# Income inequality, unemployment, and government transfer: what do their dynamics tell us

Haydory Akbar Ahmed

*Department of Accounting, Economics and Finance, Bill Munday School of Business, St. Edward's University, Austin, Texas, USA, and*

Hedieh Shadmani

*Department of Economics, Fairfield University, Fairfield, Connecticut, USA*

## Abstract

**Purpose** – In this research, we explore the dynamics among measures of income inequality in the USA, male and female unemployment rates and growth in government transfer using time series data.

**Design/methodology/approach** – This research adopts a macro-econometric approach to estimate a structural VAR model using time series data.

**Findings** – Our structural impulse responses found that growth in government transfer increases unemployment rates for both males and females. Female income inequality declines with increased government transfer. When the female income ratio rises, we observe that government transfer outlays fall over the forecast horizon. Variance decomposition finds that growth in government transfers is impacted by the male unemployment rate relatively more than the female unemployment rate. This research, therefore, suggests gender-specific government transfers to reduce income inequality. This, in effect, may reduce government transfer outlays over time.

**Practical implications** – This research, therefore, suggests gender-specific government transfers to reduce income inequality. This, in effect, may reduce government transfer outlays over time.

**Originality/value** – This research investigates the dynamics among income inequality, government transfer and unemployment rates. There is a dearth of research articles that adopt a macro-econometric in this area.

**Keywords** Income inequality, Male and female unemployment rates, Government transfer, Structural VAR model, Impulse response, Variance decomposition

**Paper type** Research paper

## 1. Introduction

We have observed increasing income inequality in the United States over the past 4 decades as the rich are getting richer. According to data from the World Inequality Database, the share of income going to the wealthiest 10% of the population increased from 34% of total earnings in 1970 to 46% in 2020. This level of income inequality has not been witnessed since before the Great Depression (see Saez, 2019). As per the Congressional Budget Office (2022), average income before transfers and taxes more than doubled for households in the highest quintile between 1979 and 2019. It grew faster among households at the very top of the income distribution than among others in that quintile. Income for poor and middle-income Americans has changed since the 1980s and, adjusted for inflation, has declined since 2000

(see Bor *et al.*, 2017). This continual expansion in income inequality since 1980 has caused concern among members of the public, researchers, policymakers, and politicians. Income distribution in the United States is heavily weighted toward the top, even among the richest 20% of the population. After taxes, the average income of the top 1% is $1.4 million, almost five times that of the next 4% (Congressional Budget Office, 2022).

Education, skills, occupation, international trade, trade unions, associative marriages, and technological change are often considered factors behind rising income inequality in the United States. While this research acknowledges these factors, it examines income inequality from a different angle. Achieving maximum employment and reducing income inequality are key government objectives, with stabilization policies playing a crucial role. Government transfers, which may vary with the business cycle, are one such policy variable. Previous studies have explored the effects of transfer payments on income inequality and the relationship between inequality and unemployment rates. From a macroeconomic perspective, unemployment rates, government transfer growth, and earnings dispersion may affect each other contemporaneously or over time, influencing the redistributive impact of welfare policies. Introducing gender-based disaggregation in our empirical analysis may reveal further variations in these dynamics.

This research aims to provide insights into the dynamic relationships among income inequality, unemployment rates, and growth in transfer payments, with a focus on gender differences. We analyze two measures of income inequality for males and females, government transfer growth and unemployment rates for each gender. This time series approach, using a structural vector autoregression (SVAR) framework, is novel in examining these dynamics from a gender perspective.

We use annual data from 1962 to 2019, including income ratios (top 10% to bottom 50%), unemployment rates by gender and government transfer growth. Our SVAR model yields several key findings. Impulse response analysis shows that shocks to government transfers increase unemployment rates for both males and females, consistent with prior research indicating that transfers can disincentivize employment (Ahmed, 2022). Variance decomposition reveals that male unemployment rates have a greater impact on government transfer growth than female unemployment rates. Shocks to male unemployment briefly increase income inequality, whereas shocks to female unemployment reduce it. Shocks to the female income ratio lower income inequality for both genders, possibly due to associative marriage effects (Greenwood *et al.*, 2014). Additionally, government transfers reduce income inequality among females, with the female income ratio initially decreasing transfer growth but increasing it over time. The variance in government transfer growth is significantly explained by female income ratios and unemployment rates, suggesting gender-specific variations. Increased government transfers may reduce poverty and income inequality among female-headed households, while higher unemployment rates lead to greater government transfers. This indicates that targeted government transfers could improve social outcomes and potentially reduce future government spending on transfers.

The rest of the paper is organized as follows: Section 2 describes relevant literature, Section 3 describes the data and the econometric approach, Section 4 discusses the empirical results and Section 5 concludes.

