

## ACCOUNTING FOR UNITED STATES HOUSEHOLD INCOME INEQUALITY TRENDS: THE CHANGING IMPORTANCE OF HOUSEHOLD STRUCTURE AND MALE AND FEMALE LABOR EARNINGS INEQUALITY

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Using a shift-share analysis on March CPS data, this paper estimates the degree to which changes in labor earnings, employment, and marriage patterns account for household income inequality growth in the United States since 1979. The factors contributing to the rapid rise in income inequality in the 1980s differ substantially from those contributing to its slower increase since that time. Unlike findings for the 1980s when changes in the correlation of spouses' earnings accounted for income inequality growth, this factor is no longer a major contributor toward its continued increase. Additionally, the 2000s business cycle is the first full business cycle in at least 30 years where changes in earnings of male household heads accounted for declines in income inequality. Instead, the continued growth in income inequality in the 2000s was accounted for primarily by increases in female earnings inequality and declines in both male and female employment.

**JEL Codes:** D31, J12

**Keywords:** earnings correlations, income inequality decomposition

### 1. INTRODUCTION

Since researchers first documented the increases in U.S. income inequality and labor earnings inequality that began in the late 1970s, there has been a strong desire to understand these trends. Much of the research has focused on what accounts for rising labor earnings inequality among full-time workers (Juhn *et al.*, 1993; DiNardo *et al.*, 1996; Lemieux, 2006; Autor *et al.*, 2008). Equally important, however, is the related question of what factors account for household income inequality trends.<sup>1</sup> Household income inequality would be equivalent to labor earnings inequality if each household contained only one worker, that worker worked full-time, and there were no non-labor income or government transfers. But since this is not the case, household income inequality

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<sup>1</sup>The terms earnings and labor earnings are used interchangeably in this paper to refer to earnings from wages and salaries, self-employment, or farm-employment. The terms income and household income refer to all income within a household from any income source.

and labor earnings inequality trends may diverge. Using a shift-share analysis, this paper explores the factors that account for the growth in household income inequality since 1979.

There are four primary possible contributors to household inequality trends considered in the previous literature: increases in male and female labor earnings inequality, shifts in male and female employment rates, increases in the correlation between earnings of household members, and the decline in households headed by married couples. Earlier research considering factors that account for income inequality changes primarily focused on the period of rapid household income inequality growth in the 1980s. This research typically separates employment from and earnings of the head of household and his or her spouse (who will both be referred to as household heads in this paper) from that of secondary household members, with the consensus finding being that increases in labor earnings inequality among male household heads was the primary driver of the 1980s rise in household income inequality (Karoly and Burtless, 1995; Daly and Valtetta, 2006).

However, while male earnings inequality growth is crucial for understanding rising household income inequality in the 1980s, researchers also agree that there is not a one-to-one relationship between male labor earnings inequality and household income inequality, as other factors play a smaller, but important, role. In particular, a substantial portion of income inequality growth during this period has also been attributed to a rise in the correlation of spouses' earnings (Karoly and Burtless, 1995) and a decline in households headed by married couples (Bishop *et al.*, 1997; Daly and Valtetta, 2006).

In this paper, I build on past research to provide an updated assessment of the factors affecting inequality in U.S. household income, extending the analysis into the recent business cycle which ended with the recession beginning in late 2007. As this paper will demonstrate, there are substantial differences in factors accounting for inequality trends in the 1980s business cycle (1979–89) when compared to subsequent periods. Most notably, in the first business cycle of the twenty-first century (2000–07), male head labor earnings inequality fell, accounting for a reduction in household income inequality. Thus, income inequality increases in this period came completely from other sources. This is in contrast to the 1980s business cycle and the 1990s business cycle (1989–2000) when male head earnings inequality growth was the most important factor accounting for household income inequality growth.<sup>2</sup>

Similarly, the role of spouses' earnings correlations have changed over the past 30 years. In contrast to the 1980s, when rising correlations of spouses' earnings accounted for rising inequality, in the early 2000s changes in spouses' earnings

<sup>2</sup>The starting and ending years of business cycles are considered the peaks in median size-adjusted household income of persons (Karoly and Burtless, 1995; Daly and Valtetta, 2006; Burkhauser *et al.*, 2012b; each use similar definitions). These years often correspond to the last full year of macroeconomic growth as defined by the NBER. However, this is not always a perfect alignment, as is the case in the 2000–07 business cycle where the macroeconomic decline began in December 2007, which was also the peak year of median earnings. If the 2000s business cycle were to be defined as 2000–06, inequality growth during this business cycle would have been greater than that observed here since inequality declined in 2007. This decline is largely attributable to declines in male and female earnings inequality.

correlations actually accounted for income inequality declines. Thus, part of the slowdown in income inequality that has occurred can be attributed to this changing trend in spouses' earnings correlations.

It is important to note that all analyses in this paper describe factors accounting for inequality changes, but do not necessarily indicate a causal relationship. This matches the approach of earlier income inequality decomposition research. However, while recognizing this limitation, this paper demonstrates how factors accounting for income inequality trends have evolved over time and no longer reflect those observed in previous research exploring the 1980s.

## 2. DATA

This analysis is based on public use March CPS data supplemented with the cell-mean data from Larrimore *et al.* (2008) to correct for Census topcoding of high incomes. The March CPS is a nationally representative survey administered by the U.S. Census Bureau that inquires about the total pre-tax, post-transfer cash income of households from both labor and non-labor income sources, excluding capital gains (see Appendix Table A1 for a detailed list of sources captured in the survey).<sup>3</sup> Income is aggregated to the household level and then, to account for economies of scale in consumption, size-adjusted household income is computed by dividing income by the square root of household size. This adjustment is common for U.S. and cross-national studies of inequality (see, e.g., Gottschalk and Smeeding, 1997; Atkinson and Brandolini, 2001; Burkhauser *et al.*, 2011) and closely matches the adjustments for household size implied by the official U.S. poverty thresholds (Ruggles, 1990). The size-adjustment is performed at the income source level when decomposing income inequality trends. For example, all individuals in a household are assigned the same male head labor earnings equal to the earnings of the male household head divided by the square root of household size.

