



Income and Earnings Mobility in U.S. Tax Data

JEFF LARRIMORE
Federal Reserve Board

JACOB MORTENSON
Georgetown University and
the Joint Committee on Taxation

DAVID SPLINTER
Joint Committee on Taxation

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Introduction

Individual and family income varies over time. This variation is often correlated with major life events. Some events—promotions, new jobs, or marrying another wage earner—are associated with substantial income gains. Others—such as job losses or divorces—are associated with income declines. This paper analyzes the likelihood and expected magnitude of intra-generational income mobility and estimates the correlation between various life events and observed mobility patterns.

Decomposing mobility patterns is important as policymakers consider the appropriate interpretation of mobility patterns. For example, if most upward mobility comes through marriage or new entrants into the labor market within a family, this presents a different picture of mobility than if the same level of mobility is observed through wage gains achieved from labor market advancements. Tracking individuals and families over time offers additional context to inequality discussions that often focus on single year cross-sections. Furthermore, when evaluating public policies such as tax laws, a valuable consideration is the extent to which policy mitigates or accentuates income changes for those experiencing upward or downward mobility.

The majority of the existing income mobility research is based on survey data from the Panel Study of Income Dynamics (PSID) (Acs and Zimmerman 2008; Bradbury and Katz 2002; Gittleman and Joyce 1999).¹ However, these data are limited by relatively small sample sizes (the PSID surveys between 5,000 and 8,000 families) and have the well-known concern that measurement error in survey data may appear as mobility, potentially upwardly biasing mobility estimates (Gardiner and Hills 1999; Jarvis and Jenkins 1998; Rendtel, Langeheine, and Berntsen 1998; Solon 1992).² Top-coding, non-response, and misreporting in the tails of the distribution may also distort

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- 1 This literature is closely linked to the related literature considering transitions out of poverty including which groups of individuals are likely to experience only transitory poverty and which groups are likely to persist in poverty for extended periods (Bane and Ellwood 1986; Gottschalk and Danziger 2001).
 - 2 Gittleman and Joyce (1999) acknowledge this problem and address it by averaging five years of income, and measuring mobility from one five-year average to the next. This captures mobility trends in *permanent income*, but by design excludes most *transitory income* from the mobility measure since transitory income shocks are filtered out along with measurement error.

extreme incomes (Bollinger et al. 2014), which adds further uncertainty to estimates of mobility from survey data.

Recognizing the issues with survey-based mobility data, this paper uses a panel of tax return data compiled from restricted access Internal Revenue Service (IRS) administrative records from 1999 through 2011. Using these data, determinants of trends are explored for individual wage earnings, such as wage growth within a job, employment changes within an industry, or changing jobs into a new industry. Next, the paper examines variation in family income, where tax units are proxies for families, which consist of individuals appearing on the same tax return.³ The paper estimates the contribution of life transitions, such as marriage, divorce, job changes, or geographic mobility, to the observed mobility levels of tax units. Finally, tax data show how federal taxes and tax credits affect mobility patterns—either by alleviating or accentuating the hardship from downward mobility or by reducing or accelerating the gains from upward mobility.

The use of administrative data to consider these questions builds on a recent line of research that established the value of such data for mobility questions (see e.g., Chetty et al. 2014; Auten, Gee, and Turner 2013; and Kopczuk, Saez, and Song 2010). But despite the increased prevalence of administrative data in research exploring income mobility, Auten and Gee (2009) is the only previous paper known to the authors that uses administrative tax return data to consider potential causes of intragenerational income mobility, and no previous research has used administrative tax data to consider how taxes interact with mobility. This paper also adds to the literature by analyzing W-2 data linked to tax returns. These data allow for estimation of employment-based life transitions for individuals or families, something prior tax-return based research has not considered.

These data reveal that almost half of all working adults in the United States experience a change in earnings of at least 25 percent over a two-year period, which is in line with findings by the Congressional Budget Office (2008) using Social Security Administration and Survey of Income and Program Participation (SIPP) data. Large swings in individual earnings are strongly correlated with job changes, although there is little difference in the level of mobility experienced by those who change jobs within their industry versus those who transition to a new industry. Marriage has a positive impact on individual labor earnings mobility for men, while it has a negative impact on individual labor earnings mobility for women.

3 While this sharing unit is common in the tax literature (see e.g., Piketty and Saez 2003), it is distinct from the Census Bureau's definition of a family, which consists of at least two individuals who are living together and are related by birth, marriage, or adoption (Lofquist et al. 2012).

When considering a broader definition of total tax unit income, the overall levels of mobility are similar—suggesting the results are robust to the unit of analysis. Large income gains are most likely among families that add workers, either through marriage or through a second family member entering the workforce, although mobility is not limited to these families. Approximately two-fifths of families that maintain the same number of workers still experience upward or downward swings in income of at least 25 percent over two years.

These large income swings are partially offset by changes in tax liabilities for many families, particularly those higher in the income distribution where marginal tax rates are greater. However, families near the lower end of the distribution that experience large income declines often see those losses accentuated by the loss of tax credits such as the Earned Income Tax Credit (EITC).⁴ This supports the findings of Bitler, Hoynes, and Kuka (2014) who observe that while the EITC successfully reduces the incidence of poverty and near-poverty, that support is lost for those who experience a substantial economic hardship.

Data: Panel and Income Definitions

Individual Panel

This paper draws on a 0.1 percent random sample of individuals from the IRS Statistics of Income (SOI) Databank, which is an individual level panel containing every person with a taxpayer identification number who was born before 2012 and had not died by 1996. For each individual, the SOI Databank includes data originating from Form 1040 (marital status, number of dependents, and Schedule C income), Form W-2 (wages and employer identifiers), Form 1099-G (unemployment insurance), and the Death Master File (sex and year of birth). Data is also merged from Form 1098-T (university student status). This panel is an individual level sample, which is used when analyzing individual labor earnings mobility.

Tax Unit Panel (Enhanced CWHS)

An enhanced version of the IRS Continuous Work History Sample panel (CWHS) from 1999 to 2011 is used to analyze tax unit incomes. The

4 Note, however, that due to limitations of the data the after-tax income definition used in this study does not include temporary transfers excluded from tax data—such as income from Temporary Assistance for Needy Families, Supplemental Security Income, or in-kind transfers such as the Supplemental Nutrition Assistance Program or Medicaid—which may help offset some large income losses.

conventional CWS panel is commonly used by researchers with access to tax return data. It includes all tax returns for which the primary filer's Taxpayer Identification Number (TIN) has the last four digits matching one of 10

combinations, which represents approximately 0.1 percent of all tax returns filed each year.

Because TINs are time-invariant for each individual, any individual with a CWS qualifying TIN tends to remain in the panel over time. Individuals drop out of the panel in a given year if they fail to file a tax return or are listed second on a joint return and can exit permanently if they emigrate or die. However, each annual cross section of the conventional CWS panel remains representative of the filing population, as new taxpayers with CWS qualifying TINs enter the panel when they file tax returns.

While the conventional CWS data is a valuable resource for tracking individuals over time, three significant improvements are made in this paper to address known limitations of the data. First, the substantial male bias that has been found in the panel (Dowd and Horowitz 2011) is corrected. Selection into the conventional CWS sample is based on the primary filer's TIN, which means that a single individual with a CWS qualifying TIN will generally drop out of the panel upon marriage if they are not listed as the primary filer on their joint return. Because the vast majority of married couples list the male as the primary filer, men are over-sampled when following individuals over time. To address this limitation, the data used in this paper include joint tax returns that list CWS qualifying TINs as secondary filers (retrieved from the *universe* of federal income tax returns using the IRS Compliance Data Warehouse (CDW)).⁵ In cases of married couples filing separately, incomes from the two separate returns are combined. This refinement allows individuals to be followed through marriage or divorce and removes the gender bias in the dataset.

The second limitation of the conventional CWS data is that it is based solely on annual income tax returns (1040, 1040EZ, etc.), and individuals drop out of the panel if they fail to file a tax return in a given year. This causes the panel to only be representative of the filing population, as opposed to the population as a whole. This paper addresses this limitation by adding income data for non-filers using information return data from the CDW, as long as the individual filed a tax return at least once between 1999

5 Including these additional returns leads to an oversampling of joint filers. To correct for this, we randomly drop about 5 percent of CWS qualifying TINs such that the fraction of joint filers in the sample approximates that from the actual population.

and 2011.⁶ Employers, financial institutions, and government agencies file information returns with the IRS detailing wage income (Form W-2), Social Security income (Form SSA-1099), unemployment income (Form 1099-G), interest (Form 1099-INT), dividends (Form 1099-DIV), retirement saving distributions (Form 1099-R), and miscellaneous income (Form 1099-MISC). Importantly, this filing occurs regardless of whether the individual files a tax return. These information return data provide partial income information for non-filers and are used to construct annual income totals for individuals who fail to file a tax return in a given year and would have otherwise dropped out of the sample.

Finally, a limitation of earlier research using the conventional CWSHS data is that it only captures information reported directly on tax returns, which provides no information about employers or the split of wage income between spouses. However, by linking tax records in the CWSHS to other tax forms, like the Form W-2, it is possible to separately observe employment information for each individual, including wages, job changes, and industry of employment.

