comparable proportion of family householders that are of Hispanic origin (see Table 1).

Because of these noted differences between married-couple and single-parent families the following discussion of low-income family dynamics, as well as the exit and re-entry rates into low-income spells, will address each group separately.

**Low Income Dynamics:**

Using the longitudinal aspect of the 1996 SIPP panel, Tables 2A and 2B summarize the income sequence patterns for families where family income was recoded as 'L' (low) if it fell below the low-income threshold for that year and 'H' otherwise.  Table 2A shows the results for the case where the low-income cut-off is the standard poverty threshold, and Table 2B presents the case where the low-income cut-off is the lowest quintile threshold.  Either of these poverty metrics presents the relative incidence of income mobility for families.

Looking at the first row in Table 2, one gets a sense of how widespread persistent poverty is among families.  For example, in Table 2A around 4.5 percent of all families, irrespective of the marital status of the family householder, had a family income below the poverty threshold for all four years, 1996-1999.  However, looking at the two groups a notable difference is observed.  Fewer than 2 percent of all married-couple families had incomes that kept them in poverty for all years, while 13 percent of single-parent families had incomes that kept them in poverty.  If the low-income cut-off is the bottom quintile threshold, the proportion of families that are persistently low-income increases at least two-fold.

For all families, those persistently with low incomes increased from 4.5 percent to 11.2 percent, for married-couple families the proportion increases from fewer than 2 percent to nearly 5 percent and for single-parent families the proportion increases more than two-fold, from 13 percent to 32 percent.

To put things another way, it was found that for married-couple families that had incomes below the poverty threshold in 1996, 60 percent had incomes less than the poverty threshold in 1997. About 46 percent of the original low-income families in 1996 had incomes under the poverty threshold in 1996-1998, and over one-third (36 percent) of all original low-income families experienced a low income for all four years, 1996-1999. When looking at single-parent families, a similar pattern, but with a much larger magnitude, emerges. Over two-thirds (68 percent) of single-parent families with incomes below the poverty threshold in 1996 had family incomes below poverty in 1997. Similarly, over half of the single-parent families with a low income in 1996 had low incomes for the subsequent two years, and 44 percent of the original low-income families still had incomes below poverty for 1996-1999.[10]

Using either definition of the low-income threshold, a small proportion of families had a low income at every year; many more, however, had a low income during one year or another. Looking at Table 2A, which focuses on the standard family poverty thresholds, in at least one of the four years of the 1996 SIPP panel just over 14 percent of all families, 9 percent of married-couple and 27 percent of single-parent families experienced a low income. Specifically, for one of the four years, 6 percent of all families, 5 percent of married-couple and 12 percent of single-parent families experienced low income. For two of the four years, around 4 percent of all families, 3 percent of married-couple families and 8 percent of single-parent families, experienced low income. Finally, in three of the four years, 4 percent of

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[10] Using the bottom quintile as the income threshold a similar pattern was observed. For married-couple families, of those with low income in 1996, 70% still have low incomes in 1997, 55% still had low incomes in 1997-98 and 45% had low incomes for all four years, 1996-1999. For single-parent families, the pattern is similar but of a large magnitude. About 82% of those with low incomes in 1996 had low incomes in 1997, about 71% had low incomes in 1997 and 1998, and about 63% had low incomes for 1996-1999.

all families, 2 percent of married-coupled families and 7 percent of single-parent families experienced a low income.

In general, most families experience relative stability in their incomes from year-to-year, with most of the stability being attributed to married-couple families. However, as from the previous discussion, single-parent families experience much more year-to-year income mobility than married-couple families.[11] In the following section exit and re-entry rates into periods of low income will be discussed, once again, within the context of all, married-couple, and single-parent families.


## Low Income Exit and Re-Entry Rates:

From the four years of data available in the 1996 SIPP panel it is possible to begin to look at how low-income exit rates vary with the length of time that families have experienced low income. Similarly, it is also possible to see how low-income re-entry rates vary with the length of time families have not experienced low income. However, this analysis is constrained by the number of years available, so it is only possible to estimate two exit and re-entry rates. The low-income exit and re-entry rates by family type, and for the two low-income thresholds, are presented in Tables 3A and 3B. In addition, both tables show the proportion of families that remained in low income or re-entered low income.