A known limitation of the March CPS for observing long-term income inequality trends is an artificial inequality increase between 1992 and 1993 that resulted from changes in Census data collection procedures (Ryscavage, 1995; Jones and Weinberg, 2000; Burkhauser *et al.*, 2012a). To remove this trend break, a procedure similar to that used by Atkinson *et al.* (2011) and Burkhauser *et al.* (2012a) is implemented where all inequality series are adjusted upwards prior to 1993 such that no income inequality growth occurred from 1992 to 1993. Of course, this procedure cannot distinguish real inequality changes that occurred in this year from those due to the redesign, and by necessity suppresses both such changes. This approach is used both for the overall sample results and for results for each step of the decomposition such that no change from any characteristics

<sup>3</sup>While this paper focuses on the standard cash-income measure, some researchers have recently advocated using broader income measures that include excluded income sources such as non-cash transfers and employee benefits, tax credits, and tax liabilities (Reynolds, 2006; Burkhauser *et al.*, 2012b; Congressional Budget Office, 2012) or measuring consumption inequality instead (Krueger and Perri, 2006; Meyer and Sullivan, 2009). Decomposing inequality trends using these alternate measures would be a valuable avenue for further research.

are captured between 1992 and 1993. All results of the decomposition, therefore, also exclude any changes from this one year of the 1989–2000 business cycle.

All individuals in the March CPS are included in the analysis regardless of age, except those in group quarters or military households. While this lack of an age restriction is common in the inequality literature (see, e.g., Ryscavage, 1995; Bishop *et al.*, 1997; Piketty and Saez, 2003; Burkhauser *et al.*, 2009; DeNavas-Walt *et al.*, 2011; Congressional Budget Office, 2012), some researchers, including Blank (2011), Daly and Valletta (2006), and Karoly and Burtless (1995) restrict their samples to households or families with working-age heads. This may result in modest differences from the findings of Daly and Valletta (2006) and Karoly and Burtless (1995). However, it also allows for a more complete picture of population-wide income inequality trends. Further, including individuals of all ages allows the analysis to account for public transfers programs such as Social Security, which cannot be fully included when analyzing only working-age individuals.

### 3. METHOD OF DECOMPOSING THE INCREASE IN HOUSEHOLD INCOME INEQUALITY

To decompose the change in household income inequality into that attributable to its component sources, a shift-share analysis is used that starts with income data from 1979 (from the 1980 CPS). To obtain the importance of each factor, each is added sequentially and the resulting income inequality trend is compared to that which would have occurred had the specified factor remained unchanged. Potential factors are divided into three categories: changes to the prevalence of population characteristics, changes to the distribution of source-level incomes, and changes to the correlations of income across income sources. The methods for capturing each category's relationship with household income inequality changes are described in greater detail below.

Unlike the DiNardo *et al.* (1996) decomposition method, which is used by Daly and Valletta (2006), this approach does not initially condition on detailed background characteristics such as age, location, and race when evaluating trends. The DiNardo *et al.* (1996) approach is valuable for observing the relationship between individual characteristics and income inequality trends. However, Cowell and Fiorio (2011) note that the data intensity of their method prevents it from being suitable for all decompositions of interest. In particular, it is limited in its ability to observe how a range of income sources interact to account for changing inequality, which is the primary focus of this paper. This is exemplified by Daly and Valletta (2006) who use DiNardo *et al.*'s (1996) approach but then must analyze source-level income changes unconditional on other factors. In contrast, the shift-share approach used here starts with a small set of categorical characteristics (marital status and employment statuses of the household heads) but allows for a more thorough understanding of the relationship between changes to income sources and household income inequality.<sup>4</sup>

<sup>4</sup>While demographic factors are not included and the analysis here starts with marital status, it was considered to start the decomposition with categorical age categories so all results would be conditional on age. This inclusion produced largely similar results and was therefore omitted. However, the aging of the population accounted for slight increases in inequality in the 1990s and 2000s and including this factor slightly reduced the inequality changes accounted for by the male labor earnings distribution during this time.

### *Changes in the Prevalence of Population Characteristic*

The first decomposition approach addresses changes in categorical characteristics, including the marital and employment status of the household heads. For example, it considers how an increase in full-time workers will change the overall income distribution, holding the income distribution of full-time, part-time, and non-workers constant. The portion of household income inequality changes attributable to the prevalence of such population groups is estimated using Atkinson's (1998) and Burtless's (1999) approach where within-group income distributions are held constant and, through reweighting observations, the relative size of each group is allowed to change.

This estimation is performed by reweighting observations from the base year,  $t$ , such that the fraction of the population in each group matches that in future years,  $t'$ . By increasing the weight of individuals with characteristics that are more prevalent in year  $t'$  than in year  $t$ , the impact of changing the prevalence of characteristics is estimated without altering the underlying income distributions within each group. For evaluating long-term income inequality trends over business cycles, as is done here, the year  $t'$  is the following business cycle peak.

### *Changes in Source-Level Income Distributions Within Population Groups*

The second set of factors recognizes that the income distributions within each of the aforementioned groups have changed along with each group's prevalence. These changes can result from any income source including male head labor earnings, female head labor earnings, non-head earnings, or non-labor income. The effect of changes to source-level income distributions are analyzed using a rank-preserving income exchange derived from Burtless (1999) and Daly and Vallenetta (2006).

In doing so, note that each individual's income,  $Y_{ik}^t$  can be represented as the sum of their incomes from each income source,  $f_{1ik}^t$  through  $f_{Nik}^t$ :

$$(1) \quad Y_{ik}^t = f_{1ik}^t + f_{2ik}^t + \dots + f_{Nik}^t.$$

Individuals are assigned a percentile rank,  $p_{fik}$ , for each source based on the rank of their source-level income within their population group  $k$ . For now, rank-correlations across income sources within each population group are assumed to be constant as these correlation changes are considered separately.

Thus, to estimate the impact that changes to the distribution of source  $f_1$  have on income inequality, each individual's income from the source  $f_1$  in year  $t$  is replaced with the income of the individual at the same percentile rank of the source  $f_1$  income distribution in year  $t'$ :

$$(2) \quad \hat{Y}_{ik}^{t'}(p_{1ik}) = f_{1ik}^{t'}(p_{1ik}) + f_{2ik}^t + \dots + f_{Nik}^t.$$

This preserves the conditional earnings rank of each individual from source  $f_1$  and the rank-correlation of earnings from source  $f_1$  with other income sources, but

captures changes in the source-level income distribution of source  $f_1$  within each population group. Since this procedure combines income across years, all income is adjusted using the CPI-U-RS prior to the analysis.