Income Definitions

Both individual labor earnings and the total income of the tax unit are considered in this analysis. Individual labor earnings are defined here as wages and salaries from Form W-2, and self-employment income from Schedule C of Form 1040.⁷ Tax-unit income is size-adjusted total cash income, excluding capital gains.⁸ This includes wages and salaries, taxable and tax-exempt interest, dividends, alimony, net business income, gross individual retirement

6 The restriction that individuals file at least once rarely binds, both because few people never file a tax return over a 12-year period and because the 2008 Stimulus Tax Rebate incentivized filing for those who otherwise would not have filed a return. The number of tax returns are consistent with those reported by the IRS, and the observation counts—inclusive of non-filers—are similar to Heim, Lurie and Pearce (2014) which are also similar to Census population counts for the adult population. Further details on these comparisons are available upon request from the authors.

7 Self-employment income is reported at the tax-unit level in the CDW data, and is not separated by individual. We assume that self-employment earnings are split evenly between spouses for jointly filed returns. Self-employment income for individuals only includes what is reported on Schedule C on the Form 1040, whereas self-employment income for the tax unit includes both Schedule C income and Schedule E income.

8 We adjust for tax-unit size by dividing income by the square root of the number of individuals in the tax unit. This adjustment is common in income distributional research (see e.g., Gottschalk and Smeeding 1997; Atkinson and Brandolini 2001; and Burkhauser et al. 2011) and is also used by the Organisation for Economic Cooperation and Development in its income inequality official measures (d'Ercole and Förster 2012). It closely matches the household size adjustments implied by the Census Bureau poverty thresholds (Ruggles 1990).

account (IRA) distributions, gross pensions, gross Social Security benefits, rental income, farm income, unemployment compensation, and other income reported on line 21 of Form 1040. Alimony payments, capital gains, and the deductible half of the self-employment tax are then removed. Although non-reported cash and in-kind transfers are excluded, this definition includes Social Security and unemployment income, which are two of the largest transfer programs and represent over 80 percent of cash transfer income (Larrimore, Burkhauser, and Armour 2015). This income definition is similar to that used by Auten and Gee (2009) and by Auten, Gee, and Turner (2013).

Tax liabilities are net of tax credits. The earned income and child credits are refundable, and as a result tax liabilities can be positive or negative. Post-tax income is calculated as pre-tax income (including capital gains) minus net tax liabilities.⁹ Tax liabilities are limited to federal income taxes and exclude state and local tax payments as well as payroll taxes.

Sample Restrictions

Similar to most previous studies on income mobility, the sample is restricted in order to avoid including mobility from initial entrance into the labor force. Observations with primary filers under 25 years of age in the first year of each three-year observation period and observations with missing income in the initial or final year, or no income in both the initial and final years, are removed. While some researchers also impose an upper age limit—including Gittleman and Joyce (1999) who exclude individuals over age 64 and Sawhill and Condon (1992) who exclude those over age 54—none is imposed in this paper to include mobility around retirement in the analysis. These sample restrictions are similar to Auten and Gee (2009), but are more restrictive than U.S. Department of the Treasury (1992), which did not have an age restriction and observed substantially greater levels of upward mobility.

Individual Earnings Mobility

Overview of Individual Earnings Mobility Patterns

This analysis begins by examining changes in individual labor earnings over time. One trend is particularly clear: a large fraction of the population

9 Although the authors prefer to exclude capital gains since many gains represent the timing of realizations rather than persistent income (see Armour, Burkhauser, and Larrimore 2014), capital gains are included here since these gains impact reported tax liabilities.

experiences substantial earnings mobility in relatively short time horizons. Table 1 summarizes mobility patterns for men (panel A) and women (panel B) over the course of two years, restricting the sample to individuals with at least \$1,000 of earnings in the initial year. Each cell in table 1 displays the percentage of people in a given income quintile in year t that experienced a given percent change in income two years later (year $t+2$).

Only 56 percent of working men have earnings within 25 percent of their earnings from two years prior. One-fifth have at least 25 percent more earnings and just under one-quarter earned at least 25 percent less (or have no earnings at all).¹⁰ This volatility occurs at all earnings levels, although the frequency of substantial mobility, and particularly upward mobility, is largest for those starting at the bottom of the distribution. Nearly half of those in the bottom earnings quintile have at least a 25 percent increase in their earnings, whereas only 10 to 13 percent of those in the upper three quintiles have this level of upward earnings mobility.

These patterns are remarkably similar among women with 43 percent experiencing earnings changes of at least 25 percent over the two-year period and 27 percent experiencing a change of at least 50 percent. Additionally, similar to that seen for men, female earnings mobility is greatest for the lowest quintile of the distribution. Nevertheless, the top three quintiles are still experiencing substantial absolute mobility, with roughly one-third experiencing earnings changes in excess of 25 percent.

Contributing Factors to Labor Earnings Mobility

To assess what factors are most associated with large earnings movements, table 2 displays the earnings mobility patterns of men and women by employment and individual characteristics. For both genders, changing jobs, changing industries, and moving to a different state are each associated with higher levels of absolute earnings mobility. Sixty-four percent of men switching jobs experience an earnings change of at least 25 percent, while only 33 percent of all men remaining in the same job experience a similar change. Similarly, 66 percent of men switching industries experience a large absolute change in earnings. Female wage earners exhibit similar patterns.

The prior evidence on the impact of job changes on income mobility is mixed and hinges critically on whether an observed job change results from a

10 As described more fully in the description of the data, earnings is defined here to include both wage earnings and self-employment income. When considering just wage earners and excluding self employment, the results are similar: 47 percent of men and 53 percent of women have a shift in earnings of at least 25 percent, and just under a quarter of men and women experienced an increase in income of at least 25 percent.

Table 1: Individual earnings mobility by initial earnings (2-year mobility, t to t+2, t=1999–2009)

PANEL A: MALE WAGE MOBILITY								% CHANGE IN		\$ CHANGE IN		INITIAL WAGE	
INITIAL WAGE QUINTILE	NO FINAL EARNINGS	DECLINE >50%	DECLINE 25–50%	DECLINE <25%	INCREASE <25%	INCREASE 25–50%	INCREASE >50%	MEAN WAGES	MEDIAN WAGES	MEAN WAGES	MEDIAN WAGES	MEAN WAGES	MEDIAN WAGES
<\$1,000	—	—	—	—	—	—	—	—	—	\$38,800	\$25,200	\$100	\$0
Lowest	8%	10%	8%	13%	12%	7%	41%	68%	22%	\$7,200	\$2,400	\$10,500	\$10,800
Second	10%	13%	9%	22%	24%	10%	13%	–3%	–3%	–\$800	–\$800	\$25,900	\$25,900
Middle	5%	10%	8%	30%	34%	8%	5%	–6%	–2%	–\$2,600	–\$800	\$41,500	\$41,400
Fourth	4%	8%	7%	34%	37%	7%	3%	–6%	–2%	–\$3,700	–\$1,200	\$61,100	\$60,400
Highest	3%	9%	9%	34%	34%	7%	5%	–7%	–4%	–\$11,000	–\$4,000	\$149,800	\$104,300
All males	6%	10%	8%	27%	29%	8%	12%	–1%	–3%	–\$800	–\$1,100	\$57,300	\$41,400

PANEL B: FEMALE WAGE MOBILITY								% CHANGE IN		\$ CHANGE IN		INITIAL WAGE	
INITIAL WAGE QUINTILE	NO FINAL EARNINGS	DECLINE >50%	DECLINE 25–50%	DECLINE <25%	INCREASE <25%	INCREASE 25–50%	INCREASE >50%	MEAN WAGES	MEDIAN WAGES	MEAN WAGES	MEDIAN WAGES	MEAN WAGES	MEDIAN WAGES
<\$1,000	—	—	—	—	—	—	—	—	—	\$28,200	\$20,200	\$100	\$0
Lowest	5%	8%	7%	13%	13%	8%	46%	79%	35%	\$6,500	\$3,000	\$8,200	\$8,600
Second	9%	12%	9%	22%	25%	10%	13%	–2%	–3%	–\$300	–\$500	\$18,700	\$18,700
Middle	6%	10%	8%	28%	34%	8%	6%	–7%	–2%	–\$2,000	–\$500	\$29,700	\$29,600
Fourth	4%	8%	7%	32%	39%	6%	3%	–6%	–1%	–\$2,800	–\$600	\$43,700	\$43,200
Highest	4%	8%	8%	33%	38%	6%	3%	–8%	–3%	–\$7,400	–\$1,800	\$89,100	\$71,500
All females	5%	9%	8%	26%	31%	8%	13%	–1%	–2%	–\$300	–\$600	\$29,600	\$29,000

Note: All dollar amounts adjusted to 2013 values using the CPI-U-RS. Earnings are W-2 wages and Schedule C income (divided by two if married filing jointly), bottom-coded at zero. The initial income less than \$1,000 group is removed from the bottom quintile. Individuals are excluded if they have no earnings in the initial and final years, three-year average earnings less than \$5,000, die during the three-year period, or are 25 years old or younger in the initial year of each three-year period. The initial earnings less than \$1,000 group, about 4 percent of men and women, is removed from the bottom quintile.