Exit rates are based upon data for those families that began a low-income spell in either the second or third year of the panel; that is, families with sequences HLxx and xHLx in Tables 2A and 2B. Also, re-entry rates are based upon data from families that just finished a low-income spell in the first or second year of the panel, that is, families with the respective sequences LHxx and xLHx in Tables 2A and 2B. Low-income exit rates are calculated by dividing the number of families ending a low-income spell after 1 or 2 years of low income by the total number of families with low income for at least 1 or 2 years. Low-

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[11] Once again, using the lowest quintile as the low-income threshold, similar patterns of low-income dynamics are observed but magnitudes of the proportions are greater than those observed using the standard poverty thresholds.

income re-entry rates are similarly calculated, taking into account those families that are entering a low-income year after 1 or 2 years of not experiencing low income.

Using the standard poverty thresholds as the low-income cut-off, and focusing on all families, it can be seen in the top of Table 3A that the exit rate for families that have experienced low income after one year is 0.50. Similarly, the exit rate for a family that has experienced low income after two years falls to 0.26. These results imply that for those families starting a low-income spell, half would still have a low income after one year and 43 percent would still experience low income after two years. From another perspective, after two years a majority of families (57 percent) that initially experienced low income would no longer have a family income below the poverty threshold.

Again, focusing on all families, the low-income re-entry rate after one year out of low income is 0.25, but after two years the re-entry rate nearly dropped by a half to 0.13. These results imply that of families starting a spell out of low income, one-fourth (25 percent) will start another low-income spell after one year, and nearly one-third (31 percent) will experience a low-income spell after two years. Once again, from another perspective, of those families ending a one-year spell out of low income, just over two-thirds (69 percent) will have incomes above the standard poverty thresholds for at least two years.

Turning to the low-income exit and re-entry rates by family type, and using the standard poverty thresholds, it can be seen in Table 3A that compared with married-couple families, single-parent families experience more income mobility. For example, the exit rate after experiencing low income after one year for married-couple families is 0.48 and for single-parent families it is 0.54. On the other hand, after two years, married-couple families experience a higher exit rate, (0.29), than the rate experienced by single-parent families (0.18). These results imply that after one year out of a low-income spell 52 percent of married-couple and 46 percent of single-parent families experienced low income. Similarly, 44 percent of married-couple and 43 percent of single-parent families experienced low income for at least two years.

Single-parent families have a greater likelihood of moving out of a low-income spell after one year, but they are less likely to exit a low-income spell after two years. A similar pattern is observed for this group regarding re-entry rates into a low-income spell. For single-parent families, the low-income re-entry rate after one year out of low income is 0.29, compared with a rate of 0.22 for married-couple families. Similarly, after two years the re-entry rate for single-parent families is 0.15 while the rate for married-couple families is 0.11. This implies that for these family groups, single-parent families starting a spell out of low income are much more likely to start another low-income spell after one year than married-couple families. Also, after being out of low income for two years, single-parent families are more likely than married-couple families to experience a low-income spell. From another perspective, about three-fourths of married-couple families compared with about two-thirds of single-parent families will have incomes above the standard poverty thresholds for at least two years after ending a one-year spell out of low income.[12]

**Modeling Family Income:**

Family income differences, such as those seen in the Tables 2 and 3, can be associated with either observed attributes, as well as unobserved short-run (transitory) or long-run (permanent) effects. Each of these effects can have a different economic interpretation and by using a components-of-variance approach in modeling family income it is possible to distinguish between the two. Using this approach, one gains insight into the measurable aspects of family income through fixed-effect attributes, as well unobserved heterogeneity associated with such attributes as the race of the family householder. Table 4 presents the results from modeling for the log of family income using a variance component specification for the previously discussed family types, married-couple and single-parent families.

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[12] When the low income cut-off is the poorest quintile, (see Table 3B), the magnitudes are different but the patterns are similar. The main differences are that exit rates are slightly lower and the re-entry rates are slightly higher. This should not be surprising given that the lowest quintile threshold values are slightly higher than the standard poverty threshold values. As noted by Jarvis and Jenkins (1997), "a higher crossbar is harder to jump over than a lower one, and easier to fall below."