### *Changes in Income-Source Rank Correlations Within Population Groups*

The previous methods held the rank correlation of income sources constant, such that if the male and female heads at percentile-ranks  $p_{1ik}$  and  $p_{2ik}$  in their conditional earnings distributions are married to each other one year, then the same rank pairing is assumed to exist in all future years. Thus, by performing rank-preserving income exchanges for sources  $f_1$  and  $f_2$  separately, the impacts of the separate earnings distributions are analyzed without impacting the correlation between the two:

$$(3) \quad \hat{Y}_{ik}^{t'}(p_{1ik}, p_{2ik}) = f_{1ik}^{t'}(p_{1ik}) + f_{2k}^{t'}(p_{2k}) + f_{3ik}^{t'} + \dots + f_{Nik}^{t'}.$$

In order to update the correlation between sources  $f_1$  and  $f_2$ , rather than dividing income into  $N$  separate sources it is divided into  $(N - 1)$  sources such that  $g_1 = f_1 + f_2$  and  $f_3$  through  $f_N$  are unchanged. The rank-correlation change of sources  $f_1$  and  $f_2$  is captured by combining these sources prior to the rank-preserving income exchange rather than after. Thus, calling each individual's percentile-rank in the  $g_1$  distribution  $q_{fik}$ , estimated incomes can be calculated as:

$$(4) \quad \hat{Y}_{ik}^{t'}(q_{1ik}) = g_{1ik}^{t'}(q_{1ik}) + f_{3ik}^{t'} + \dots + f_{Nik}^{t'},$$

which updates the correlation between sources  $f_1$  and  $f_2$  along with their income distributions. By comparing the results when only their separate income distributions change (equation (3)) with that when their joint distribution changes (equation (4)), the impact of the changing correlation between sources  $f_1$  and  $f_2$  is captured in the analysis.

## 4. DECOMPOSITION RESULTS

In order to focus on trends devoid of business cycle variations, we proceed by considering income inequality trends across peak years of median income in each business cycle. The first row of Table 1 presents the actual average annual percentage change in Gini coefficients for each business cycle since 1979. Household income inequality, measured using the Gini coefficient, increased at a rapid rate of 0.97 percent per year in the 1980s business cycle (1979–89). While it continued to rise in subsequent business cycles, this increase was small compared to that seen in the 1980s. In the 1990s business cycle (1989–2000) it increased by an average of just 0.08 percent per year, and in the 2000s business cycle (2000–07) it increased by an average of 0.10 percent per year. This mirrors the household income inequality trends observed by Burkhauser *et al.* (2011) and Larrimore *et al.* (2008). The remainder of Table 1, and the discussion that follows, considers the factors accounting for these trends.

TABLE 1

## ESTIMATED AVERAGE ANNUAL PERCENTAGE CHANGE IN THE SIZE-ADJUSTED HOUSEHOLD INCOME GINI COEFFICIENT ATTRIBUTABLE TO FACTOR COMPONENTS BY BUSINESS CYCLE

	1979–89	1989–00	2000–07	1979–07
(1) Actual Gini average annual percentage change	0.97	0.08	0.10	0.40
<i>Average annual percentage change accounted for by:</i>				
(2) Marriage rates	0.13	0.05	0.10	0.09
(3) Male head employment	0.03	-0.02	0.05	0.02
(4) Male head earnings distribution	0.65	0.36	-0.35	0.29
(5) Female head employment	-0.15	-0.16	0.08	-0.10
(6) Female head earnings distribution	0.09	0.01	0.17	0.08
(7) Spouses' earnings correlation	0.14	0.02	-0.05	0.04
(8) Non-head labor earnings distribution	-0.01	-0.10	-0.02	-0.05
(9) Non-head labor earnings correlation	0.03	-0.03	-0.02	0.00
(10) Private non-labor income distribution	-0.09	0.04	0.08	0.00
(11) Private non-labor income correlation	0.08	-0.01	-0.01	0.02
(12) Public transfers distribution	0.01	-0.06	0.02	-0.02
(13) Public transfers correlation	0.06	-0.01	0.03	0.02

*Notes:* References to male and female head employment and earnings refer to those of both the household head and his or her spouse.

Due to changes in the March CPS data collection procedures between 1992 and 1993 that limit comparability between those years, inequality changes from 1992 to 1993 are suppressed using the procedure from Atkinson *et al.* (2011) and described in the main text.

*Source:* Author's calculations using March CPS data.

### *Changes to Male Employment Status and Earnings Distributions*

The first major factors considered in the analysis are earnings and employment changes among male head of households.<sup>5</sup> Before addressing these key factors, the analysis first controls for the underlying demographic shift from declining marriage rates in the United States since the 1970s. While this shift in marriage patterns provides an underpinning for inequality growth, matching Karoly and Burtless's (1995) and Daly and Valletta's (2006) findings for the 1980s, it alone cannot explain substantial inequality growth. From Row 2 of Table 1 we see that it accounts for approximately 0.09 percent per year of inequality growth over the three business cycles and has been relatively stable over time. Thus, we turn our attention to those factors, such as employment and earnings, which are generally viewed as more important for household income inequality trends.

Over the past 30 years there has been a general decline in work among male heads of households (Panel A of Table 2), although this decline is primarily concentrated among part-time workers (those working less than 35 hours per week or less than 50 weeks of the year) rather than among full-time workers. Using the reweighting technique described previously, the relationship between these employment declines and inequality growth can be observed. When doing so, we

<sup>5</sup>Since household heads are analyzed separately from other household members, all references to male and female earnings refer to the size-adjusted labor earnings of the male and female household heads and their spouses. Additionally, since household heads and spouses are considered equivalent for this paper, references to household heads refer to both the head and his or her spouse. Together, household heads and spouses made up 79 percent of all individuals over the age of 18 in 2007 and 89 percent of all labor earnings in the United States in that year, so this represents the vast majority of all earnings received.