Source: Enhanced CWSHS panel and authors' calculations.

displacement or a voluntary job change. For example, Farber (2005) observes that displacements result in substantial wage declines, while Topel and Ward (1992) observe that voluntary job changes are an important source of upward wage mobility for young workers. Whether a change is voluntary in nature, however, cannot be observed in the data so the types of job changes are not separated. While recognizing this limitation, there is no clearly dominant direction for large earnings swings among those who change jobs, although both job changers and industry changers are slightly more likely to experience substantial upward mobility than substantial downward mobility.

Earnings mobility also varies with family life events and exhibits greater variation between males and females. Perhaps unsurprisingly, both men and women who move across state lines are likely to experience a large earnings change. But, in what may be reflective of who is leading the move, in the event of a move to a new state women are more likely to experience a large downward swing in their earnings: 38 percent of women have at least a 25 percent earnings decline compared with 32 percent of men.

The evidence from this analysis also suggests that marriage improves the earnings trajectory of male workers more than female workers. Marriage is associated with large median gains in male earnings (11 percent), but approximately no change in female earnings (1 percent). Similarly, men who get divorced one or two years after the initial year fare worse than women: 38 percent of these men have a 25 percent drop in earnings, whereas only 31 percent of women who get divorced have an earnings decline of this magnitude.

Regression Analyses

A limitation of the previous comparisons is that they cannot separate the relationship between multiple variables of interest. This section uses regression analysis to control for covariates, including life cycle effects (using five-year age bins), starting centile in the income distribution, and the year of observation (using year dummies).

Table 3 considers which factors are correlated with large income changes, with binary dependent variables that indicate whether the individual experienced a 25 percent increase or decrease in their labor earnings over the two-year period. The logit regression results are presented as odds ratios, where odds ratios greater than one indicate that the variable is associated with higher odds of experiencing a 25 percent increase or decrease in earnings, while odds ratios less than one indicate a reduced likelihood of experiencing such an earnings shift.

The regression results support many of the conclusions drawn from the summary statistics in table 2. After controlling for individual level characteristics, changing jobs is still associated with higher levels of earnings mobility, with a

Table 2: Individual earnings mobility by employment and individual characteristics

PANEL A

MALE EARNINGS MOBILITY								% CHANGE IN		INITIAL EARNINGS		FRACTION OF MALES
	NO FINAL EARNINGS	DECLINE >50%	DECLINE 25–50%	DECLINE <25%	INCREASE <25%	INCREASE 25–50%	INCREASE >50%	MEAN EARNINGS	MEDIAN EARNINGS	MEAN	MEDIAN	
Stay in job	—	8%	8%	32%	35%	8%	10%	2%	0%	\$64,900	\$47,400	69%
Job change	—	19%	12%	19%	18%	9%	24%	–3%	–4%	\$45,600	\$31,800	22%
Industry change	—	21%	11%	17%	17%	8%	25%	–5%	–5%	\$43,800	\$30,000	20%
Move to different state	4%	17%	10%	18%	22%	9%	19%	2%	–3%	\$59,300	\$40,200	4%
Unemp. insur: initial yr	8%	16%	9%	16%	17%	10%	23%	0%	3%	\$33,700	\$27,200	8%
Unemp. insur: second yr	12%	22%	12%	18%	15%	7%	13%	–26%	–26%	\$40,000	\$32,500	9%
Unemp. insur: final yr	8%	26%	16%	21%	13%	5%	10%	–29%	–32%	\$41,900	\$34,500	9%
Single, stays single	8%	16%	8%	23%	24%	7%	15%	–1%	–2%	\$39,000	\$30,500	34%
Married, stays married	4%	11%	8%	29%	31%	7%	10%	–2%	–3%	\$69,400	\$50,100	57%
Marriage	4%	20%	7%	21%	24%	9%	16%	13%	11%	\$45,200	\$35,200	5%
Divorce	15%	15%	8%	22%	21%	7%	13%	–4%	–14%	\$55,700	\$37,800	4%
Added first dependent	3%	10%	7%	24%	28%	10%	18%	9%	4%	\$49,200	\$36,500	2%
Added additional depts.	3%	11%	8%	25%	28%	9%	16%	6%	6%	\$49,300	\$35,700	1%

TABLE 2 CONTINUED ON NEXT PAGE

TABLE 2 CONTINUED FROM PREVIOUS PAGE

PANEL B

FEMALE EARNINGS MOBILITY								% CHANGE IN		INITIAL EARNINGS		FRACTION OF FEMALES
	NO FINAL EARNINGS	DECLINE >50%	DECLINE 25-50%	DECLINE <25%	INCREASE <25%	INCREASE 25-50%	INCREASE >50%	MEAN EARNINGS	MEDIAN EARNINGS	MEAN	MEDIAN	
Stay in job	—	19%	11%	18%	18%	9%	26%	0%	-1%	\$31,300	\$23,400	21%
Job change	—	20%	11%	17%	17%	9%	27%	-1%	-2%	\$30,200	\$22,000	19%
Industry change	6%	20%	12%	17%	19%	8%	18%	-4%	-13%	\$38,000	\$28,800	4%
Move to different state	7%	15%	9%	15%	17%	10%	27%	5%	8%	\$23,900	\$19,000	6%
Unemp. insur: initial yr	13%	23%	12%	17%	14%	7%	13%	-29%	-31%	\$29,500	\$23,800	7%
Unemp. insur: second yr	9%	27%	16%	19%	12%	5%	10%	-32%	-37%	\$30,700	\$25,200	7%
Unemp. insur: final yr	5%	12%	8%	25%	30%	7%	13%	0%	-1%	\$34,900	\$28,100	41%
Single, stays single	5%	12%	8%	26%	30%	7%	13%	-1%	-3%	\$40,000	\$31,100	51%
Married, stays married	6%	19%	8%	21%	25%	7%	14%	5%	1%	\$36,000	\$30,100	4%
Marriage	10%	14%	7%	20%	24%	8%	18%	-3%	-1%	\$34,900	\$26,200	4%
Divorce	4%	12%	9%	22%	24%	9%	20%	3%	1%	\$28,800	\$22,800	2%
Added first dependent	3%	12%	9%	23%	25%	9%	19%	7%	6%	\$26,600	\$21,800	1%
Added additional depts.	—	19%	11%	18%	18%	9%	26%	0%	-1%	\$31,300	\$23,400	21%

Note: All dollar amounts adjusted to 2013 values using the CPI-U-RS. Earnings are W-2 wages and Schedule C income (divided by two if married filing jointly), bottom-coded at zero. Individuals are excluded if they have no earnings in the initial and final years, three-year average earnings less than \$5,000, die during the three-year period, or are 25 years old or younger in the initial year of each three-year period.

Source: Enhanced CWSH panel and authors' calculations.

Table 3: Regression results for the odds of a 25 percent increase or decrease in individual earnings

VARIABLES	MEN		WOMEN	
	DECREASE 25%	INCREASE 25%	DECREASE 25%	INCREASE 25%
	ODDS RATIO	ODDS RATIO	ODDS RATIO	ODDS RATIO
Age 25–29	0.94**	1.67**	1.33**	1.49**
Age 30–34	0.96*	1.51**	1.28**	1.38**
Age 35–39	0.97	1.25**	1.12**	1.27**
Age 40–44	0.98	1.12**	1.03	1.14**
Age 50–54	1.14**	0.89**	1.16**	0.87**
Age 55–59	1.52**	0.75**	1.56**	0.69**
Age 60–64	3.08**	0.51**	3.00**	0.46**
Age 65–69	3.17**	0.46**	3.29**	0.39**
Age >69	3.02**	0.35**	3.38**	0.32**
Student initial yr	0.77**	1.60**	0.79**	1.72**
Job change	1.10**	1.66**	1.20**	1.63**
Change of job & industry	1.71**	1.13**	1.61**	1.15**
Unemp. insur: initial yr	0.63**	2.41**	0.61**	2.46**
Unemp. insur: second yr	2.15**	0.60**	2.35**	0.57**
Unemp. insur: final yr	2.85**	0.49**	3.52**	0.42**
Move to different state	1.27**	1.26**	1.60**	1.16**
Diff state & married init yr	1.22**	1.17**	1.47**	0.77**
Married initial year	0.68**	1.30**	1.10**	1.09**
Marriage	0.80**	1.45**	1.45**	1.05
Divorce	2.15**	0.78**	1.25**	1.17**
Dependents initial yr	0.98	0.96*	1.00	0.96*
Added first dependent	0.71**	1.29**	0.98	1.00
Added additional deps.	0.80**	1.21**	0.86**	1.13*
Agriculture	0.84**	0.83**	1.01	0.91
Mining and oil	1.17**	1.14**	0.99	1.21**
Utilities and construction	0.92**	0.95*	0.91**	1.10**
FIRE & STEM	0.96**	1.23**	0.95**	1.29**
Education & health	0.75**	1.16**	0.87**	1.19**
Entert., accom. & food	0.99	0.90**	1.05*	0.93**
Other services	0.95*	1.01	0.99	1.05*

TABLE 3 CONTINUED ON NEXT PAGE

TABLE 3 CONTINUED FROM PREVIOUS PAGE

VARIABLES	MEN		WOMEN	
	DECREASE 25%	INCREASE 25%	DECREASE 25%	INCREASE 25%
Public admin	1.04	1	0.99	1.28*
Self-employed	2.06**	1.11**	2.20**	1.12**
Control for starting centile	Yes	Yes	Yes	Yes
Control for initial year	Yes	Yes	Yes	Yes
Observations used	663,323	663,323	593,002	593,002
Fraction decr./incr. 25%	27%	24%	25%	24%

Note: Dependent variables are binary variables indicating a two-year decrease or increase of at least 25 percent of individual earnings, where non-positive to positive changes in earnings are considered increases of at least 25 percent. Odds ratios from logistic regressions are reported. Income mobility is measured from t to $t+2$, where $t=1999-2009$. Observations are removed if the individual is less than 25 years old in the initial year. Earnings are W-2 wages and Sch. C income (divided by two if married filing jointly), bottom-coded at zero. Intercept, year dummies, and initial year centile dummies are not shown. Number of children in 1999 and 2000 set to 2001 number due to missing data. Retail and Transportation industry code is the excluded industry group and age 45–49 is excluded age group. The fraction with increases or decreases of at least 25 percent differ from table 1 due to inclusion of individuals whose starting wages are under \$1,000, who were considered separately in table 1.