## 2. Literature review
In this section, we will describe the relevant literature. Existing literature ties rising income inequality to several factors. These include technological change and creative destruction, globalization and trade, the decline of unions, and the demographic differences in the labor force such as education, experience, occupation, gender, and marital status. For example,

Lemieux (2006), Goldin and Katz (2007) and Autor (2014) emphasize changes in returns to education as a factor. Caines *et al.* (2017), Atkinson (1997) and Acemoglu and Autor (2011) discuss the evolution of skills, tasks, and technologies as important determinants of income inequality. Hoffmann *et al.* (2020), Acemoglu and Autor (2011) and Autor (2019) are among the large literature showing that changes in the demand for different tasks have contributed to the evolution of wage distribution over time. Fortin *et al.* (2021) argue that the decline of labor market institutions such as unions contributes toward rising income equality. Esping-Andersen (2007), Schwartz (2010) and Greenwood *et al.* (2014) focus on the link between assortative marriage and household income inequality. These studies predominantly employ micro-econometric approaches in their analyses.

We can find a consensus on the rising trend in income inequality in the United States, but the factors causing this rising trend and the policy remedies to reverse this trend remain contentious among policymakers and researchers. In theory, policymakers can address rising income inequality using welfare policy tools-such as taxes and transfer payments. In practice, however, the income redistribution effect of these policy tools depends on the size, mix, and progressivity of each component as well as other economic factors (see for example, Betson and Haveman, 1984; Higgins and Lustig, 2016; Joumard *et al.*, 2013). Governments, around the world, implement various types of in-cash and/or in-kind transfer programs under the social safety net program to help low-income or poverty-stricken families. In the United States, government transfer payments to persons include the Social Security, Medicare, Medicaid, Affordable Care Act, Unemployment Insurance (UI), Supplemental Nutrition Assistance Program (SNAP), and other forms of income supplement programs to support low-income households. Poorer households benefit from these income support programs, although we observe variation in eligibility and coverage across the states. These transfer payment programs along with their qualifying criteria require the recipients to actively search for jobs or maintain their employment status.

Income inequality is crucial because it affects economic growth and stability. Keynes (1936) argued that reducing income inequality can enhance economic growth and achieve full employment through appropriate economic policies. Research emphasizes the importance of addressing income inequality and the role of welfare policies in redistribution. Kumhof and Rencière (2010), Ostry (2015) and Stiglitz (2015) suggest that reducing inequality through income redistribution could prevent major economic crises. Empirical evidence from McCombie and Spreafico (2015) and Cynamon and Fazzari (2015) shows that higher inequality hinders economic growth and employment in the USA Arestis (2018) highlights the urgency of policies for a more equal income distribution by advocating for coordinated fiscal and monetary policies to boost economic activity. Ahn *et al.* (2018) demonstrated that income inequality affects macroeconomic aggregates, and vice versa, with implications for aggregate consumption and productivity shocks. Their models show that income inequality influences consumption spending and that low-income households respond slowly to economic changes. These studies highlight the macroeconomic significance of income inequality and its impact on economic growth and redistribution.

Jäntti and Jenkins (2010) emphasize the role of economic policies and institutions in shaping income inequality. They explore how unemployment, inflation, and economic growth affect income distribution. Breen and García-Peñalosa (2005) find that higher income inequality is linked to greater macroeconomic volatility, suggesting a feedback loop between income distribution and economic instability. These studies highlight the broader macroeconomic implications of income inequality and motivate further research into the relationships between macroeconomic variables, particularly unemployment rates and inequality.

Aghion (2002), using Schumpeterian Growth Theory, explains that while innovation and technological progress may initially increase between-group wage inequality, they can also

enhance upward mobility and reduce inequality in the long run, especially with investments in education and skills. This provides a basis for further research into income disparities, including gender differences.

Despite valuable insights from existing literature, there is a gap in understanding the dynamic interactions between income inequality, unemployment rates, and government transfer policies, particularly from a gender perspective. This paper addresses this gap by using a time series approach to analyze these variables, focusing on gender-specific variations and employing aggregate-level data. Through SVAR analysis, the paper offers new insights into how changes in government transfer policies impact unemployment rates and income inequality for both genders. The findings contribute to the discourse on labor market effects of welfare policies and gender disparities, extending existing literature and providing useful implications for policymakers addressing income inequality.

## 3. Data and methodology

This research examines the dynamics among income inequality measures, unemployment rates by gender, and government transfer growth using annual data from the United States. We analyze income inequality through the income share ratio between the top 10% and bottom 50% of earners for both males and females, along with unemployment rates and government transfer growth from 1962 to 2019. Data on unemployment rates and government transfers are sourced from the Federal Reserve Bank of St. Louis's FRED database, with monthly frequency available. Income inequality measures are obtained from the World Inequality Database (WID), using Distributional National Accounts guidelines, but are only available annually. Thus, we construct our dataset using annual data for the empirical analysis.

For our structural VAR model estimation, we use five variables: income ratios for males and females, unemployment rates for each gender, and growth in government transfers. We choose income ratios over Gini coefficients for their interpretability. Government transfers are included based on Ahmed (2022), who identifies a common long-run trend with labor force participation rates. To our knowledge, this is the first research to use this specific series.

We obtain impulse responses and variance decompositions to understand the dynamics among these variables to develop valuable insights [1]. The structural vector auto-regression model is a simple yet useful vehicle to obtain the impulse responses and variance decompositions which enables us to analyze the dynamic relationship among the variables in the estimated models in an objective manner. We estimate a five variable SVAR that includes ratios of income earned by the top 10% to the bottom 50% for male and female disaggregates, unemployment rates for male and female disaggregates, and finally the growth in government transfer.