TABLE 2  
PERCENTAGE OF MALE AND FEMALE HOUSEHOLD HEADS AND SPOUSES WORKING FULL-TIME,  
PART-TIME, AND NOT WORKING

Year	Percent Working Full-Time	Gini for Full- Time Earnings	Percent Working Part-Time	Gini for Part- Time Earnings	Percent Not Working
<b>Panel A: Employment status and Gini coefficient for earnings by employment status for male household heads and male spouses of household heads</b>					
1979	63.4	0.307	19.4	0.465	17.2
1989	62.4	0.348	17.8	0.530	19.9
2000	64.6	0.409	14.2	0.558	21.2
2007	62.8	0.391	14.6	0.569	22.6
<b>Panel B: Employment status and Gini coefficient for earnings by employment status for female household heads and female spouses of household heads</b>					
1979	27.0	0.269	29.6	0.500	43.4
1989	33.9	0.309	27.0	0.517	39.1
2000	40.4	0.340	23.8	0.524	35.8
2007	41.0	0.355	21.8	0.527	37.2

*Source:* Author's calculations using March CPS data.

see that the male employment changes had only a small impact on income inequality (Row 3 of Table 1). In each full business cycle since 1979, male employment declines accounted for less than a 0.05 percent-per-year change in income inequality. This is not to say that employment effects never have an effect, as Burkhauser and Larrimore (2011) illustrate the importance of employment changes during periods of economic declines. But it is clear that male head employment patterns are not primary drivers of long-term income inequality growth.

In contrast to male employment changes, shifts in the male earnings distribution conditional on employment and marital status were extremely important for understanding income inequality growth in both the 1980s and 1990s business cycles. During this time, male earnings inequality changes accounted for more of the income inequality growth than any other single factor. In the 1980s business cycle when income inequality grew most rapidly, male earnings changes accounted for income inequality growth of 0.65 percent-per-year. This represents over two thirds of the net increase in income inequality during this period, which is in line with estimates previously observed for the 1980s by Daly and Valletta (2006).

In the 1990s business cycle, male earnings changes accounted for a smaller 0.36 average annual percentage increase in income inequality. But the contribution of male earnings did not slow nearly as much as household income inequality growth, which slowed to 0.08 percent growth per year. As a result, in the 1990s business cycle rising male earnings inequality accounted for over four times the increase in household income inequality. This suggests that it was the slowing inequality growth or faster inequality declines from other factors which account for why household income inequality growth slowed to the extent that it did in the 1990s.

In the most recent business cycle, however, the contribution of male earnings changes shifted dramatically. This shift is notable given that male earnings are a primary focus of many inequality discussions. In the 2000s business cycle it

accounted for a 0.35 average annual percentage point reduction in income inequality, rather than accounting for growth as was previously the case. Thus, while male earnings changes over-accounted for inequality growth in the 1990s business cycle, this trend reversed in the 2000s as it accounted for inequality declines.

This pattern is broadly consistent with the pattern of inequality in male full-time earnings seen in Column 2 of Table 2, which presents the Gini coefficient for annual male labor earnings among household heads working full-time. This column illustrates that male head earnings inequality rose for these men during the 1980s and 1990s business cycle before falling during the 2000s business cycle. While the focus here is on male household heads, this is also true among all men working full-time and is broadly consistent with Kopczuk *et al.* (2010) who use Social Security Records to observe that male inequality in the last year of their sample, 2004, was virtually the same as in 2000. This decline in earnings inequality among full-time workers in the early 2000s matches the previous observation that male labor earnings inequality no longer contributed to household income inequality growth during this period.

A further robustness check of these results is to consider their sensitivity to the choice of inequality measure. Table 3 does just that, replicating the decomposition approach from Table 1 for seven additional inequality measures that are sensitive to different areas of the income distribution: three Generalized Entropy (GE) measures, the coefficient of variation (CV), and three percentile ratios. The Gini, GE(1), and CV are all relatively middle-sensitive; the GE(0) is relatively bottom-sensitive; the GE(2) is relatively top-sensitive; and the P90/P10, P90/P50, and P50/P10 are sensitive to changes around the specified percentile points in each series. As with Table 1, the first row of each panel presents the actual increase observed for the inequality measure and the subsequent rows provide the increase accounted for by each factor.

From Table 3, we see that the pattern describing the changes accounted for by male earnings is largely robust to the inequality measure chosen. For all inequality series, male earnings were the dominant factor for household income inequality growth in the 1980s. In the 1990s, its contribution slowed but not to the same extent as household income inequality growth slowed so male earnings now over-account for total income inequality growth. And in the 2000s, the contribution of male head earnings turned negative under every measure. While there are differences in the magnitude of these trends, based on where in the distribution inequality measures are sensitive, it is clear that male earnings did not continue to account for income inequality growth in the early 2000s as it did in earlier decades.

### *Changes to Female Employment Status and Earnings Distributions*

A key shift in household incomes in the past 30 years came from the dramatic increase in female employment. As seen in Row 5 of Table 1, these increases slowed household income inequality growth over both the 1980s and 1990s. Specifically, increases in female head employment accounted for slowing inequality growth by 0.15 and 0.16 percent-per-year, respectively, in these two business cycles. In the 2000s business cycle, however, female employment declined from