* denotes significant at 1 percent level.

** denotes significant at 0.1 percent level.

Source: Enhanced CWSHS and authors' calculations.

more pronounced increase in the odds of upward mobility. Changing industry is similarly associated with greater occurrences of mobility, although with a larger increase in the probability of moving down in the distribution.

Even though these regressions focus exclusively on individual earnings, family dynamics matter, and again, marriage has a differential impact on men and women. For men, being younger, being married at the start of the observation period, getting married, or having children are each associated with an increased probability of experiencing at least a 25 percent increase in earnings and a decreased probability of experiencing at least a 25 percent decrease in earnings. For women, on the other hand, marriage does not have the same positive impact on the odds of upward mobility. Instead, women who get married during the observation period have a substantial increase in their odds of downward mobility, with no significant impact on substantial upward mobility.

Recognizing that the industry of occupation may impact mobility patterns, these regressions include the one-digit North American Industry Classification System (NAICS) code associated with the individual's employer in year t ("retail trade and transportation" code is the excluded baseline category). Men working in agriculture are much less likely than those in retail or other

industries to experience large earnings shocks *ceteris paribus*, as are men working in construction or utilities. In contrast, health and education workers and FIRE and STEM (finance, investment, real estate; and science, technology, engineering, and math) workers of both genders are disproportionately likely to experience large earnings gains and much less likely to experience large earnings declines.

In order to further assess how the employment events and individual circumstances considered impact average earnings changes, the arc-percentage change in earnings is regressed on the family and employment events discussed previously, controlling for age, year, and initial centile in the income distribution. The arc-percent change is used rather than the percentage change so that gains and losses are treated symmetrically.¹¹ Next, earnings are transformed into a logistic scale (following Auten and Gee 2009) in order to perform a logistic regression. This approach addresses issues associated with using linear functions to estimate bounded dependent variables. This transformation scales earnings changes so that the logit input, \widehat{arcp} , has a range of (0, 1), rather than a range of (−2, 2). Those with no earnings mobility have a dependent variable with a value of one half. Here, their transformation is slightly adjusted in order to avoid a logit input of zero or one:

$$y = \text{logit}(\widehat{arcp}) = \ln(\widehat{arcp} / (1 - \widehat{arcp}))$$

$$\text{where } \widehat{arcp} = \frac{50 * \text{ArcPercentChange} + 101}{202} \quad (1)$$

Table 4 contains the results of this regression, which assesses the impact of factors associated with earnings mobility for men (columns 1 and 2) and women (columns 3 and 4). Among both genders, changing jobs is associated with positive earnings growth—although the effect is somewhat larger for men (38 arc-percent) than for women (30 arc-percent). Recognizing that workers may acquire industry-specific capital that allows them to command higher wages at any job within their industry, greater levels of upward mobility can be expected for those who change jobs within an industry than those who switch industries (Parent 2000). However, whether the job change was within the same industry or to a new industry had little impact on the magnitude of earnings growth, with almost no additional impact from industry changes for men and a small positive effect for women.

11 The arc-percent change equal $2 * (x_{\text{final}} - x_{\text{initial}}) / (x_{\text{final}} + x_{\text{initial}})$. Arc-percentages are bounded by negative and positive two, which result from tax units moving to or from no income (or negative income in the specification). Arc-percent changes offer a “symmetric” measure of gains and losses. For example, assume one income doubles from 100 to 200 and another is cut in half from 100 to 50. Whereas percent changes are 100 and −50 percent, arc-percentage changes are 67 and −67 arc-percent.

As seen in the earlier regression for large earnings changes, working in education and healthcare fields exhibited the greatest positive impact on upward wage mobility for both genders. This may reflect that human capital development is necessary in these fields, which results in individuals becoming more skilled and productive as they gain additional experience, therefore commanding higher wages and exhibiting greater upward earnings mobility. In contrast, men working in the mining and oil industry and both men and women working in public administration experienced less average wage growth (or larger declines) than those working in other industries during this period.

The results of this regression demonstrate the importance of family dynamics for individual earnings mobility, consistent with the results for large earnings swings in table 3. Men who get married, on average, experience earnings growth, while women who get married demonstrate a small earnings decline. Additionally, although men who are married at the start of the observation period exhibit greater earnings growth than their single counterparts, there is no similar increase in mobility for married women. Perhaps counter-intuitively, the presence of children in the tax unit, and having additional children, are both associated with higher levels of upward earnings mobility for men and women. While the regression controls for age, this may partially reflect that men and women who have children are likely to be in their peak years of earnings growth. But it also could partially indicate that the need to support children acts as an income effect and increases effort exerted in the labor market.

A final aspect of family dynamics that appears in the regression is the different effects for men and women moving to new states. Unmarried men who move to a different state experience a small increase in earnings, while married men experience a small decrease. Moving to new states, on the other hand, has a negative impact on the earnings trajectory of women regardless of whether they were initially married or not, and the effect is substantial for married women. This sex and marital status difference in earnings mobility may suggest that long-distance moves among married couples are more likely to favor the husband's employment over the wife's, resulting in slower earnings growth for women.

Tax Unit Income Mobility

Overview of Income Mobility Patterns

The statistics presented in the previous section suggest family composition decisions strongly influence individual earnings. As a result, it may be that individual *earnings* mobility is larger than family *income* mobility, to the extent that spouses act as a stabilizing influence on family income. In a two-earner

Table 4: Regression results for individual earnings mobility from life events

VARIABLES	COEFFICIENT ARC% EFFECT			
	MEN		WOMEN	
Age 25–29	0.07**	7%	–0.10**	–10%
Age 30–34	0.03**	3%	–0.09**	–9%
Age 35–39	0.01	1%	–0.03**	–3%
Age 40–44	0.01	1%	–0.01	–1%
Age 50–54	–0.06**	–6%	–0.07**	–7%
Age 55–59	–0.23**	–23%	–0.22**	–22%
Age 60–64	–0.67**	–65%	–0.62**	–61%
Age 65–69	–0.75**	–73%	–0.76**	–73%
Age >69	–0.68**	–66%	–0.77**	–75%
Student initial yr	0.17**	17%	0.17**	17%
Job change	0.38**	38%	0.29**	30%
Change of job & Industry	0.00	0%	0.02*	2%
Unemp. insur: initial yr	0.28**	28%	0.30**	30%
Unemp. insur: second yr	–0.67**	–65%	–0.77**	–74%
Unemp. insur: final yr	–0.29**	–29%	–0.43**	–43%
Move to different state	0.05**	5%	–0.08**	–8%
Diff state & married init yr	–0.15**	–15%	–0.33**	–33%
Married initial year	0.25**	25%	0.00	0%
Marriage	0.18**	18%	–0.14**	–14%
Divorce	–0.62**	–61%	–0.23**	–23%
Dependents initial yr	0.01	1%	0.03**	3%
Added first dependent	0.22**	22%	0.11**	11%
Added additional deps.	0.18**	18%	0.16**	16%
Agriculture	0.04*	4%	–0.01	–1%
Mining and oil	–0.06**	–6%	0.03*	3%
Utilities and construction	0.02*	2%	0.04**	4%
FIRE & STEM	0.01	1%	0.03**	3%
Education & health	0.14**	14%	0.10**	10%
Entert., accom. & food	0.02	2%	0.00	0%
Other services	0.02*	2%	0.03*	3%
Public admin	–0.10*	–10%	–0.09*	–9%

TABLE 4 CONTINUED ON NEXT PAGE

TABLE 4 CONTINUED FROM PREVIOUS PAGE

VARIABLES	COEFFICIENT ARC% EFFECT			
	MEN		WOMEN	
Self-employed	-0.11**	-11%	-0.21**	-21%
Control for starting centile	Yes	Yes	Yes	Yes
R-square	0.295		0.299	
Root MSE	1.490		1.438	
Mean of dependent variable	-0.125		-0.092	
Observations	659,563		590,273	

Note: Dependent variables are two-year arc-percent changes in individual earnings with logistic transformation, as described in the text. Income mobility is measured from t to $t+2$, where $t=1999-2009$. The column labeled “Arc% Eff.” displays the arc-percentage point effect calculated using $((EXP(b)/(1+EXP(b)))^{*202}-101)*0.02$, where b is the coefficient. Observations are removed if the individual is less than 25 years old in the initial year. Earnings are W-2 wages and Sch. C income (divided by two if married filing jointly), bottom-coded at zero. Intercept, year dummies, and initial year centile dummies are not shown. Number of children in 1999 and 2000 set to 2001 number due to missing data. Retail and Transportation industry code is the excluded industry group and age 45–49 is the excluded age group.