It is very common to use the structural vector auto-regression model in macro-econometrics in analysis using aggregates in a time series framework. We can find a plethora of articles that use this approach, and to develop further insight one can refer to Breitung (2001). The empirical approach in this paper follows Breitung (2001), Johnston and Mas (2018) and Ahmed *et al.* (2022). According to Sims (1980), the SVAR model provides a more systematic yet simpler approach for imposing restrictions, which could enable the researcher to capture empirical regularities which remain hidden in the techniques that were previously applied. We estimate a structural vector autoregression model to derive the impulse responses and variance decomposition to understand their dynamics. We can define a vector autoregression model in the reduced form as follows:

$$Z_t = A_1 Z_{t-1} + A_2 Z_{t-2} + \ldots + A_p Z_{t-p} + e_t \tag{1}$$

where $Z_t$ is a $4 \times 1$ vector of time series observations for a measure of income inequality, the unemployment rate for males, the unemployment rate for females, and growth in government transfer to person. For simplicity, we leave out constants, time trends, and seasonal trends. $A_1, A_2, \ldots, A_p$ are the coefficient matrices for the lagged dependent variables. Equation (1) is known as the reduced form of the system, and associated with this reduced form model is a structural model given by

$$Be_t \equiv R\varepsilon_t \tag{2}$$

The B and R represent matrices that are assumed to be invertible. $\varepsilon_t$ is an $(N \times 1)$ vector of structural shocks with a covariance matrix $E(\varepsilon_t \varepsilon_t^T) = \Omega$. As per Breitung (2001), this representation is the most general model considered by Amisano and Giannini (1997). The SVAR model can be written as Equation (3), where $e_t \equiv B^{-1}R\varepsilon_t$.

$$BZ_t = A_1^* Z_{t-1} + A_2^* Z_{t-2} + \ldots + A_p^* Z_{t-p} + R\varepsilon_t \tag{3}$$

$A_i^*$ for $i = 1, 2, \ldots, p$ are structural coefficients that differ in general from their reduced form counterparts.

The dynamic effect of the structural shock is analyzed using the following moving average representation:

$$Z_t = e_t + \theta_1 e_{t-1} + \theta_2 e_{t-2} + \ldots \ldots$$
$$Z_t = \theta(L)e_t$$
$$Z_t = B^{-1}R\varepsilon_t + \theta_1 B^{-1}R\varepsilon_{t-1} + \theta_2 B^{-1}R\varepsilon_{t-2} + \ldots$$
$$Z_t = \Phi(L)\varepsilon_t$$

The $(i, j)^{th}$ element of the matrix $\Phi_h$ measures the impact of a shock from the jth variable on the ith variable h periods ahead. We can use a number of approaches to identify the structural shocks in the vector auto-regression. In this research, we apply the recursive identification scheme and arrange the variables in the following order to obtain the structural shocks in the SVAR model. We place the ratio of income earned by the top 10% to the bottom 20 for males and females as the first and second variables. It is well-established in the literature that income is determined by ownership of labor and capital, as per the neo-classical theory of income distribution, depending on the marginal product of labor and the marginal product of capital in the respective markets (Mankiw, 2022). In addition, income inequality is determined by factors such as productivity, education, experience, and occupation among others. We have discussed the relevant literature in Section 2 of this paper. Therefore, this research argues that the income ratios for males and females, as measures of income inequality, do not contemporaneously impact each other. Additionally, unemployment rates and growth in government transfers to individuals do not have a contemporaneous impact on these income ratios. Unemployment rates are determined in the labor market and are known as the lagged indicators. They are likely to impact the labor income in a lagged manner, but not contemporaneously. In our estimated model, we order the income inequality measures for males first, followed by those of females, and apply the following restrictions for identification: $\theta_{12} = \theta_{13} = \theta_{14} = \theta_{15} = 0$ and $\theta_{21} = \theta_{23} = \theta_{24} = \theta_{25} = 0$. The male unemployment rate is ordered as the third variable followed by the female unemployment rate. As argued earlier, the unemployment rate is determined in the labor market. The income ratios for males and females, unemployment rate for females, and growth in government transfer do not contemporaneously impact the unemployment rate for males. Therefore, we apply the following restrictions for identification: $\theta_{31} = \theta_{32} = \theta_{34} = \theta_{35} = 0$. Policymakers

increase government transfer by observing the labor market, and the growth in government transfers impacts unemployment rates in future periods but not contemporaneously (Ahmed, 2022). In our model, the unemployment rate for females is ordered fourth, and we argue that the unemployment rate for males may impact the unemployment rate for females contemporaneously. We, therefore, impose the following restrictions for identification: $\theta_{41} = \theta_{42} = \theta_{25} = 0$ but $\theta_{43} \neq 0$. We can find a plethora of research related to the concept of "tied migrants" that links male employment to female unemployment. For example, Boyle *et al.* (2001) found that women who migrate long distances with their partners are most likely to be unemployed analyzing the labor markets in the United States and Great Britain. Clark and Withers (2002) examined the impact of mobility on the labor-force participation status of two-earner households in the United States in a longitudinal context. Like Boyle *et al.* (2001), this research also finds that female labor force participation drops with migration. The growth in government transfers to individuals is placed last in the ordering as we argue that transfer payments can be contemporaneously impacted by income ratios and unemployment rates. Policymakers respond by increasing government allocation to government transfer by observing the inequality and unemployment scenario in the economy. The global government responses during the COVID-19 pandemic provide a clear example to support this argument. We, therefore, impose the following restrictions: $\theta_{51} = \theta_{52} = \theta_{53} = \theta_{54} \neq 0$. We can summarize the identification as follows:

$$
\begin{bmatrix}
e_{inc\,ineq\,male} \\
e_{inc\,ineq\,female} \\
e_{unem\,rate\,male} \\
e_{unem\,rate\,female} \\
e_{gov\,trans}
\end{bmatrix}
=
\begin{bmatrix}
1 & 0 & 0 & 0 & 0 \\
0 & 1 & 0 & 0 & 0 \\
0 & 0 & 1 & 0 & 0 \\
0 & 0 & \theta_{43} & 1 & 0 \\
\theta_{51} & \theta_{52} & \theta_{53} & \theta_{54} & 1
\end{bmatrix}
\times
\begin{bmatrix}
\varepsilon_{inc\,ineq\,male} \\
\varepsilon_{inc\,ineq\,female} \\
\varepsilon_{unem\,rate\,male} \\
\varepsilon_{unem\,rate\,female} \\
\varepsilon_{gov\,trans}
\end{bmatrix}
\tag{4}
$$

We apply the aforementioned identification scheme to obtain impulse responses and variance decompositions, which help analyze dynamics over the forecast horizon. Although this empirical approach is widely used, we will not discuss the details of these analyses for brevity. We use the Akaike and Bayesian criteria to select the optimal lag length in our SVAR model and check that the roots are within the unit circle to ensure model stability. These steps confirm that the model is stationary and that the impulse responses and variance decompositions are stable.

## 4. Empirical result

This section presents the estimation results and analysis. We use one lag in the VAR model according to the Schwarz Bayesian Information Criterion. The estimated roots of the SVAR model lie within the unit circle, indicating that the models are stationary and the impulses are stable.

### 4.1 Impulse responses

We present the impulse responses from our SVAR model. Figure 1 displays the effects of a shock on the income ratio (top 10% to bottom 50%) for males. This shock has a minimal impact on most variables except for government transfer growth, which briefly declines between years 1 and 2 of the forecast horizon. Figure 2 illustrates the impact of a similar shock for females. Here, we observe significant effects across all variables. Income inequality among males and unemployment rates both decline significantly, with the male income ratio decreasing over the forecast period. Unemployment rates decrease but return to initial levels by the end of the forecast horizon, remaining significant for about 5 years. Government
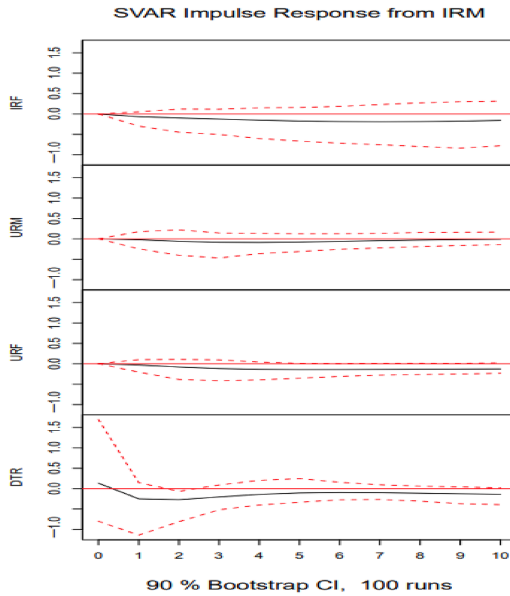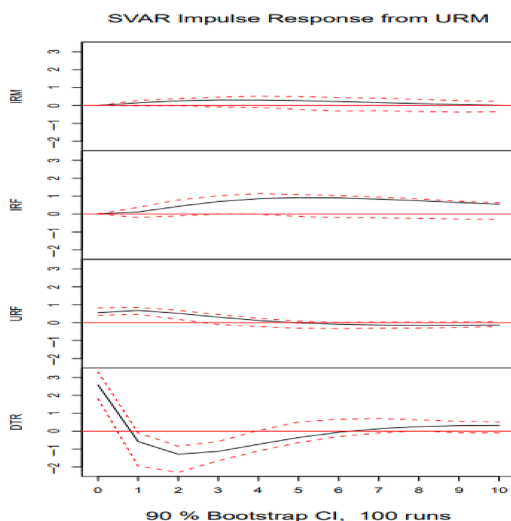
**Source(s):** Authors' own estimation
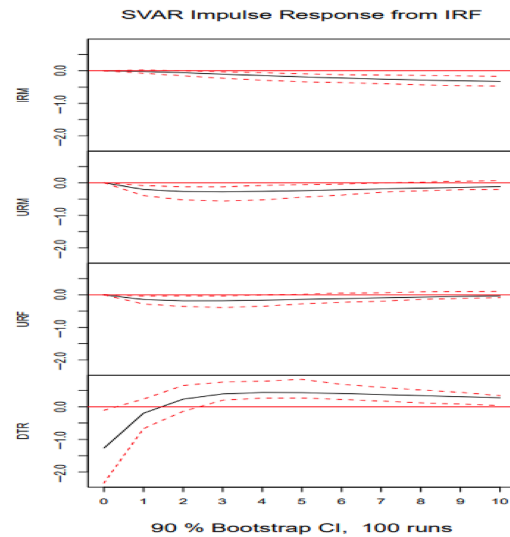
**Source(s):** Authors' own estimation

transfer growth initially declines but rises after approximately three years, stabilizing over the forecast period. Increased income inequality among females, alongside higher government transfers, likely reflects the greater need for support among female-headed households.