TABLE 3

ESTIMATED AVERAGE ANNUAL PERCENTAGE CHANGE IN VARIOUS INEQUALITY MEASURES ACCOUNTED FOR BY FACTOR COMPONENTS

	Gini	GE(0)	GE(1)	GE(2)	CV	P90/P10	P90/P50	P50/P10
<b>Panel A: Inequality changes from 1979 to 1989</b>								
Actual	0.97	1.37	2.15	2.97	1.48	1.89	0.91	0.98
(2) Marriage rates	0.13	0.32	0.25	0.26	0.13	0.40	0.10	0.31
(3) Male head employment	0.03	0.07	0.06	0.08	0.04	0.08	0.04	0.04
(4) Male head earnings distribution	0.65	0.89	1.51	2.31	1.16	0.74	0.53	0.22
(5) Female head employment	-0.15	-0.25	-0.32	-0.45	-0.23	-0.16	-0.16	0.00
(6) Female head earnings distribution	0.09	0.14	0.14	0.06	0.03	0.30	0.08	0.22
(7) Spouses' earnings correlation	0.14	0.20	0.27	0.33	0.17	0.29	0.17	0.13
(8) Non-head labor earnings distribution	-0.01	-0.16	-0.01	-0.02	-0.01	0.00	0.01	-0.01
(9) Non-head labor earnings correlation	0.03	0.09	0.07	0.12	0.06	0.09	0.11	-0.02
(10) Private non-labor income distribution	-0.09	-0.26	-0.14	-0.08	-0.04	-0.23	-0.18	-0.05
(11) Private non-labor income correlation	0.08	0.09	0.18	0.29	0.14	0.14	0.24	-0.10
(12) Public transfers distribution	0.01	0.39	0.05	0.02	0.01	0.03	-0.04	0.07
(13) Public transfers correlation	0.06	0.06	0.11	0.09	0.04	0.17	0.03	0.14
<b>Panel B: Inequality changes from 1989 to 2000</b>								
Actual	0.08	0.37	0.19	0.21	0.10	-0.17	0.27	-0.44
(2) Marriage rates	0.05	0.13	0.09	0.10	0.05	0.13	0.04	0.08
(3) Male head employment	-0.02	-0.01	-0.04	-0.05	-0.03	-0.04	-0.03	-0.01
(4) Male head earnings distribution	0.36	0.50	0.94	1.58	0.79	0.53	0.43	0.09
(5) Female head employment	-0.16	-0.40	-0.33	-0.38	-0.19	-0.41	-0.15	-0.26
(6) Female head earnings distribution	0.01	-0.02	-0.10	-0.35	-0.18	0.20	0.04	0.16
(7) Spouses' earnings correlation	0.02	0.08	0.04	0.03	0.02	0.05	-0.01	0.06
(8) Non-head labor earnings distribution	-0.10	-0.33	-0.20	-0.24	-0.12	-0.28	-0.08	-0.20
(9) Non-head labor earnings correlation	-0.03	-0.15	-0.05	-0.03	-0.01	-0.20	-0.10	-0.10
(10) Private non-labor income distribution	0.04	0.15	0.02	-0.06	-0.03	0.28	0.19	0.09
(11) Private non-labor income correlation	-0.01	-0.06	-0.07	-0.22	-0.11	-0.07	-0.02	-0.05
(12) Public transfers distribution	-0.06	0.51	-0.11	-0.12	-0.06	-0.33	0.00	-0.34
(13) Public transfers correlation	-0.01	-0.26	-0.02	-0.02	-0.01	-0.07	-0.07	0.00
<b>Panel C: Inequality changes from 2000 to 2007</b>								
Actual	0.10	1.68	0.11	-0.10	-0.05	0.85	0.12	0.73
(2) Marriage rates	0.10	0.25	0.20	0.21	0.11	0.29	0.08	0.21
(3) Male head employment	0.05	0.11	0.10	0.12	0.06	0.11	0.09	0.01
(4) Male head earnings distribution	-0.35	-0.78	-0.90	-1.31	-0.65	-0.23	-0.03	-0.20
(5) Female head employment	0.08	0.16	0.16	0.16	0.08	0.13	0.08	0.05
(6) Female head earnings distribution	0.17	0.33	0.45	0.74	0.37	0.21	0.12	0.10
(7) Spouses' earnings correlation	-0.05	-0.08	-0.06	-0.02	-0.01	-0.13	-0.14	0.02
(8) Non-head labor earnings distribution	-0.02	-0.16	-0.03	-0.03	-0.01	-0.01	-0.07	0.07
(9) Non-head labor earnings correlation	-0.02	0.01	-0.05	-0.08	-0.04	-0.09	0.02	-0.11
(10) Private non-labor income distribution	0.08	0.33	0.15	0.11	0.06	0.31	0.05	0.26
(11) Private non-labor income correlation	-0.01	-0.06	-0.02	-0.08	-0.04	0.13	0.03	0.10
(12) Public transfers distribution	0.02	1.55	0.06	0.00	0.00	0.17	-0.10	0.27
(13) Public transfers correlation	0.03	-0.09	0.06	0.05	0.02	0.01	-0.05	0.05
<b>Panel D: Inequality changes from 1979 to 2007</b>								
Actual	0.40	1.05	0.87	1.11	0.56	0.82	0.46	0.36
(2) Marriage Rates	0.09	0.23	0.18	0.19	0.09	0.27	0.07	0.20
(3) Male Employment Rates	0.02	0.05	0.03	0.04	0.02	0.04	0.03	0.01
(4) Male Earnings Distribution	0.29	0.32	0.68	1.11	0.56	0.41	0.35	0.06
(5) Female Employment Rates	-0.10	-0.21	-0.20	-0.27	-0.14	-0.18	-0.10	-0.09
(6) Female Earnings Distribution	0.08	0.12	0.12	0.07	0.03	0.24	0.08	0.16
(7) Spouses' Earnings Correlation	0.04	0.08	0.10	0.12	0.06	0.09	0.02	0.07
(8) Non-head Labor Earnings Distribution	-0.05	-0.23	-0.09	-0.10	-0.05	-0.11	-0.05	-0.07
(9) Non-head Labor Earnings Correlation	0.00	-0.03	0.00	0.01	0.01	-0.07	0.01	-0.08
(10) Private Non-labor income Distribution	0.00	0.05	0.00	-0.02	-0.01	0.10	0.02	0.08
(11) Private Non-labor income Correlation	0.02	0.00	0.03	0.00	0.00	0.05	0.09	-0.03
(12) Public Transfers Distribution	-0.02	0.72	-0.01	-0.04	-0.02	-0.08	-0.04	-0.04
(13) Public Transfers Correlation	0.02	-0.10	0.05	0.04	0.02	0.03	-0.03	0.06

Notes: See Notes to Table 1.

Since the Generalized Entropy inequality metrics are undefined for negative incomes, negative income values are bottom coded to \$0.01 when calculating inequality for these three measures.

Source: Author's calculations using March CPS data.

peak-to-peak of a business cycle for the first time since at least the 1970s (Panel B of Table 2). This, in turn, reversed the contributions to inequality from female employment changes seen in earlier business cycles. In the 2000–07 business cycle, female employment actually accounted for an increase in income inequality. This reversal helps account for why moderate levels of income inequality growth continued in the early 2000s despite the earlier observation that male earnings changes accounted for inequality declines.