Comparing the fixed-effect results for the two family types, several of the estimated coefficients are comparable in sign, magnitude, and significance. These included such things as the family householder's level of educational attainment, occupation, union membership, age, and the control for Hispanic origin. It should not be surprising that, irrespective of the family type, the family householder's level of educational attainment, occupation, and age are significant, positive indicators for the family's income.[13] On the other hand, for the time attributes, the variables controlling for race, and the number of own children under 18 years old in the family, notable differences are observed regarding these coefficients' signs, magnitudes, and significance.[14]

As was previously discussed, there are notable differences observed between married-couple and single-parent families by the race of the family householder. The variance-component estimates for both family types are reported in the bottom of Table 4, and some general observations by the race of the family householder are immediately apparent.[15] Within the sample of single-parent families, unobserved heterogeneity attributable to the family householder's race explains just under half (47 percent) of the variance in income with a nearly constant variance (22 percent) among all racial groups. A much different picture emerges when looking at the variance components for the sample of married-couple families. Unobserved heterogeneity attributable to the family householder's race explains over three-fourths (78 percent) of the variance in the family income: one-third of the unobserved heterogeneity is attributable to white family householders; around 29 percent is attributable to black family householders; and around 44 percent is attributable to other race family householders.[16]

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[13] For example, if a family householder was a high school graduate with some or no college, compared with a family householder that was not a high school graduate, for a married-couple family the income would be 50 percent higher and for a single-parent family the income would be 44 percent higher.

[14] For example, looking at the control variable for family householder being Black, for married couples the estimated coefficient is significant and positive, while for a single-parent family it is negative and not significantly different from zero.

[15] For both family types, the temporary or transitory variance component will diminish as reflected by the estimated values of the AR(1) parameter: for married-couple families, 0.52; and for single-parent families, 0.555.

[16] Explanatory power is measured here as 1 – var(residual)/var(total). For a more detailed explanation of this measure, see Lillard and Willis (1979).

To be in poverty at a given time requires that a family's income be less than some specific threshold value. Using the coefficient estimates from the model of family income, it is possible to simulate the probability of a family being in poverty controlling for the unobserved heterogeneity accountable from the race of the family householder (Lillard and Willis, 1978; Stevens, 1999). Table 5 compares the model results with the actual tabulated data controlling for the level of education, race, and ethnicity of the family householder. The predicted and tabulated outcomes suggest that for single-parent families, the model's coefficient estimates, overall, do a reasonable job at simulating outcomes. For married-couple families, the simulated outcomes, while reasonable, are consistently lower than the tabulated outcomes, raising the issue of the role that unobserved heterogeneity play in the dynamics of family income and poverty.

Table 6 reports the simulated probabilities that a random family would be in poverty for a single year, and that a random family would be in poverty for all years.[17] It should not be surprising that single-parent families are around twice as likely to be in poverty for at least one year and at least three times as likely to be in poverty for all four years when compared to married-couple families. However, when controlling for unobserved heterogeneity as captured by the family householder's race, a single-parent family whose householder is black has a much greater probability of being in poverty for at least one year, as well as for all four years, compared with either white or other race single-parent family householders.

Around nine percent of married-couple families and 27 percent of single-parent families were observed to experience at least one year of low income, from 1996-1999. Similarly, two percent of married-couple and 13 percent of single-parent families were observed to experience low income in all four years (see Table 2A). However, based upon the probabilities estimated from the model coefficients, (see Table 6), one would expect the proportion of families experiencing low income to be at least twice as

high.  One could argue that the differences in observed and expected outcomes, with respect to families experiencing low income, may not be all attributable to the heterogeneous nature of the samples involves, but rather to unobserved macroeconomic attributes of the time period, 1996-1999.[18]

## CONCLUSION

It is often noted in studies that look at incidence, such as accidents, unemployment, and labor participation that individuals who have experienced the event under study in the past are more likely to experience the event in the future than are individuals who have not experienced the event (Manski and McFadden, 1981).  In the case of families and their incidence of low income and poverty, all families are different and changes in their life experiences will affect their incomes.  Most of what is known about families, their incomes, and their attributes that contribute to income dynamics and poverty has largely depended upon using cross-sectional data.  With the availability of longitudinal data, such as the SIPP, it is possible to follow the same families over time and track their family income dynamics.  However, if the differences observed between families are correlated over time, and if these differences are not properly controlled, previous experience may appear to be a determinant of future experience because it is a proxy for temporally persistent unobservable attributes that determine a family's income.