* denotes significant at 1 percent level.

** denotes significant at 0.1 percent level.

Source: Enhanced CWSHS and authors’ calculations.

family, for example, if one individual loses their job or exits the labor force while the other remains employed, the income mobility for the tax unit will be less than that experienced by a single individual. Additionally, work decisions are influenced by other sources of income flowing into the family, as is the case of an individual who retires but begins receiving Social Security income (which offsets the earnings loss). This section further explores the mobility of family resources by shifting the unit of analyses from individuals to families and considering the size-adjusted income mobility of the tax unit (individuals who file a tax return together) rather than individual earnings mobility.

Table 5 replicates table 1, but does so for the total size-adjusted income of each tax unit. Even when considering the income of tax units rather than individual labor earnings, there remains a substantial level of income mobility, with 42 percent of tax units experiencing an income change of at least 25 percent over the course of two years. When comparing family income mobility to the individual earnings mobility from table 1, it appears families offer a degree of stability, since severe income declines are less frequent than severe labor earnings declines. While 16 percent of men and 14 percent of women saw their labor earnings fall by at least 50 percent or fall to zero, only 7 percent of tax units saw their incomes fall this much.

Examining levels of income mobility at various starting income levels, low- and moderate-income families are much more likely to exhibit upward mobility than high-income families. Forty-three percent of those in the bottom quintile and 27 percent of those in the second quintile have earnings growth of at least 25 percent over the course of two years. Upper income tax units, on the other hand, show the greatest propensity for substantial income declines. Both the degree of mobility and the inverse relationship to an individual's starting point in the distribution are broadly consistent with the findings of Auten and Gee (2009). These results emphasize the extent to which substantial mobility occurs even over short time horizons.

A substantial portion of this mobility, however, is transitory and does not persist into subsequent years. Table 6 shows the fraction of tax units in each quintile, which conditional on having an income shift of at least 25 percent or 50 percent over two years, maintain an income that is 25 or 50 percent below or above their initial level for a subsequent two years. Only around one-third of tax units for which income falls by 25 percent or more after two years remain at their lower income level after an additional two years, and less than 40 percent of those for which income rises by 25 percent maintain that increase. However, the persistence of income gains is greater for those starting lower in the income distribution, while the persistence of income losses is greater for those starting higher in the distribution.

Table 7 displays how the frequency of large earnings changes differs based on family characteristics. This is important since, to the extent that mobility comes from changes in the number of workers, it may suggest the improvement in financial well-being reflects a reduction in home-production or leisure, thus offsetting the true magnitude of the gains. While tax units who add a second worker are substantially more likely to be upwardly mobile (50 percent of whom increased their income by at least a 25 percent), 23 percent of tax units with no change in the number of workers experienced substantial upward mobility. This matches the level of upward mobility for the general population, indicating that the addition of workers to the labor market is not the primary driver of the income mobility observed in table 5. Similarly, even in cases where all individuals in the tax unit remain employed by the same employer, 22 percent experience income gains of at least 25 percentage points.

Tables 8 and 9 display regression results for tax unit income changes analogous to the individual earnings regressions in table 3 and table 4, respectively. Table 8 displays the odds ratios from two logistic regressions on binary variables indicating whether or not a family experienced an income gain or loss in excess of 25 percent. The odds-ratios associated with the five-year age bins (of the primary filer) mostly tell a story consistent with standard notions

Table 5: Income mobility in tax unit income by initial income

INITIAL INCOME QUINTILE							% CHANGE IN		INITIAL SIZE-ADJUSTED INCOME	
	DECLINE >50%	DECLINE 25–50%	DECLINE <25%	INCREASE <25%	INCREASE 25–50%	INCREASE >50%	MEAN INCOME	MEDIAN INCOME	MEAN	MEDIAN
<\$1,000	—	—	—	—	—	—	—	—	-\$7,600	\$0
Lowest	4%	7%	23%	23%	9%	34%	60%	20%	\$10,300	\$10,600
Second	7%	10%	28%	27%	11%	16%	16%	3%	\$21,800	\$21,700
Middle	7%	11%	30%	32%	11%	9%	8%	1%	\$35,500	\$35,500
Fourth	6%	10%	34%	34%	9%	7%	4%	0%	\$53,200	\$52,500
Highest	11%	14%	32%	28%	8%	7%	-8%	-5%	\$147,100	\$92,000
All	7%	10%	29%	29%	9%	14%	2%	1%	\$53,500	\$35,500

Note: Income mobility is measured from t to $t+2$, where $t=1999-2009$. All dollar amounts adjusted to 2013 values using the CPI-U-RS. Tax unit incomes are size adjusted by dividing income by the square root of the number of people in the tax unit. Tax units with initial income less than \$1,000 are removed from the bottom quintile and positive to non-positive positive changes in earnings are considered decreases of at least 50 percent. Tax units are excluded if they have no income in the initial and final years, three-year average incomes less than \$5,000, the primary dies during the three-year period, or the primary is 25 years old or younger in the initial year of each three-year period.

Source: Enhanced CWS panel and authors' calculations

Table 6: Persistence of tax unit income gains and losses

	PERCENT WITH INITIAL SHOCK BY INITIAL INCOME GROUP (FROM T TO T+2)					PERCENT WITH PERSISTENT SHOCK CONDITIONAL ON INITIAL SHOCK (FROM T+2 TO T+4)				
	LOWEST QUINTILE	SECOND QUINTILE	MIDDLE QUINTILE	FOURTH QUINTILE	HIGHEST QUINTILE	LOWEST QUINTILE	SECOND QUINTILE	MIDDLE QUINTILE	FOURTH QUINTILE	HIGHEST QUINTILE
Decline >50%	4%	7%	7%	6%	11%	16%	22%	26%	30%	40%
Increase >50%	35%	17%	9%	7%	7%	45%	39%	32%	26%	22%
Decline >25%	10%	17%	17%	16%	25%	24%	31%	34%	36%	43%
Increase >25%	44%	28%	20%	16%	15%	46%	42%	38%	34%	30%

Note: Initial shocks are measured from t to $t+2$, and persistent shocks are $t+2$ to $t+4$, where $t=1999-2007$. All dollar amounts are adjusted to 2013 values using the CPI-U-RS. Tax unit incomes are size adjusted by dividing income by the square root of the number of people in the tax unit. Tax units are excluded if they have no income in the initial and final years, three-year average incomes less than \$5,000, the primary dies during the three-year period, or the primary is 25 years old or younger in the initial year of each three-year period. Quintiles are set before tax units with initial incomes below \$1,000 are dropped.

Source: Enhanced CWHs panel and authors' calculations.

Table 7: Tax unit income volatility by employment and family characteristics

							% CHANGE IN		INITIAL INCOME		
	DECLINE >50%	DECLINE 25–50%	DECLINE <25%	INCREASE <25%	INCREASE 25–50%	INCREASE >50%	MEAN INCOME	MEDIAN INCOME	MEAN	MEDIAN	FRACTION OF TAX UNITS
All stay in job	4%	9%	30%	35%	10%	11%	5%	3%	\$55,600	\$42,200	44%
Any changes job	11%	14%	22%	21%	11%	20%	2%	2%	\$41,000	\$29,200	14%
Primary changes industry	13%	14%	20%	19%	11%	24%	2%	3%	\$33,800	\$23,500	10%
State change	13%	13%	22%	20%	11%	21%	9%	1%	\$57,300	\$36,900	4%
Unemp. insur: initial yr	12%	14%	23%	21%	11%	19%	–3%	0%	\$35,600	\$26,400	6%
Unemp. insur: second yr	16%	18%	24%	18%	9%	14%	–12%	–14%	\$37,800	\$29,000	6%
Unemp. insur: final yr	14%	19%	26%	18%	8%	14%	–7%	–14%	\$37,900	\$29,300	7%
No change in # of workers	6%	9%	31%	31%	10%	13%	3%	2%	\$54,000	\$36,300	87%
Add worker	7%	8%	15%	20%	13%	37%	26%	35%	\$40,900	\$22,500	5%
Drop worker	26%	22%	23%	13%	6%	10%	–24%	–29%	\$54,100	\$32,900	6%
Single, stays single	8%	10%	30%	28%	9%	15%	2%	2%	\$39,000	\$26,400	52%
Married, stays married	6%	10%	30%	31%	10%	12%	1%	0%	\$72,300	\$47,600	42%
Marriage	11%	14%	18%	17%	12%	29%	9%	17%	\$50,400	\$33,400	3%
Divorce	16%	15%	19%	17%	11%	21%	5%	–7%	\$46,000	\$31,500	3%
Added first dependent	16%	32%	27%	10%	5%	10%	–22%	–24%	\$55,100	\$40,000	4%
Added additional depts.	11%	25%	34%	14%	6%	10%	–15%	–18%	\$48,200	\$34,100	7%

Note: Income mobility is measured from t to $t+2$, where $t=1999–2009$. All dollar amounts are adjusted to 2013 values using the CPI-U-RS. Tax unit incomes are size adjusted by dividing income by the square root of the number of people in the tax unit. Tax units are excluded if they have no income in the initial and final years, three-year average incomes less than \$5,000, the primary dies during the three-year period, or the primary is 25 years old or younger in the initial year of each three-year period. Positive to non-positive positive changes in earnings are considered decreases of at least 50 percent.