Of course, in addition to changes in female employment, we observe changes in the earnings distribution of female heads of household, conditional on marital status and whether they works full- or part-time. The impact of these changes in female head earnings can be seen in Row 6 of Table 1 where they partially offset the household income inequality declines that resulted from the increase in female employment. However, until the 2000s business cycle, the net increase in inequality is still smaller than it would have been had both female employment and female earnings inequality remained unchanged at the 1979 levels. It is only in this early 2000s business cycle that the changes in female head employment and earnings distribution both worked in the same direction. In the early 2000s, these factors combined to account for a 0.25 percent-per-year increase in the household income Gini coefficient. Thus, rather than mitigating income inequality growth, the shifts in female employment and earnings accounted for sizable income inequality increases in the most recent business cycle. Additionally, this pattern across business cycles for female employment can be seen for each of the major inequality metrics in Table 3. In particular, female employment growth accounted for inequality declines for all but one metric in the 1980s and 1990s and female employment declines accounted for inequality growth across all metrics in the 2000s.

### *Changes to Spouses' Earnings Correlations*

Thus far the analysis has assumed that the rank correlation across income sources remains unchanged. However, this has not been the case as spouses' labor earnings have become more correlated since the 1970s. This increase in rank correlations has, in turn, accounted for increased household income inequality by concentrating wealth into a smaller number of households (Row 7 of Table 1). Closely matching Burtless's (1999) findings, this increase in correlation accounted for a 0.14 percent-per-year increase in income inequality during the 1980s business cycle. However, this was the high-point of correlation accounting for inequality growth.

By the 1990s business cycle, we observe that earnings correlation's importance fell and only accounted for a smaller 0.02 percent-per-year of inequality growth. By the 2000s business cycle the effect reversed directions and actually accounted for inequality declines. Thus, a shift in correlation trends sheds light on the slowdown in household income inequality growth that persisted through the 1990s and 2000s.

But what led to the different patterns of correlation changes in the 1980s compared to the 1990s and 2000s? Correlation changes can come either from shifts in the correlation of earnings among dual-earner couples or from changes in where

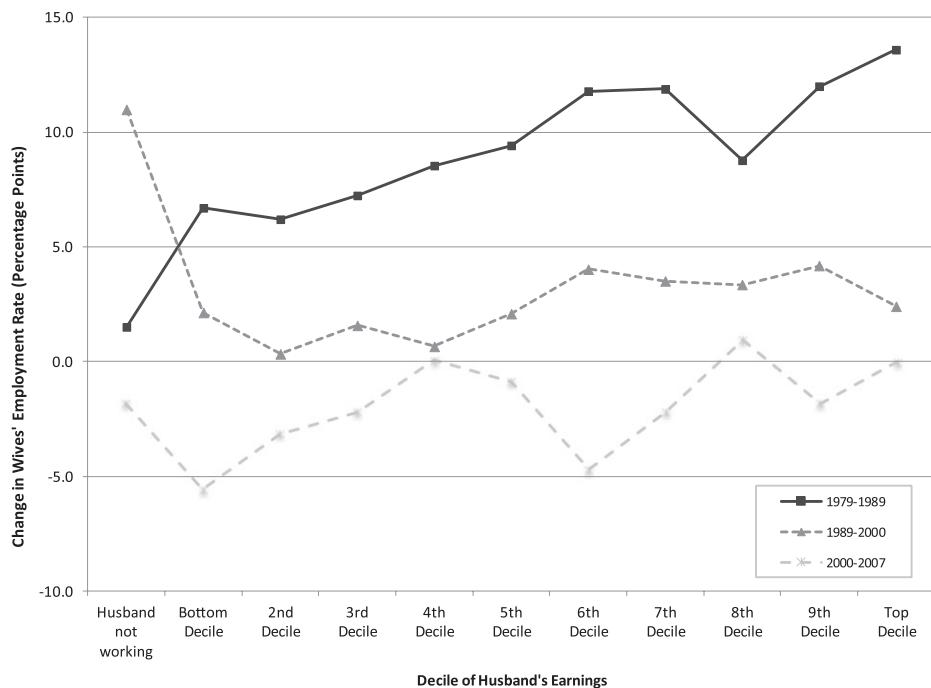


Figure 1. Percentage Change in Wives' Employment Rate by Decile of Husbands' Earnings Among Working-Age (22–62 Years) Couples

Note: Includes head-of-household couples where both individuals are of working-age (22–62).  
Source: Author's calculations using March CPS data.

in the income distribution women are entering the labor market and men are leaving the labor market. It appears that the shifts in where entry and exits from the labor market are occurring are driving these results.

Previous research has observed an increase in the correlation between a man's earnings and his wife's probability of working since the late 1960s, with more wives of high earning men working now than was the case in the past (Schwartz, 2010). But while this is true over the long-run, by the early 1990s the wives of high earning men were no longer entering the labor market at a faster pace than those women married to lower earning men. This can be seen in Figure 1, which illustrates the change in female employment rates among married female household heads in each full business cycle since 1979 based on the decile of their husband's labor earnings. Since most labor earnings belong to individuals of working age, the sample is restricted here to couples where both members are between the ages of 22 and 62. Additionally, based on the cross-sectional nature of the data, it does not track the same individuals over the period but instead considers female employment rates in the first year of the business cycle based on their husbands' earnings in that year and then considers female employment rates in the last year of the business cycle based on their husbands' earnings in this final year.

When considering employment trends in this way, it is apparent that in the 1980s the most rapid rise in female employment occurred among women married to high earning men. Among working-age women married to men in the top decile of the male earnings distribution, employment increased by over 13 percentage points. However, among women married to non-working men, employment increased by less than 2 percentage points. This difference is valuable for understanding why correlations rose during that time, since the increase in employment among women married to high earning men necessarily increases spouses' earnings correlations.

Looking at the 1990s and 2000s business cycles when the correlation's influence on income inequality trends slowed, the pattern is quite different. During the 1990s business cycle, women married to non-working men increased their employment by 11 percentage points while women married to working men in any decile saw slower employment growth that was less than 5 percentage points in all deciles. This reduced earnings correlations as zeros (non-earners) are no longer paired as the woman enters the labor market. Similarly, in the 2000s business cycle women married to non-working men increased their employment rate faster than women married to men in six of the earnings deciles. So while the increased income inequality from rising correlations in the 1980s came from high-earning households increasing their incomes as spouses entered the labor market, in the 1990s and 2000s earnings correlations fell at the bottom of the distribution through the decline in no-earner households.