This paper had a two-fold objective: first, to describe what can be observed about the income dynamics of families from the data for the years 1996-1999; and second, to model the income dynamics of these families, controlling for the effects of heterogeneity, in order to assess the incidence of low income and poverty among these families.  Recognizing that family types do make for substantial differences in the observed incomes, information has been provided for married-couple and single-parent

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[17] These reported estimates can be interpreted in the following manner: if the poverty threshold and the set of fixed-effects attributes remain unchanged over time, then some percentage of families would have an income below the poverty threshold, for at least one year, or for all years.

families, respectively. For all the information that was presented and discussed, single-parent families were much more likely to experience a year or more of low income. What the data suggest is different from what would be expected from an acceptable modeling approach for family income dynamics, controlling for observed attributes and unobserved heterogeneity. For example, around 27 percent of single-parent families were observed to experience at least one year of low income, from 1996-1999. When accounting for unobserved heterogeneity, however, the probability of a single-parent family experiencing at least one year of low income was 32 percent for those with a white family householder, 44 percent for those with a black family householder, and 36 percent for those with an other race family householder.

Finally, most of the literature on income dynamics and unobserved heterogeneity has focused on individual earnings (Lillard and Willis, 1978; Lillard and Weiss, 1979; Baker, 1997) or some variation on family income (Smith, 1979; Stevens, 1999). The novelty of this paper rests upon the fact that it investigates family income dynamics using the 1996 SIPP panel, and compares and contrasts what was observed and would be expected for different family types. The observed dynamics of family income that has been reported in this paper have similar patterns to what was observed for British families (Jarvis and Jenkins, 1997): while the methods are comparable, the time frame and scope of the studies are different. The incidence of poverty is both an economic and social phenomena, with a long-standing history. Being able to identify, as well as investigate, those observed and unobserved attributes that explain the occurrence of poverty for families provides a needed analytical tool in the debate concerning this issue.

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[18] It is well documented in by the U.S. Council of Economic Advisors (2003) that the 1990s was a period of positive economic growth accompanied by low unemployment rates.

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**Table 1: Selected Characteristics of All, Married-Couple, and Single Parent Families**

| | All Families | | Married Couples (male householder) | | Single-Parent Families (male or female householder) | |
|---|---|---|---|---|---|---|
| | Value | 90% C.I. (+/-) | Value | 90% C.I. (+/-) | Value | 90% C.I. (+/-) |
| Total number (in thousands) | 34,700.2 | 878.2 | 26,482.0 | 505.8 | 8,218.2 | 157.0 |
| Average family income[19] | | | | | | |
| *1996* | $54,976 | $1,106 | $63,688 | $1,325 | $26,903 | $343 |
| *1997* | $56,723 | $1,137 | $65,036 | $1,367 | $29,932 | $379 |
| *1998* | $59,189 | $1,173 | $67,350 | $1,397 | $32,889 | $466 |
| *1999* | $59,522 | $1,191 | $67,664 | $1,427 | $33,284 | $450 |
| | Families in poverty | | | | | |
| | % | | % | | % | |
| Based on poverty threshold[20] | | | | | | |
| 1996 | 13.8 | 1.6 | 7.7 | 1.4 | 33.5 | 4.4 |
| 1997 | 11.7 | 1.4 | 7.2 | 1.3 | 26.4 | 4.1 |
| 1998 | 11.5 | 1.4 | 7.4 | 1.4 | 24.9 | 4.0 |
| 1999 | 11.0 | 1.4 | 7.2 | 1.3 | 23.3 | 3.9 |
| Based on less than lowest quintile value | | | | | | |
| 1996 | 20.0 | 1.8 | 10.3 | 1.6 | 51.2 | 4.6 |
| 1997 | 20.0 | 1.8 | 11.4 | 1.6 | 47.6 | 4.6 |
| 1998 | 20.0 | 1.8 | 11.9 | 1.7 | 46.0 | 4.6 |
| 1999 | 20.0 | 1.8 | 12.1 | 1.7 | 45.3 | 4.6 |
| Average age[21] | 38.0 yrs. | 2.0 yrs. | 38.4 yrs. | 2.0 yrs. | 36.8 yrs. | 2.3 yrs. |

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[19] Family income was adjusted reflect 1999 dollars using the CPI-U-RS.

[20] Following the Office of Management and Budget's (OMB) Statistical Policy Directive 14, a set of income thresholds that vary by family size and composition was used to determine which families were in poverty.

[21] Averages and distributions are based upon information provided at the beginning of the survey.