Figure 3 presents the impulse responses from a shock to the unemployment rate for males. We observe a statistically significant increase in the female unemployment rate for about two years, and then it declines. The shock to the male unemployment rate increasing the female unemployment rate may reflect the general labor market conditions, especially during economic downturns. Growth in government transfer initially depicts a statistically significant increase on impact for a year and then it declines up to year four. This again may reflect the policymaker's preference to support families in need with the required income support. At the same time, they reduce it over some period to disincentivize or discourage voluntary unemployment. Figure 4 presents the impulse responses from a shock to the unemployment rate for females. We observe a statistically significant decline in the ratio of income earned by the top 10% to the bottom 50% for males, and the ratio of income earned by the top 10% to the bottom 50% for females also depicts a statistically significant decline between the years four and seven. These results are interesting because these findings indicate that an increase in female unemployment reduces income inequality. This is perhaps indicative of a gender dimension to rising income inequality in the United States. We are observing a rising trend in female labor force participation but a declining trend for males in the United States. Therefore, it is plausible that family income is higher for households where both husband and wife are working. So, when the women in these families lose their jobs, their overall incomes decline, resulting in a fall in income inequality. We can find a plethora of research that links income inequality to marital choices, such as Esping-Andersen (2007), Schwartz (2010) and Greenwood et al. (2014). The response from growth in government transfer is statistically insignificant.

Figure 5 presents the impulse responses from a shock to growth in government transfer. We observe a statistically significant decline in the ratio of income earned by the top 10% to the bottom 50% for females up to year 3 in the forecast horizon. Beyond this point, it rises but it is not statistically significant. It is once again interesting that growth in government transfer reduces income inequality among females. This is perhaps indicative of a growing need for income-support programs for female-headed households. Drejerska et al. (2023) provide a detailed analysis exploring the linkage between transfer and female labor supply. There are
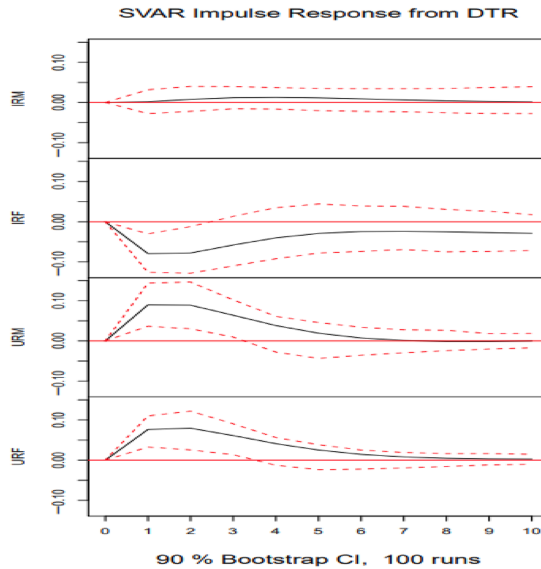


**Source(s):** Authors' own estimation

Figure 3.
Shock to
unemployment rate
of males

**Figure 4.**
Shock to unemployment rate of females
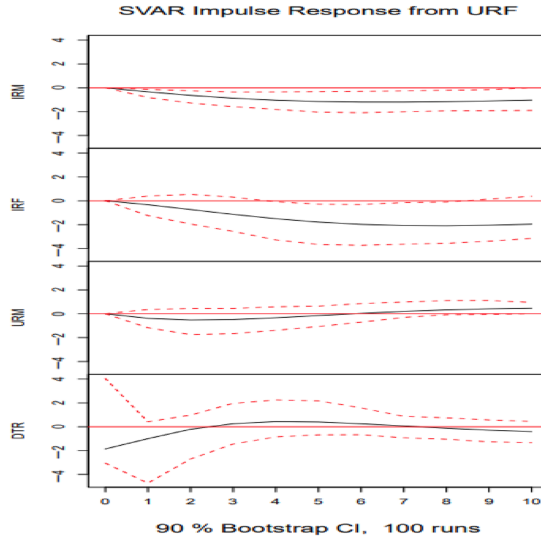
**Source(s):** Authors' own estimation



**Figure 5.**
Shock to growth in government transfer

**Source(s):** Authors' own estimation

studies that find a positive relationship between government transfer leading to increased female labor force participation (for example, Ennser-Jedenastik (2017) and Ahmed (2022)). One aspect that is highlighted in the literature is the availability of government supported subsidy for childcare that is available for working mothers (Ennser-Jedenastik, 2017). The unemployment rates for males and females rise in a statistically significant manner for about

three years in the forecast horizon. We observe both unemployment rates to depict a similar dynamic over the forecast horizon. It is plausible that an increase in government transfer increases unemployment rates consistent with other micro-econometric and macro-econometric studies. Arguably, government transfer creates an incentive to remain unemployed both for males and females. Overall, these findings are indicative of a potential tradeoff facing the policymakers – increasing resources for transfer may reduce income inequality among females at the cost of rising voluntary unemployment.