Source: Enhanced CWSHS panel and authors' calculations.

Table 8: Regression results for the odds of a 25 percent increase or decrease in tax unit income

VARIABLES	DECREASE 25%	INCREASE 25%
	ODDS RATIO	ODDS RATIO
Age 25–29	1.02	1.41**
Age 30–34	1.03*	1.19**
Age 35–39	1.02	1.09**
Age 40–44	1.00	1.04**
Age 50–54	1.01	0.97*
Age 55–59	1.14**	0.97
Age 60–64	1.34**	1.17**
Age 65–69	1.29**	1.10**
Age >69	1.12**	0.93**
Either filer student initial yr	0.81**	1.49**
Either filer changes jobs	1.57**	1.35**
Unemp. insur: initial yr	1.00	1.36**
Unemp. insur: second yr	1.57**	0.71**
Unemp. insur: final yr	1.53**	0.81**
Either filer retired initial yr	0.81**	0.60**
Either filer retires	2.01**	1.17**
Add one worker	0.87**	2.31**
Drop one worker	5.16**	0.45**
Move to different state	1.47**	1.28**
Diff state & married init yr	1.03	1.01

TABLE 8 CONTINUED ON NEXT PAGE

of life-cycle income patterns. Younger families are more likely to experience large, positive income shocks, while older families are more likely to experience large income losses. After controlling for age, starting income, and other factors, married tax units exhibit greater rates of upward mobility and lower rates of downward mobility than single tax units.

A job change for one or more family members is associated with large positive and negative shocks, but the logistic regression suggests a different relationship between changing jobs and tax unit income than that observed for individual earnings. Similar to the individual earnings regressions, tax units with job changers are more likely to have either a 25 percent increase or decrease in total income. But, unlike individual earnings, the increase in odds of a 25 percent income decline exceeds that for a 25 percent income increase.

TABLE 8 CONTINUED FROM PREVIOUS PAGE

VARIABLES	DECREASE 25%	INCREASE 25%
	ODDS RATIO	ODDS RATIO
Married initial year	0.67**	1.32**
Marriage	0.68**	3.80**
Divorce	3.44**	0.94**
Children: 1st yr	1.08**	0.75**
Added first child	4.96**	0.37**
Added additional children	0.69**	3.85**
Female primary	1.03**	0.96**
CZ avg. wage change	0.97**	1.03**
CZ unemp. rate change	1.05**	0.97**
Control for starting centile	Yes	Yes
Observations used	1,325,727	1,325,727
Fraction decr./incr. 25%	18%	18%

Note: Dependent variables are two-year decreases or increases of at least 25 percent of size-adjusted tax unit income, where non-positive to positive changes in earnings are considered increases of at least 25 percent. Odds ratios of logistic regressions are shown. Income mobility is measured from t to $t+2$, where $t=1999-2009$. Observations are removed if primary less than 25 years old in the initial year. The income definition is described in text. Intercept, year dummies, and initial year centile dummies not shown. Ages are based on the primary tax filer, and ages 45–49 are the excluded age group. The fraction with increases or decreases of at least 25 percent differ from table 5 due to inclusion of individuals whose starting income is under \$1,000, who were considered separately in table 5.

* denotes significant at 1 percent level.

** denotes significant at 0.1 percent level.

Source: Enhanced CWSHS and authors' calculations.

Table 9 mimics the logistic regression specification in table 4, where the arc-percent change in family income is the dependent variable. Once again, in contrast to individual earnings regressions, job changes were associated with a 3 arc-percent decline in family income. Similarly, moving to a different state was associated with a 4 arc-percent decline in family income. These (relatively small) coefficients suggest that income gains by one spouse from a new job are partially counterbalanced by the employment and hours decisions of others in the tax unit.

Since job changes are not a significant driver of upward mobility, who is most upwardly mobile? Those who got married or had a member of the family start working were the most likely to exhibit large income gains. Getting married was associated with a 25 arc-percent increase in their family

Table 9: Regression results for tax unit income mobility from life events

VARIABLES	COEFFICIENT	ARC%. EFF.
Age 25–29	0.02**	3%
Age 30–34	0.01*	1%
Age 35–39	0.00	0%
Age 40–44	0.00	0%
Age 50–54	0.00	0%
Age 55–59	–0.01**	–1%
Age 60–64	–0.01**	–1%
Age 65–69	–0.01*	–1%
Age >69	0.00	0%
Either filer student initial yr	0.09**	9%
Either filer changes jobs	–0.03**	–3%
Unemp. insur: initial yr	0.02**	2%
Unemp. insur: second yr	–0.11**	–11%
Unemp. insur: final yr	–0.05**	–5%
Either filer retired initial yr	–0.04**	–4%
Either filer retires	–0.09**	–9%
Add one worker	0.09**	9%
Drop one worker	–0.47**	–47%
Move to different state	–0.04**	–4%
Diff state & married init yr	0.00	0%

TABLE 9 CONTINUED ON NEXT PAGE

incomes. This is despite the fact that incomes are size-adjusted, which partially counterbalances the income gains reflecting the increase in individuals sharing the family’s income. Similarly, having a family member start work was associated with a 9 arc-percent increase in family income. Thus, although there is substantial earnings volatility among tax units that do not experience a change in family or employment circumstances, the fastest way to move up the income ladder is clearly through marriage or transitioning from a single earner family to a dual earner family.

Stabilizing Effects of Federal Income Taxes

While researchers considering cross-sectional income inequality increasingly recognize the importance of taxes and transfers for mitigating income

TABLE 9 CONTINUED FROM PREVIOUS PAGE

VARIABLES	COEFFICIENT	ARC% EFF.
Married initial year	0.11**	12%
Marriage	0.25**	25%
Divorce	-0.19**	-19%
Children: 1st yr	-0.05**	-5%
Added first child	-0.27**	-27%
Added additional children	0.15**	15%
Female primary	-0.01**	-1%
CZ avg. wage change	-0.01**	-1%
CZ unemp. rate change	-0.02**	-2%
Control for starting centile	Yes	Yes
R-square	0.320	
Root MSE	0.635	
Mean of dep variable	0.020	
Observations used	1,325,727	

Note: Dependent variables are two-year arc-percent changes in tax unit incomes with logistic transformation, as described in the text. Income mobility is measured from t to $t+2$, where $t=1999-2009$. The column labeled “Arc% eff.” shows the arc-percentage point effect calculated using $((\text{EXP}(b)/(1+\text{EXP}(b))) * 202) - 101) * 0.02$, where b is the coefficient. The income definition is described in text. Observations are removed if less than 25 years old in the initial year. Intercept, year dummies, and initial year centile dummies are not shown. Ages are based on the primary tax filer, and ages 45–49 are the excluded age group.

* denotes significant at 1 percent level.

** denotes significant at 0.1 percent level.

Source: Enhanced CWSHS and authors’ calculations.

inequality (see e.g., Burkhauser, Larrimore, and Simon 2012), the stabilizing impact of taxes has often been overlooked in previous research on income mobility. The progressive tax rate schedule, as well as the EITC, child tax credit, and Alternative Minimum Tax (AMT), all impact the economic resources available to individuals for consumption. However, they also alter the magnitude of income swings as individuals pass through qualifying income levels for different tax programs.

This section documents the stabilizing and destabilizing effect of federal income taxes based on the extent to which they offset pre-tax income mobility. These stabilization effects are closely tied to effective marginal tax rates, which are impacted by tax rate schedules, the AMT, phase outs or limitation of credits and other benefits (EITC, child and child care credits, savings and education credits, and IRA contributions), and standard deductions and exemptions. Given that almost two-thirds of large income swings over

two years prove to be transitory, any stabilizing impacts can help to mitigate short-term changes. However, some elements of the tax code can also create destabilizing effects and accentuate income changes, such as the phase-in ranges of the EITC and the refundable portion of the child credit, where increases in income decrease tax liabilities.

The stabilizing and destabilizing effects of federal income taxes are measured by the percent of stabilization (PercentStabilization) between pre- and post-tax income changes, where ΔIncome equals final minus initial income:

$$\text{Stabilization} = \Delta\text{Income}_{\text{Pre-Tax}} - \Delta\text{Income}_{\text{Post-Tax}} \quad (2)$$

$$\text{PercentStabilization} = \text{Stabilization} / \Delta\text{Income}_{\text{Pre-Tax}} \quad (3)$$

The percent stabilization is closely tied to effective marginal tax rates, as tax units with higher marginal tax rates will experience greater levels of income stabilization. This marginal tax rate is impacted both by the individual's tax bracket and the phase-in and phase-out of credits and exemptions described previously.