One potential explanation for the decline in no-earner households in the 1990s is the increase in public policies encouraging employment among families with children. Significant expansions of the Earned Income Tax Credit between 1993 and 1996 incentivized low income households with children to have at least one working household member. Additionally, welfare changes in the Welfare Reform Act of 1996 made it more difficult for households with children to survive on government benefits alone. Thus, if the increase of female employment in families where the man is not working occur primarily in families with children, it could be attributed to these public policy changes. Figure 2 provides evidence that this is the case.

Among married working-age women with a non-working husband, employment increased over the 1990s for both those with and without children, but the growth is faster among mothers, who would be most impacted by the policy shifts. In 1996, prior to the implementation of the Welfare Reform Act in 1997, the employment rate for mothers with a non-working husband was 5.3 percentage points greater than that for non-mothers with a non-working husband. By 2000, this gap had grown to 14.6 percentage points. Among unmarried women with children, who are similarly affected by the policy, we also see a disproportionate rise in employment when compared to unmarried women without children.

In contrast, no similar dynamic occurred over this period among women with working husbands, who would be less affected by changing welfare rules. In 1996, women with working husbands with children were 5.7 percentage points less likely than women with working husbands without children to work. In 2000, this gap remained a similar 6.4 percentage points. Therefore, while it is likely that other

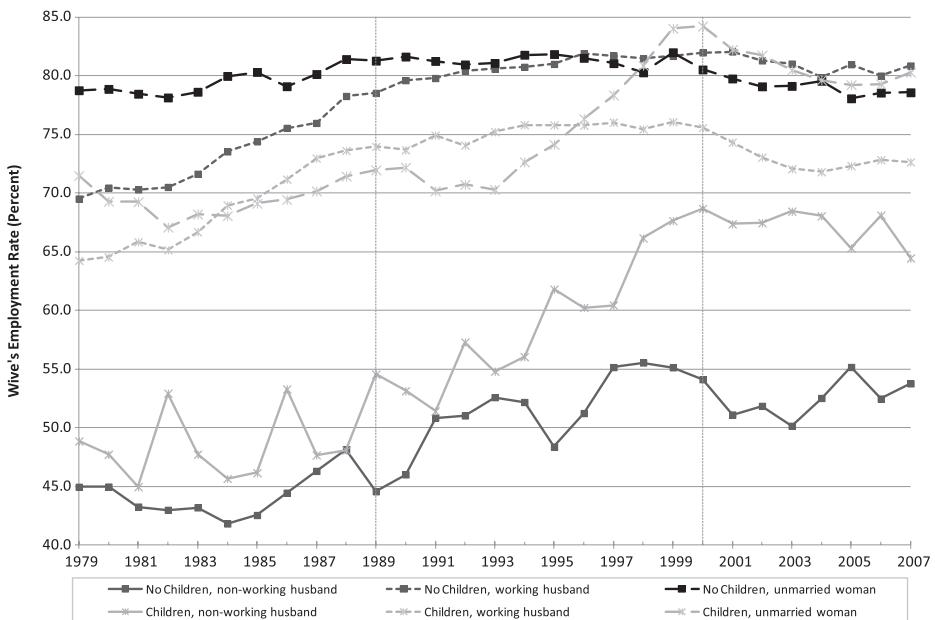


Figure 2. Wives' Employment Rate by Husbands' Employment Status and Presence of Children Among Working-Age (22–62 Years) Couples

Note: Includes head-of-household couples where both individuals are of working-age (22–62). Unmarried women include head-of-household working-age (22–62) women. Children include those living in the household under the age of 18.

Source: Author's calculations using March CPS data.

broad-based factors also contributed to the growth in employment among women married to non-working men in the 1990s, it is probable that at least part of this trend—and the related slower growth in earnings correlations between spouses—can be attributed to the labor response to these public policies.

### Other Income

While declining marriage rates, changing employment statuses, increased labor earnings inequality of household heads, and increased correlations of spouses' earnings accounts for much of the increase in inequality, shifts in these factors alone underestimate the rapid rise in inequality in the 1980s and 2000s and overstate it in the 1990s. This is because non-labor income and the earnings of non-heads have not yet been included in the analysis.

During the rapid income inequality increases in the 1980s business cycle, the combination of factors considered thus far accounted for 0.89 percent-per-year of the 0.97 percent-per-year increase in the Gini coefficient that actually occurred. In particular, reductions in the amount of public transfers and reductions in their concentration among the lowest income individuals (Rows 12–13 of Table 1) accounted for further income inequality growth and explain most of this gap between inequality growth already accounted for and the 0.97 percent-per-year of

actual inequality growth. This increase accounted for by public transfers should not be taken to say that public transfers increased inequality but rather that they became less effective at reducing inequality. In the 1990s, on the other hand, public transfers increased and became more correlated with low incomes which helped account for the slowdown in income inequality as measured using the Gini coefficient.

Similarly, in the 1990s when the factors discussed so far over-account for inequality growth, it is evident that shifts in the labor earnings distribution of non-heads mitigated income inequality increases. This is in contrast to the 1980s where changes in the labor earnings distribution of non-heads slightly increased income inequality. Thus, along with the other factors which accounted for slower inequality growth from the 1980s to the 1990s, the reversing impact of non-head income is an important factor in accounting for the slowdown in household income inequality growth after its rapid increases in the 1980s.

A further consideration of particular relevance to these factors is the choice of inequality measure. Since public transfers tend to be concentrated among low-income individuals and private non-labor income tend to be concentrated among those with high-incomes, we may expect to see differences for alternate inequality measures. This is, in fact, the case. Most notably, the bottom-sensitive GE(0) observes the influence of public transfers more than any other inequality measure. For the overall 28-year period (Panel D of Table 3), changes in the level and distribution of public transfers accounted for almost 60 percent of the growth in the GE(0) inequality metric. This is in contrast to that seen for the other measures where it never accounts for more than 10 percent of income inequality growth. Even when using the P50/P10 ratio this relationship is not as strong, suggesting that it truly is the poorest of the poor, below the 10th percentile of the distribution, where the changes captured by the GE(0) are occurring.