### 4.2 Variance decomposition

We present the forecast error variance decomposition here. Table 1 presents the variance decomposition of the ratio of income earned by the top 10% to the bottom 50% for the males. In year 1, 100% of its variation can be explained by its own innovation. But the impact seems to fall over the forecast horizon, as the explained variation drops below 50% from year 7 onwards. The shock in the income ratio for females and growth in government transfer can explain very little variation in the income ratio for males. The unemployment rate for males can similarly explain very little variation in the income ratio for males. Interestingly, the female unemployment rate has a larger impact on the ratio of income for males. Though it does not impact the income ratio for males in the first year, the impact grows significantly over the forecast horizon from 5.8% in year 2, to 15.9% in period 3, 26.3% in year 4, and so forth. By year 10, in the forecast horizon, this shock can explain more than 53% of variation in the income ratio in males. This finding is perhaps indicative of some influence of the associative marriage hypothesis as evident in Esping-Andersen (2007), Schwartz (2010) and Greenwood *et al*. (2014). Arguably, in families where both husband and wife are working, an increase in female unemployment (or employment) will impact total household income. Perhaps, the male household member may also become unemployed along with the female partner or the male partner may increase labor supply to compensate for the total loss in family income.

Table 2 presents the variance decomposition of the ratio of income earned by the top 10% to the bottom 50% by the females (income ratio for females, henceforth). It can explain 100% of its variation in year 1, followed by 94% in year 2 of the forecast horizon. But the impact seems to significantly fall over the forecast horizon, as the explained variation drops below 50% from year 5 onwards. The shocks to the income ratio for males and growth in government transfer can explain very little variation in the income ratio for females. The shock to male unemployment rate can explain variation in the ratio of income for females around 4.6% in year 3, 9.7% in year 4, 13.09% in year 5, and reaches a maximum of 14.77% in

| | Income ratio male | Income ratio female | Unemployment rate male | Unemployment rate female | Growth in gov transfer |
|---|---|---|---|---|---|
| 1 | 1.000 | 0.000 | 0.000 | 0.000 | 0.00000 |
| 2 | 0.931 | 0.000 | 0.011 | 0.058 | 0.00000 |
| 3 | 0.813 | 0.001 | 0.027 | 0.159 | 0.00002 |
| 4 | 0.697 | 0.003 | 0.036 | 0.263 | 0.00004 |
| 5 | 0.604 | 0.005 | 0.040 | 0.351 | 0.00005 |
| 6 | 0.535 | 0.008 | 0.038 | 0.418 | 0.00005 |
| 7 | 0.486 | 0.011 | 0.035 | 0.467 | 0.00005 |
| 8 | 0.453 | 0.014 | 0.032 | 0.501 | 0.00005 |
| 9 | 0.430 | 0.018 | 0.028 | 0.524 | 0.00004 |
| 10 | 0.416 | 0.022 | 0.025 | 0.537 | 0.00004 |

**Source(s):** Authors' own estimation

Table 1.
VDC of income earned
by top 10% to bottom
50% for males

| | | Income ratio male | Income ratio female | Unemployment rate male | Unemployment rate female | Growth in gov transfer |
|---|---|---|---|---|---|---|
| | 1 | 0.0000 | 1.0000 | 0.0000 | 0.0000 | 0.0000 |
| | 2 | 0.0019 | 0.9422 | 0.0056 | 0.0477 | 0.0027 |
| | 3 | 0.0033 | 0.7932 | 0.0465 | 0.1540 | 0.0029 |
| | 4 | 0.0042 | 0.6168 | 0.0973 | 0.2794 | 0.0022 |
| | 5 | 0.0048 | 0.4719 | 0.1309 | 0.3908 | 0.0016 |
| | 6 | 0.0053 | 0.3689 | 0.1454 | 0.4792 | 0.0012 |
| | 7 | 0.0057 | 0.2986 | 0.1477 | 0.5472 | 0.0009 |
| | 8 | 0.0059 | 0.2505 | 0.1438 | 0.5991 | 0.0007 |
| | 9 | 0.0060 | 0.2171 | 0.1373 | 0.6389 | 0.0006 |
| | 10 | 0.0061 | 0.1934 | 0.1304 | 0.6696 | 0.0006 |

Table 2.
VDC of income earned by top 10% to bottom 50% females

**Source(s):** Authors' own estimation

year 7. Beyond this point, it drops, albeit very small in magnitude. This finding is consistent with the associative marriage hypothesis (Greenwood *et al.*, 2014). As expected, we observe that the female unemployment rate can explain a larger fraction of the variation in the income ratio for females over the forecast horizon. Although it can explain 0 variations on impact and explains only 4% in year 2, it increases sharply afterward in the forecast horizon. In year 3 it rises to 15.40% followed by 27.94% in year 4 and 39.08% in year 5. By year 10 of the forecast horizon, this shock can explain about 66% variation.