Table 1 -- continued

| | All Families | | Married Couples (male householder) | | Single-Parent Families (male or female householder) | |
|---|---|---|---|---|---|---|
| Age distribution[2] | % | 90% C.I. (+/-) | % | 90% C.I. (+/-) | % | 90% C.I. (+/-) |
| *24 – 30 yrs.* | 17.0 | 1.7 | 15.0 | 1.6 | 23.3 | 3.9 |
| *31- 40 yrs.* | 46.9 | 2.2 | 47.1 | 2.6 | 46.3 | 4.6 |
| *41 – 50 yrs.* | 30.7 | 2.1 | 32.3 | 2.4 | 25.5 | 4.0 |
| *51 – 60 yrs.* | 5.4 | 1.0 | 5.6 | 1.2 | 4.8 | 2.0 |
| Race/ethnicity | | | | | | |
| White | 82.0 | 1.7 | 86.3 | 1.8 | 68.0 | 4.3 |
| *White, non-Hispanic* | 70.7 | 2.0 | 75.1 | 2.2 | 56.6 | 4.6 |
| *Black* | 13.0 | 1.5 | 8.2 | 1.4 | 28.7 | 4.2 |
| *Other races* | 5.1 | 1.0 | 5.5 | 1.2 | 3.3 | 1.6 |
| | | | | | | |
| Hispanic | 12.1 | 1.3 | 11.9 | 1.5 | 12.7 | 2.7 |
| Level of educational attainment[2] | | | | | | |
| *Less than high school graduate* | 13.2 | 1.5 | 11.2 | 1.6 | 19.6 | 3.7 |
| *High school graduate, some or no college* | 62.5 | 2.2 | 60.6 | 2.5 | 68.7 | 4.3 |
| *College graduate* | 14.8 | 1.6 | 17.0 | 1.9 | 7.8 | 2.5 |
| *Post-graduate* | 9.5 | 1.3 | 11.3 | 1.6 | 3.8 | 1.8 |

Source: U.S. Census Bureau, Survey of Income and Program Participation, 1996 panel, author's calculations.

**Table 2A: Low-Income Sequence Patterns for All, Married-Couple, and Single-Parent Families**

| Income sequence | Low-income cut-off = poverty threshold | | | | | |
|---|---|---|---|---|---|---|
| | All Families | | Married-Couple Families (male family householder) | | Single-Parent Families (male or female family householder) | |
| | Percentage | Cumulative percentage | Percentage | Cumulative percentage | Percentage | Cumulative percentage |
| LLLL | 4.53 | 4.53 | 1.85 | 1.85 | 13.18 | 13.18 |
| LLLH | 1.32 | 5.84 | 0.72 | 2.57 | 3.25 | 16.44 |
| LLHL | 0.48 | 6.32 | 0.27 | 2.83 | 1.16 | 17.59 |
| LLHH | 1.52 | 7.85 | 0.87 | 3.70 | 3.65 | 21.25 |
| LHLL | 0.42 | 8.26 | 0.22 | 3.92 | 1.07 | 22.32 |
| LHLH | 0.48 | 8.74 | 0.25 | 4.16 | 1.22 | 23.54 |
| LHHL | 0.51 | 9.25 | 0.27 | 4.44 | 1.28 | 24.83 |
| LHHH | 3.58 | 12.84 | 2.37 | 6.81 | 7.52 | 32.34 |
| HLLL | 0.70 | 13.53 | 0.58 | 7.39 | 1.07 | 33.41 |
| HLLH | 0.37 | 13.90 | 0.38 | 7.78 | 0.31 | 33.72 |
| HLHL | 0.16 | 14.06 | 0.09 | 7.86 | 0.39 | 34.11 |
| HLHH | 1.09 | 15.15 | 0.91 | 8.77 | 1.65 | 35.76 |
| HHLL | 0.86 | 16.00 | 0.74 | 9.52 | 1.22 | 36.99 |
| HHLH | 0.83 | 16.83 | 0.65 | 10.17 | 1.40 | 38.39 |
| HHHL | 0.91 | 17.74 | 0.71 | 10.88 | 1.55 | 39.94 |
| HHHH | 82.26 | 100.00 | 89.12 | 100.00 | 60.06 | 100.00 |
| | | | | | | |
| All | 100.00 | | 100.00 | | 100.00 | |
| Base n: (in 000s) | 34,700.2 | | 26,482.0 | | 8,218.2 | |

Note:
This table summarizes the family income sequences covering calendar years 1996-1999 (as aggregated from the 12 waves of the SIPP 1996 panel) with 'L' referring to the family income being equal to or less than the threshold value, and 'H' referring to the family income being above the threshold value.