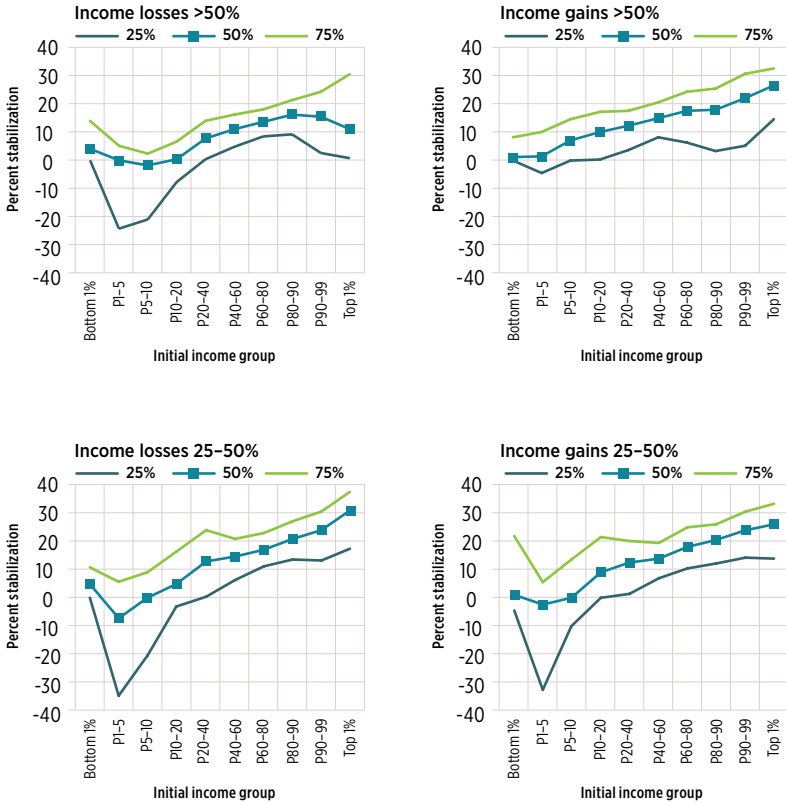
The direction of the income change is important when considering the practical effect of income stabilization from taxes. The stabilizing impact of taxes is a positive feature for tax units experiencing a negative income shock, as the decline in tax liabilities offsets income losses and cushions the decline. However, the reverse is true for positive income shocks, as the increase in tax liabilities offsets income gains.

Estimating Stabilization Effects throughout the Distribution

The four panels of figure 1 measure the stabilizing effects of federal taxes for tax units experiencing large income gains or losses at each starting point in the income distribution. As expected, the percent of income changes offset by tax changes increases for those with higher initial incomes. This is due to progressive tax rates, the AMT, and various phase-outs of tax credits and deductions that increase effective marginal tax rates. For example, tax units in the second decile of the income distribution (p10–p20) experiencing a moderate pre-tax income gain (25–50 percent) have a median stabilization from taxes of 10 percent. However, a similar pre-tax income shock to a tax unit in the top decile is offset (reduced) by approximately 25 percent.

A key asymmetry appears among tax units near the bottom of the income distribution, particularly when looking at the 25th and 75th percentiles of stabilization rather than the median. Among tax units starting in the bottom decile, those with losses in excess of 50 percent of their initial pre-tax income are likely to experience tax destabilization; that is, their losses are accentuated

Figure 1: Stabilization of income from federal income taxes



Note: Percent stabilization is the difference between pre- and post-tax income changes divided by pre-tax income changes. Income gains and losses are two-year pre-tax income changes: t to $t+2$, where $t=1999-2009$. Incomes include capital gains and post-tax income subtracts net federal income tax liabilities.

Source: Enhanced CWS panel and authors' calculations.

Figure 2: Stabilizing effect of federal income taxes by parental status

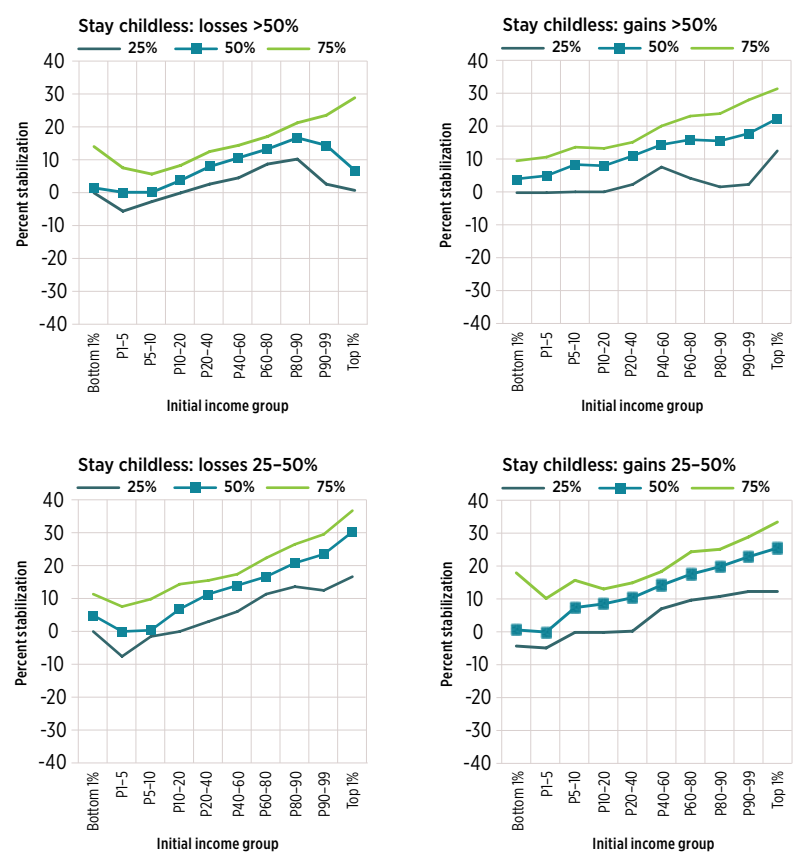
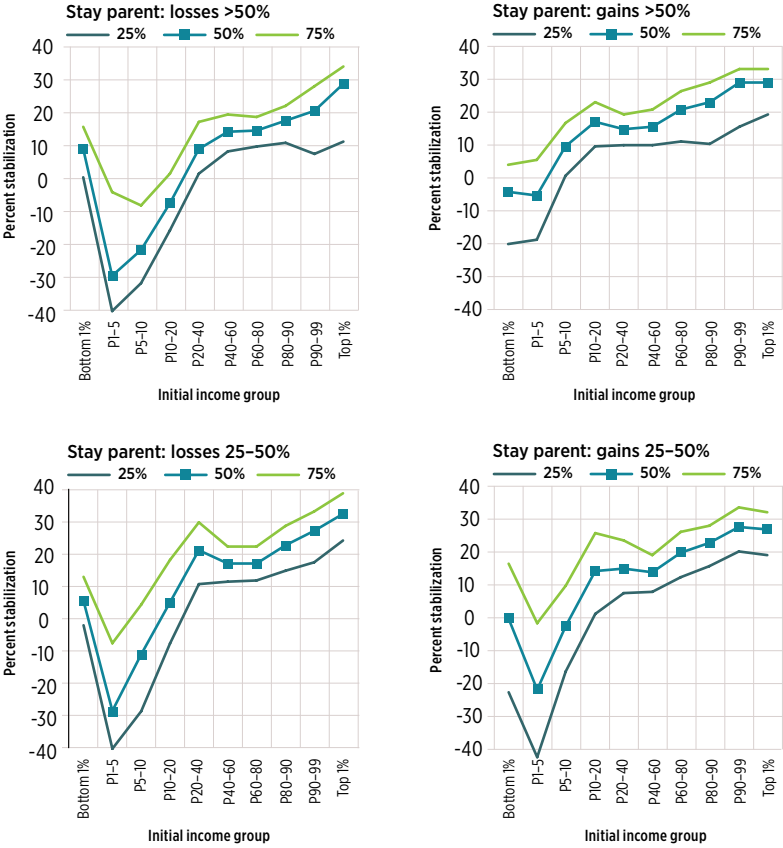


FIGURE 2 CONTINUED ON NEXT PAGE

FIGURE 2 CONTINUED FROM PREVIOUS PAGE



Note: See note to figure 1.
Source: Enhanced CWSH panel and authors' calculations.

by changes to their tax liabilities and credits (top left panel of figure 1). The median tax unit in this range has a slight accentuation of their pre-tax income loss when incorporating taxes, while 25 percent have at least one-fifth of their losses accentuated by taxes. This is because tax units in the phase-in range of the EITC that experience large, negative income shocks often lose their earned income and/or refundable child tax credits, thus exacerbating their market income decline.

In contrast, tax units in the bottom decile whose pre-tax income increases by at least 50 percent are likely to experience relatively modest stabilization from the tax code (top right of figure 1) and their post-tax income will increase by less than their pre-tax income. Unlike tax units in this range with income losses, large gains often increase their incomes to the point that the EITC begins phasing out, thus limiting the tax benefits. From a practical standpoint, this asymmetric relationship presents a challenge for these tax units. If they suffer a negative income shock, the destabilizing effects of taxes magnify the income decline. However, if their market income rises, the stabilizing nature of the EITC phase-out attenuates their post-tax income growth. For moderate-income gains and losses of between 25 and 50 percent (bottom two panels of figure 1), this asymmetry is less apparent.

Estimating Stabilization Effects by Parental Status

Recognizing that much of the deviation from the stabilization generated from the progressive rate schedule is related to credits offered to low- and moderate-income families with children, such as the EITC the child tax credit, the panels of figure 2 separately consider the stabilizing impact of taxes for mobility among families with and without children. The top four panels consider individuals who are childless in both observation years while the bottom four panels consider individuals who are parents in both observation years. This analysis excludes those individuals who added children or whose children age out of their family.