Table 3 presents the variance decomposition for the male unemployment rate. It can explain 100% of its variation in year 1, followed by 91% in year 2 of the forecast horizon. But the impact seems to fall over the forecast horizon. We can find a similar pattern for a shock to the unemployment rate for females. Arguably, both these labor market indicators depict the same labor market dynamics. Therefore, we will observe a similar pattern. Male income ratio and growth in government transfer can explain very little variance in the unemployment rate for males. The income ratio for females seems to explain some variance in the unemployment rate for males in a monotonically increasing manner over the forecast horizon. For example, 1.8% in year 2, 3.58% in year 3, 5.23% in year 4, and so forth. Table 4 presents the variance decomposition for the unemployment rate for females. In year 1, 76% of its variation can be explained by its own innovation; this impact drops to 53.44% in year 5, stays persistent for a couple of years, and then increases to 60% in year 10 over the forecast horizon. It depicts a u-shaped pattern, but interestingly it depicts an inversely u-shaped pattern for a shock to the

| | | Income ratio male | Income ratio female | Unemployment rate male | Unemployment rate female | Growth in gov transfer |
|---|---|---|---|---|---|---|
| | 1 | 0.0000 | 0.0000 | 1.0000 | 0.0000 | 0.0000 |
| | 2 | 0.0002 | 0.0181 | 0.9128 | 0.0653 | 0.0036 |
| | 3 | 0.0013 | 0.0358 | 0.8238 | 0.1340 | 0.0051 |
| | 4 | 0.0031 | 0.0523 | 0.7584 | 0.1806 | 0.0055 |
| | 5 | 0.0050 | 0.0675 | 0.7212 | 0.2007 | 0.0056 |
| | 6 | 0.0065 | 0.0805 | 0.7054 | 0.2021 | 0.0056 |
| | 7 | 0.0073 | 0.0902 | 0.6988 | 0.1983 | 0.0055 |
| | 8 | 0.0076 | 0.0958 | 0.6902 | 0.2011 | 0.0053 |
| | 9 | 0.0075 | 0.0976 | 0.6743 | 0.2156 | 0.0051 |
| | 10 | 0.0072 | 0.0966 | 0.6513 | 0.2402 | 0.0048 |

Table 3.
VDC of unemployment rate male

**Source(s):** Authors' own estimation

| | Income ratio male | Income ratio female | Unemployment rate male | Unemployment rate female | Growth in gov transfer |
|---|---|---|---|---|---|
| 1 | 0.0000 | 0.0000 | 0.2368 | 0.7632 | 0.0000 |
| 2 | 0.0005 | 0.0096 | 0.3653 | 0.6219 | 0.0027 |
| 3 | 0.0030 | 0.0213 | 0.4114 | 0.5595 | 0.0048 |
| 4 | 0.0077 | 0.0320 | 0.4163 | 0.5381 | 0.0058 |
| 5 | 0.0139 | 0.0403 | 0.4052 | 0.5344 | 0.0062 |
| 6 | 0.0202 | 0.0454 | 0.3895 | 0.5387 | 0.0062 |
| 7 | 0.0257 | 0.0474 | 0.3726 | 0.5484 | 0.0059 |
| 8 | 0.0298 | 0.0469 | 0.3549 | 0.5629 | 0.0056 |
| 9 | 0.0326 | 0.0450 | 0.3365 | 0.5807 | 0.0052 |
| 10 | 0.0345 | 0.0424 | 0.3182 | 0.6001 | 0.0048 |
| **Source(s):** Authors' own estimation | | | | | |

Table 4.
VDC of unemployment
rate female

unemployment rate for males. The shock to the unemployment rate for males can explain 23.68% of the variation of the unemployment rate for females in year 1 and keep rising reaching at 41.63% in year 4. Then, the variance starts to decline reaching 31.82% in year 10. Both these indicators refer to the same labor market. The u-shaped variation may arise due to the associative marriage hypothesis. A shock to the growth in government transfer can explain very little variance in the unemployment rate for females. Shocks to the ratio of income earned by the top 10% to the bottom 50% for males as well as females can explain the very small variance in the unemployment rate for females. Over the forecast horizon, we find around 3% and 4% of the variation in the unemployment rate for females can be explained by the income ratio for males and females.

Table 5 presents the variance decomposition of the growth in government transfer. It is interesting that the shock to this variable can explain very little of its own variation in a monotonically decreasing manner over the forecast horizon. It can explain 7.8% in year 1, 5.74% in year 5, and 5.38% in year 10. We can observe that about 1% of the variations in the growth in transfers can be explained by the income ratio for males over the forecast horizon, while the scenario is different for a shock to the income ratio for females. This shock can explain 12.60% variation in year 1, followed by 11.57% in year 2, and 10.60% in year 3. The impact then continuously increases to 13.89% in year 10. Perhaps female-headed families need and apply for government support, which then impacts the female income ratio. Also, we may observe opt-out of the program when situations improve for them. We observe shocks to the unemployment