Source: U.S. Census Bureau, Survey of Income and Program Participation (SIPP), 1996 panel, author's calculations.

**Table 2B: Low-Income Sequence Patterns for All, Married-Couple, and Single-Parent Families**

| Income sequence | Low-income cut-off = bottom quintile (< 20%) | | | | | |
| | All Families | | Married-Couple Families (male family householder) | | Single-Parent Families (male or female family householder) | |
| | Percentage | Cumulative percentage | Percentage | Cumulative percentage | Percentage | Cumulative percentage |
|---|---|---|---|---|---|---|
| LLLL | 11.18 | 11.18 | 4.64 | 4.64 | 32.22 | 32.22 |
| LLLH | 1.74 | 12.91 | 1.05 | 5.69 | 3.96 | 36.19 |
| LLHL | 0.75 | 13.67 | 0.47 | 6.16 | 1.68 | 37.87 |
| LLHH | 1.79 | 15.46 | 1.03 | 7.18 | 4.27 | 42.13 |
| LHLL | 0.71 | 16.17 | 0.44 | 7.62 | 1.60 | 43.73 |
| LHLH | 0.34 | 16.51 | 0.23 | 7.85 | 0.68 | 44.41 |
| LHHL | 0.55 | 17.06 | 0.36 | 8.21 | 1.15 | 45.56 |
| LHHH | 2.93 | 19.99 | 2.09 | 10.30 | 5.65 | 51.20 |
| HLLL | 2.13 | 22.11 | 1.92 | 12.22 | 2.80 | 54.01 |
| HLLH | 0.63 | 22.75 | 0.64 | 12.86 | 0.61 | 54.62 |
| HLHL | 0.34 | 23.09 | 0.29 | 13.14 | 0.51 | 55.13 |
| HLHH | 1.43 | 24.52 | 1.39 | 14.53 | 1.57 | 56.70 |
| HHLL | 1.90 | 26.43 | 1.74 | 16.27 | 2.40 | 59.10 |
| HHLH | 1.37 | 27.79 | 1.27 | 17.54 | 1.69 | 60.79 |
| HHHL | 2.44 | 30.23 | 2.29 | 19.84 | 2.91 | 63.71 |
| HHHH | 69.77 | 100.00 | 80.16 | 100.00 | 36.29 | 100.00 |
| | | | | | | |
| All | 100.00 | | 100.00 | | 100.00 | |
| Base n: (in 000s) | 34,700.2 | | 26,482.0 | | 8,218.2 | |

Note:
This table summarizes the family income sequences covering calendar years 1996-1999 (as aggregated from the 12 waves of the SIPP 1996 panel) with 'L' referring to the family income being equal to or less than the threshold value, and 'H' referring to the family income being above the threshold value.

Source: U.S. Census Bureau, Survey of Income and Program Participation (SIPP), 1996 panel, author's calculations.

**Table 3A: Low-Income Exit and Re-Entry Rates for Families by Duration, 1996-1999
(Low income cut-off = family poverty threshold)**

| Duration (in years) | Low-income exit rate | Percentage of families still with low-income | Low-income re-entry rate | Percentage of families re-entered low-income |
|---|---|---|---|---|
| | All families | | | |
| 1 | 0.50 | 100 | 0.25 | 0 |
| 2 | 0.26 | 50 | 0.13 | 25 |
| 3 | | 43 | | 31 |
| | Married-couple families | | | |
| 1 | 0.48 | 100 | 0.22 | 0 |
| 2 | 0.29 | 52 | 0.11 | 22 |
| 3 | | 44 | | 27 |
| | Single-parent families | | | |
| 1 | 0.54 | 100 | 0.29 | 0 |
| 2 | 0.18 | 46 | 0.15 | 29 |
| 3 | | 44 | | 36 |

Notes: Exit rates are derived using data for families beginning a low-income spell in the second or third year of the 1996 SIPP panel (sequences HLxx and xHLx in Table 2A). Re-entry rates are derived using data for families finishing a low-income spell in the first or second wave (sequences LHxx and xLHx in Table 2A).