Among childless individuals, taxes almost always stabilize incomes regardless of their point in the income distribution—and this is true both for income gains and income losses. This is consistent with the expected effects of a progressive income tax schedule and the significantly smaller EITC for childless families. However, among parents changes in tax liabilities accentuate both moderate and large income losses for those in the bottom quintile of the income distribution. This is consistent with the findings of Bitler, Hoynes, and Kuka (2014): the EITC may be successful at encouraging work, but it can actually accentuate income losses. Considering income gains, parents who start in the bottom 5 percent of the distribution that experience a moderate income

gain have those gains accentuated by the tax code. However, this tax bonus for income gains dissipates by the second quintile (p5–p10) and by the second decile taxes return to offsetting most moderate large income gains.

Conclusion

This paper examines a large panel of tax return data, and documents substantial intragenerational income mobility over short time horizons. Almost one half of working adults experience a 25 percent change in their earnings over a two-year period, and almost as many families experience a shift of this magnitude in their family income. However, incomes quickly return to their original level, with only about a third of family incomes persisting at these new levels after a subsequent two years.

Large swings in individual earnings are strongly correlated with job changes, although there is little difference in the level of mobility experienced by those who change jobs within their industry versus those who transition to a new industry. There is some difference in earnings stability by industry, as men and women working in education, healthcare, FIRE, or STEM industries are the most likely to experience 25 percent earnings growth over a two-year period. There also are differences in the relationship between individual earnings and family status by gender, with marriage having a positive impact on earnings mobility for men but not for women.

When considering income more broadly, and focusing on tax units (as opposed to individuals), large income gains are most likely among those that add workers—either through marriage or through a second family member entering the workforce. However, approximately one-quarter of families that maintain the same number of workers still experienced at least a 25 percent increase in income. But downward mobility for those with no change in workers was also quite prevalent, with approximately one-seventh of tax units who had no change in the number of workers experiencing a 25 percent income decline.

For tax units near the bottom of the income distribution, income declines are often exacerbated by the loss of tax credits such as the EITC. One-quarter of tax units starting in the bottom decile that experienced a 50 percent drop in their pre-tax income had their losses accentuated by the tax code resulting in post-tax losses that were larger than pre-tax losses. This suggests that while the EITC and other programs in the tax code may be successful at encouraging work among low-income families, when such families experience economic hardships the loss of these credits can exacerbate an income decline. ■

References

- Acs, Gregory, and Seth Zimmerman. 2008. *U.S. Intragenerational Economic Mobility from 1984 to 2004: Trends and Implications*. Washington, D.C.: Pew Charitable Trusts.
- Armour, Philip, Richard V. Burkhauser, and Jeff Larrimore. 2014. "Levels and Trends in U.S. Income and its Distribution: A Crosswalk from Market Income towards a Comprehensive Haig-Simons Income Approach." *Southern Economic Journal* 81 (2): 271–93.
- Atkinson, Anthony B., and Andrea Brandolini. 2001. "Promises and Pitfalls in the Use of 'Secondary' Data-Sets: Income Inequality in OECD Countries as a Case Study." *Journal of Economic Literature* 39 (3): 771–99.
- Auten, Gerald, and Geoffrey Gee. 2009. "Income Mobility in the United States: New Evidence from Income Tax Data." *National Tax Journal* 62 (2): 301–28.
- Auten, Gerald, Geoffrey Gee, and Nicholas Turner. 2013. "Income Inequality, Mobility, and Turnover at the Top in the US, 1987–2010." *American Economic Review* 103 (3): 168–72.
- Bane, Mary Jo, and David Ellwood. 1986. "Slipping Into and Out of Poverty: The Dynamics of Spells." *Journal of Human Resources* 21 (1): 1–23.
- Bitler, Marianne, Hilary Hoynes, and Elira Kuka. 2014. "Do In-Work Tax Credits Serve as a Safety Net?" NBER Working Paper 19785.
- Bollinger, Christopher R., Barry T. Hirsch, Charles M. Hokayem, and James P. Ziliak. 2015. "Trouble in the Tails? Earnings Nonresponse and Response Bias across the Distribution Using Matched Household and Administrative Data." Paper presented at the American Economic Association (AEA) meetings, Boston, MA, January 3.
- Bradbury, Katherine, and Jane Katz. 2002. "Women's Labor Market Involvement and Family Income Mobility When Marriages End." *New England Economic Review* 4:41–74.
- Burkhauser, Richard V., Shuaizhang Feng, Stephen P. Jenkins, and Jeff Larrimore. 2011. "Estimating Trends in US Income Inequality Using the March Current Population Survey: The Importance of Controlling for Censoring." *The Journal of Economic Inequality* 9 (3): 393–415.
- Burkhauser, Richard V., Jeff Larrimore, and Kosali I. Simon. 2012. "A 'Second Opinion' on the Economic Health of the American Middle Class." *National Tax Journal* 65 (1): 7–32.
- Chetty, Raj, Nathaniel Hendren, Patrick Kline, and Emmanuel Saez. 2014. "Where is the Land of Opportunity? The Geography of Intergenerational Mobility in the United States." NBER Working Paper 19843.
- Congressional Budget Office. 2008. "Recent Trends in the Variability of Individual Earnings and Household Income." Washington, D.C.: Congressional Budget Office.
- d'Ercole, Marco M., and Michael Förster. 2012. "The OECD Approach to Measuring Income Distribution and Poverty: Strengths, Limits and Statistical Issues." In *European Measures of Income and Poverty: Lessons for the U.S.*, edited by D. J. Besharov and K. A. Couch. New York: Oxford University Press.

- Dowd, Tim, and John B. Horowitz. 2011. "Income Mobility and the Earned Income Tax Credit: Short-Term Safety Net or Long-Term Income Support." *Public Finance Review* 39 (5): 619–52.
- Farber, Henry S. 2005. "What Do We Know About Job Loss in the United States? Evidence from the Displaced Workers Survey, 1981–2004." *Journal of Economic Perspectives* 29 (2): 13–28.
- Gardiner, Karen, and John Hills. 1999. "Policy Implications of New Data on Income Mobility." *The Economic Journal* 109 (453): 91–111.
- Gittleman, Maury, and Mary Joyce. 1999. "Have Family Income Mobility Patterns Changed?" *Demography* 36 (3): 299–314.
- Gottschalk, Peter, and Sheldon Danziger. 2001 "Income Mobility and Exits from Poverty of American Children, 1970–1992." In *The Dynamics of Child Poverty in Industrialised Countries*, edited by B. Bradbury, S. P. Jenkins, and J. Micklewright, 135–53. Cambridge: Cambridge University Press.
- Gottschalk, Peter, and Timothy M. Smeeding. 1997. "Cross-National Comparisons of Earnings and Income Inequality." *Journal of Economic Literature* 35 (2): 633–87.
- Heim, Bradley T., Ithai Z. Lurie, and James Pearce. 2014. "Who Pays Taxes? A Dynamic Perspective." *National Tax Journal* 67 (4): 755.
- Jarvis, Sarah, and Stephen P. Jenkins. 1998. "How Much Income Mobility is There in Britain?" *The Economic Journal* 108 (447): 428–43.
- Kopczuk, Wojciech, Emmanuel Saez, and Jae Song. 2010. "Earnings Inequality and Mobility in the United States: Evidence from Social Security Data since 1937." *The Quarterly Journal of Economics* 125 (1): 91–128.
- Larrimore, Jeff, Richard V. Burkhauser, and Philip Armour. 2015. "Accounting for Income Changes over the Great Recession (2007–2010) Relative to Previous Recessions: The Importance of Taxes and Transfers." *National Tax Journal* 68 (2): 281–318.
- Lofquist, Daphne, Terry Lugaila, Martin O'Connell, and Sarah Feliz. 2012. "Households and Families: 2010." *U.S. Census Bureau 2010 Census Briefs, C2010BR-14*. Washington, D.C.: Government Printing Office.
- Parent, Daniel. 2000. "Industry-Specific Capital and the Wage Profile: Evidence from the National Longitudinal Survey of Youth and the Panel Study of Income Dynamics." *Journal of Labor Economics* 18 (2): 306–23.
- Piketty, Thomas, and Emmanuel Saez. 2003. "Income Inequality in the United States, 1913–1998." *The Quarterly Journal of Economics* 118 (1): 1–39. Updates on website of Emmanuel Saez.
- Rendtel, Ulrich, Rolf Langeheine, and Roland Berntsen. 1998. "The Estimation of Poverty Dynamics Using Different Measurements of Household Income." *Review of Income and Wealth* 44 (1): 81–98.
- Ruggles, Patricia. 1990. *Drawing the Line: Alternative Poverty Measures and their Implication for Public Policy*. Washington, D.C.: Urban Institute Press.
- Sawhill, Isabel V., and Mark Condon. 1992. "Is U.S. Income Inequality Really Growing?: Sorting Out the Fairness Question." *Policy Bites*. Washington, D.C.: Urban Institute.

- Solon, Gary. 1992. "Intergenerational Income Mobility in the United States." *American Economic Review* 82 (3): 393–408.
- Topel, Robert H., and Michael P. Ward. 1992. "Job Mobility and the Careers of Young Men." *The Quarterly Journal of Economics* 107 (2): 439–79
- U.S. Department of the Treasury. 1992. "Household Income Changes over Time: Some Basic Questions and Facts." *Tax Notes* 56:1065–74.