Furthermore, the importance of public transfers to the GE(0) exists across all business cycles, as it accounts for 32 percent of GE(0) inequality growth in the 1980s, 68 percent in the 1990s, and 86 percent in the 2000s. The declining ability for public transfers to mitigate income inequality stands out as the primary factor for the acceleration of inequality growth in the 2000s when measured using the GE(0) series. This is in contrast to that seen earlier for the Gini, where inequality growth slowed and public transfer income was relatively unimportant for income inequality trends in the 1990s and 2000s.

It is also among these bottom-sensitive inequality measures where non-head earnings represent the biggest mitigating factor against income inequality growth. Previously, we observed that increases in earnings of these secondary household members accounted for relatively modest inequality declines—particularly since 1990. Consistent with low-income houses joining together to pool resources, when focusing on the bottom-sensitive GE(0) and P50/P10 ratio we can see that increases in secondary wage earnings had a more substantial impact when focusing on the lower portion of the distribution.

Finally, at the other end of the income scale, private non-labor income such as interest and dividends are more prevalent. In the 1980s, changes to the distribution for these income sources resulted in increases in the top-sensitive GE(2) inequality measure more than that seen for other measures. However, these

increases were not sustained in the future business cycles, suggesting that interest and dividends did not account for increases in inequality among the upper half of the distribution in the most recent business cycles. This does not, however, rule out the possibility of capital gains leading to income inequality growth in recent decades since capital gains are not captured in the CPS and are not included in these inequality calculations.

### *Robustness Checks*

In addition to testing the robustness of results to different inequality metrics, two further checks of the robustness of results were employed. The first addresses a known limitation of shift-share analyses, where results may be sensitive to the order in which the component factors are analyzed (Jenkins, 1995; Fournier, 2001; Daly and Valletta, 2006). A common approach to address this possibility is analyzing factor components in reverse order (see, e.g., Daly and Valletta, 2006). The results of reversing the order of analysis are provided in Appendix Table A2. When doing so, the general patterns of factors accounting for income inequality growth in each business cycle remain largely consistent with those discussed above. In most instances, the change accounted for by each factor is within 0.03 percent-per-year regardless of which order is used. However, this is not universally the case as there are some differences in the magnitude of results. The most notable are that declines in marriage and male labor earnings changes account for less income inequality growth in the 1990s when using the reverse decomposition, while private non-labor income and labor earnings of non-heads or their spouses accounted for more. Thus, when using the reverse-decomposition, the extent to which male earnings inequality over-accounts for income inequality growth in the 1990s is less substantial. While some such differences exist, the consistency of the main results to these reverse-order decomposition results suggests that the order of analysis is not driving the results.

A second robustness check addresses whether the importance of marital changes and non-head labor earnings may be overstated. Over the past several decades there has been an increase in cohabitation, which may result in couples acting like married couples but not being counted as married in CPS data. These long-term cohabitation are estimated by assuming that all pairs of unrelated similarly aged (within 10 years of each other) unmarried adults of opposite gender who live together without other adults present are a cohabiting couple (Congressional Budget Office (1997) and Martin (2006) employ similar definitions). Appendix Table A3 reruns the analysis from Table 1, treating these cohabiting couples as married. When doing so, the income inequality growth accounted for by marriage patterns is slower than that reported in Table 1 since this reduces the observed decline in marriage. It similarly reduces the mitigation of income inequality growth from changes in the non-head labor earnings distribution. Thus, for these two variables it is evident that shifts to cohabitation played a role, particularly in the 1990s. However, the magnitude of differences between these results and those in the main results in Table 1 remains small and never differs by more than 0.04 percent-per-year for any factor. Similarly, the inequality changes accounted for by the correlation of earnings between spouses and cohabiting couples is virtually unchanged. Thus, the contributions of marriage patterns and

non-head earnings to income inequality trends appear to go beyond recent increases in cohabitation.

## 5. CONCLUSIONS

Numerous studies have documented the increases in male earnings inequality and household income inequality that occurred since the late 1970s. Despite close relationships between these series, there are numerous other factors that must also be considered to understand household income inequality trends.

When disaggregating the increase in household income inequality into its component sources, during the 1980s business cycle when household income inequality growth was most pronounced, the increase came from an alignment of numerous factors all driving income inequality higher. During this period, male earnings changes accounted for two-thirds of the rise in household income inequality. However, declines in marriage rates and an increased correlation between spouses' earnings further contributed to increasing inequality, leading to the rapid overall income inequality growth.

During the 1990s business cycle when income inequality growth was the slowest, while the contribution of male earnings changes slowed it did not slow nearly as much as household income inequality growth did. However, the contribution to rising income inequality of marriage rate declines, spouses' earnings correlation changes, and changes to the non-head earnings distributions and public-transfers distributions all declined or reversed by the 1989–2000 business cycle, largely accounting for the slower inequality growth actually observed.

In contrast, the most recent business cycle from 2000 to 2007 is notable because for the first time since at least 1979, male earnings inequality growth could not account for any increases in household income inequality over a business cycle. Furthermore, while female employment changes mitigated income inequality growth for each of the previous two business cycles, during this business cycle it contributed to rising inequality.

As this paper illustrates, the factors accounting for rising household income inequality have changed over time and the relative importance of these factors is more different today than it was 30 years ago. It also highlights a substantial challenge in reducing inequality from its current elevated levels, as the primary factor mitigating inequality growth in the 1980s and 1990s—female employment growth—no longer accounts for income inequality declines. If female employment has reached a plateau and is unable to be increased further, other factors will have to drive any effort to reduce inequality going forward.

In further considering how to reverse the upward trend in inequality, it may be fruitful to extend upon these factors further and consider how taxes and in-kind transfers have influenced inequality trends. Many of the policy discussions regarding inequality incorporate some element of tax policy, so determining the influence of taxes on inequality trends in a post-tax environment could help to guide policy decisions. Such factors cannot be fully evaluated using the pre-tax, cash-income definitions that are common in the income inequality literature, although incorporating these factors in a post-tax analysis will be a valuable extension of this area of research.

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#### SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:

**Table A1:** Income Variables used for Calculating Household Incomes

**Table A2:** Estimated Average Annual Percentage Change in the Size-Adjusted Household Income Gini Coefficient Attributable to Factor Components by Business Cycle, Evaluating Component Income Source Effects in Reverse Order

**Table A3:** Estimated Average Annual Percentage Change in the Household Income Gini Coefficient Attributable to Factor Components by Business Cycle, Treating Cohabiting Couples as Married