Source: U.S. Census Bureau, Survey of Income and Program Participation (SIPP), 1996 panel, author's calculations.

**Table 3B: Low-Income Exit and Re-Entry Rates for Families by Duration, 1996-1999**
**(Low income cut-off = bottom quintile (lowest 20%)**

| Duration (in years) | Low-income exit rate | Percentage of families still with low-income | Low-income re-entry rate | Percentage of families re-entered low-income |
|---|---|---|---|---|
| All families | | | | |
| 1 | 0.46 | 100 | 0.30 | 0 |
| 2 | 0.23 | 54 | 0.16 | 30 |
| 3 | | 47 | | 36 |
| Married-couple families | | | | |
| 1 | 0.48 | 100 | 0.28 | 0 |
| 2 | 0.25 | 52 | 0.15 | 28 |
| 3 | | 44 | | 34 |
| Single-parent families | | | | |
| 1 | 0.43 | 100 | 0.33 | 0 |
| 2 | 0.18 | 58 | 0.17 | 33 |
| 3 | | 53 | | 40 |

Notes: Exit rates are derived using data for families beginning a low-income spell in the second or third year of the 1996 SIPP panel (sequences HLxx and xHLx in Table 2B). Re-entry rates are derived using data for families finishing a low-income spell in the first or second wave (sequences LHxx and xLHx in Table 2B).

Source: U.S. Census Bureau, Survey of Income and Program Participation (SIPP), 1996 panel, author's calculations.

**Table 4: Model Results for Married-Couple and Single-Parent Families**

| | Dependent variable: log of family income | | | | | |
|---|---|---|---|---|---|---|
| | Married-Couple Families (male family householder) | | | Single-Parent Families (male or female family householder) | | |
| | Fixed Effects | | | | | |
| | Estimated coefficient | Std. Error | | Estimated coefficient | Std. Error | |
| Intercept | -0.573 | 2.248 | | -3.538 | 3.434 | |
| Year | | | | | | |
| 1996 | -0.034 | 0.011 | *** | -0.112 | 0.016 | *** |
| 1997 | -0.013 | 0.010 | | -0.033 | 0.015 | ** |
| 1998 | 0.002 | 0.009 | | 0.019 | 0.012 | * |
| Race | | | | | | |
| White | 0.206 | 0.041 | *** | 0.143 | 0.082 | * |
| Black | 0.146 | 0.049 | *** | -0.060 | 0.086 | |
| Hispanic origin | -0.212 | 0.027 | *** | -0.154 | 0.047 | *** |
| Educational attainment | | | | | | |
| High school degree, some or no college | 0.404 | 0.035 | *** | 0.361 | 0.038 | *** |
| College graduate | 0.718 | 0.032 | *** | 0.737 | 0.058 | *** |
| Post-graduate degree | 0.877 | 0.027 | *** | 0.855 | 0.077 | *** |
| Region | | | | | | |
| Northeast | -0.001 | 0.025 | | -0.074 | 0.047 | |
| Midwest | -0.029 | 0.023 | | 0.047 | 0.044 | |
| South | -0.126 | 0.022 | *** | -0.072 | 0.042 | * |
| Covered by union contract | -0.088 | 0.016 | *** | -0.137 | 0.027 | *** |
| General occupational groups | | | | | | |
| #1 | 0.306 | 0.021 | *** | 0.457 | 0.032 | *** |
| #2 | 0.277 | 0.022 | *** | 0.506 | 0.036 | *** |
| #3 | 0.221 | 0.023 | *** | 0.380 | 0.024 | *** |
| #4 | 0.208 | 0.021 | *** | 0.417 | 0.041 | *** |
| #5 | 0.127 | 0.018 | *** | 0.320 | 0.022 | *** |
| #6 | 0.263 | 0.124 | | | | |

Table 4 -- continued

| | | | | | | |
|---|---|---|---|---|---|---|
| Log of age | 5.344 | 1.234 | *** | 6.280 | 1.899 | *** |
| Log of age squared | -0.652 | 0.169 | *** | -0.740 | 0.262 | *** |
| Log # of children under 18 yrs. | -0.042 | 0.014 | *** | 0.088 | 0.022 | *** |
| | Variance components | | | | | |
| Permanent component[22] | | | | | | |
| White | 0.170 | | | 0.228 | | |
| Black | 0.123 | | | 0.219 | | |
| Other race | 0.273 | | | 0.220 | | |
| | | | | | | |
| Transitory component[23] | 0.164 | | | 0.248 | | |
| AR(1) parameter | 0.520 | | | 0.555 | | |

Note:

Number of observations used to estimate:

     Married couple model – 11,604 unweighted observations

     Single-parent model – 6,938  unweighted observations

Occupational groupings:

#1: Executive, administrative, and managerial occupations, supervisors and proprietors.

#2: Professional specialty occupations.

#3: Sales occupations.

#4: Precision production, craft and repair occupations.

#5: Operators, fabricators, and laborers.

#6: Current labor force status is unemployed and whose last job was the Armed Forces.

Source: Survey of Income and Program Participation (SIPP), 1996 panel, author's calculations.

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[22] The permanent component is an individual random effect considered constant for the duration of the SIPP panel.  It is assumed that the variance of the individual random effect varies by the race of the family householder.

[23] The transitory component is the stochastic error following an AR(1) structure that we attribute to market fluctuations.

Table 5: Comparing The Observed and Model Predicted Outcome of Being Poor Using the Standard Poverty Thresholds, by Race/Ethnicity of Family Head and Level of Education

| Family type | Education | | Year 1 | Year 2 | Year 3 | Year 4 |
|---|---|---|---|---|---|---|
| **Married Couple** | | | | | | |
| White family head | HS drop-out | Observed | 0.291 | 0.258 | 0.217 | 0.170 |
| | | Predicted | 0.217 | 0.188 | 0.178 | 0.132 |
| Black family head | HS drop-out | Observed | 0.242 | 0.180 | 0.290 | 0.231 |
| | | Predicted | 0.187 | 0.107 | 0.090 | 0.131 |
| Hispanic family head | HS drop-out | Observed | 0.370 | 0.314 | 0.325 | 0.236 |
| | | Predicted | 0.300 | 0.246 | 0.273 | 0.197 |
| White family head | HS grad | Observed | 0.050 | 0.040 | 0.040 | 0.040 |
| | | Predicted | 0.010 | 0.020 | 0.010 | 0.010 |
| Black family head | HS grad | Observed | 0.060 | 0.060 | 0.030 | 0.050 |
| | | Predicted | 0.010 | 0.010 | 0.004 | 0.003 |
| Hispanic family head | HS grad | Observed | 0.100 | 0.090 | 0.080 | 0.090 |
| | | Predicted | 0.020 | 0.030 | 0.010 | 0.010 |
| **Single-Parent** | | | | | | |
| White family head | HS drop-out | Observed | 0.540 | 0.430 | 0.390 | 0.420 |
| | | Predicted | 0.600 | 0.470 | 0.410 | 0.390 |
| Black family head | HS drop-out | Observed | 0.760 | 0.600 | 0.610 | 0.540 |
| | | Predicted | 0.830 | 0.700 | 0.650 | 0.640 |
| Hispanic family head | HS drop-out | Observed | 0.650 | 0.480 | 0.440 | 0.430 |
| | | Predicted | 0.700 | 0.600 | 0.500 | 0.450 |
| White family head | HS grad | Observed | 0.240 | 0.170 | 0.150 | 0.130 |
| | | Predicted | 0.160 | 0.130 | 0.100 | 0.090 |
| Black family head | HS grad | Observed | 0.430 | 0.340 | 0.320 | 0.270 |
| | | Predicted | 0.380 | 0.310 | 0.260 | 0.240 |
| Hispanic family head | HS grad | Observed | 0.340 | 0.310 | 0.260 | 0.250 |
| | | Predicted | 0.290 | 0.290 | 0.230 | 0.230 |

Note:

HS -- refers to high school

**Source**: Survey of Income and Program Participation, 1996 panel, author's calculations

Table 6: Simulated probability that a family would be in poverty

| | White family householder | | Black family householder | | Other race family householder | |
|---|---|---|---|---|---|---|
| | Married couple | Single parent | Married couple | Single parent | Married couple | Single parent |
| In poverty at least 1 year | 0.17 | 0.32 | 0.21 | 0.44 | 0.23 | 0.36 |
| In poverty all 4 years | 0.08 | 0.23 | 0.09 | 0.40 | 0.14 | 0.34 |
| | | | | | | |

Note: poverty is defined as having a family income below the standard U.S. poverty thresholds.

Source: Survey of Income and Program Participation, 1996 panel, author's calculations.