| | Income ratio male | Income ratio female | Unemployment rate male | Unemployment rate female | Growth in gov transfer |
|---|---|---|---|---|---|
| 1 | 0.0014 | 0.1260 | 0.5225 | 0.2720 | 0.0781 |
| 2 | 0.0056 | 0.1157 | 0.4919 | 0.3144 | 0.0724 |
| 3 | 0.0095 | 0.1060 | 0.5388 | 0.2812 | 0.0645 |
| 4 | 0.0111 | 0.1056 | 0.5633 | 0.2602 | 0.0598 |
| 5 | 0.0116 | 0.1108 | 0.5635 | 0.2567 | 0.0574 |
| 6 | 0.0119 | 0.1179 | 0.5556 | 0.2583 | 0.0563 |
| 7 | 0.0122 | 0.1252 | 0.5487 | 0.2582 | 0.0557 |
| 8 | 0.0126 | 0.1314 | 0.5447 | 0.2560 | 0.0552 |
| 9 | 0.0131 | 0.1361 | 0.5421 | 0.2541 | 0.0546 |
| 10 | 0.0137 | 0.1389 | 0.5390 | 0.2545 | 0.0538 |
| **Source(s):** Authors' own estimation | | | | | |

Table 5.
VDC of growth in
government transfer

rates for the males and females can explain a lot of variation in the growth in government transfer. This is expected as people may apply for government assistance at times of unemployment. We observe that a shock to the unemployment rate for males can explain more than 50% of the variation in growth in government transfer. It starts with 52.25% in year 1, followed by 49.19% in year 2, 53.88% in year 3, 56.33% in year 4, and it remains in that range over the forecast horizon. We can see a similar pattern for the female unemployment rate as well. It starts with 27% in year 1, followed by 31% in year 2 and then gradually declines to about 25% for the remaining periods in the forecast horizon. The impact of the male unemployment rate is much more profound and quantitatively twice the impact relative to females.

## 5. Conclusion

Rising income inequality is a significant concern for policymakers, academics, and the public in the United States. Extensive research explores this issue from various perspectives. Governments globally use transfer programs to address inequality and poverty though these programs often face criticism for potentially discouraging labor market participation. This research examines the dynamics among income inequality measures, unemployment rates by gender, and government transfer growth using annual time series data. We employ structural vector autoregression models to compute impulse responses and variance decompositions, aiming to provide new insights into these dynamics.

The results from structural impulse responses show that a shock to growth in government transfer increases unemployment rates for males and females. This finding conforms to earlier work that shows that the government transfers disincentives employment in the labor market (see for example, Ahmed (2022)). Variance decomposition analysis also echoes similar findings. The variance in the growth in government transfer can be explained by the male unemployment rate twice as much as the female unemployment rate. A shock to the male unemployment rate increases income inequality, albeit briefly, but a shock to the female unemployment rate reduces income inequality. A shock to the female income ratio lowers income inequality for males. Perhaps the associative marriage hypothesis plays an important role in this regard (Esping-Andersen, 2007; Schwartz, 2010; Greenwood et al., 2014). We observe that a shock to growth in government transfer reduces income inequality among females. A shock to the female income ratio reduces growth in government transfer on impact but then it rises over the forecast horizon. When we analyze the variance decomposition for growth in government transfer, we find that the female income ratio and the unemployment rates explain a lot of variation in government transfer. This set of findings is indicative of a gender-specific variation. Perhaps, increased government transfer reduces poverty by reducing income inequality among female-headed households. Also, it is noteworthy that increased unemployment in the labor market significantly increases government transfer. Therefore, a gender-directed government transfer may improve social outcomes, and over time reduce government outlays on transfer.

Our findings indicate that policymakers should use gender-specific tools to address income inequality, as the female workforce shows different responses compared to males. Monthly or quarterly data would have improved the analysis. A key limitation of the SVAR approach is its high parameterization, which can lead to degrees of freedom issues with many variables and lags. Additionally, omitted variable effects may distort impulse responses and introduce measurement errors or misspecifications.

### Note
1. Data plots for the variables are presented in the Online Appendix.

# References

Acemoglu, D. and Autor, D.H. (2011), "Skills, tasks and technologies: implications for employment and earnings", in Card, D. and Ashenfelter, O. (Eds), *Handbook of Labor Economics*, 4th ed., Elsevier, North Holland, pp. 1043-1172.

Aghion, P. (2002), "Schumpeterian growth theory and the dynamics of income inequality", *Econometrica*, Vol. 70 No. 3, pp. 855-882, doi: 10.1111/1468-0262.00312.

Ahmed, H.A. (2022), "Is there a long-run relationship between the unemployment insurance and the labor force participation rate in the USA? A nonlinear analysis", *EconomiA*, Vol. 23 No. 1, pp. 25-43, doi: 10.1108/econ-05-2022-0006.

Ahmed, H.A., Mahmood, S. and Shadmani, H. (2022), "Defense and nondefense vs debt: how does defense and non-defense government spending impact the dynamics of federal government debt in the United States?", *Journal of Government and Economics*, Vol. 7, 100050, doi: 10.1016/j.jge.2022.100050.

Ahn, S., Kaplan, G., Moll, B., Winberry, T. and Wolf, C. (2018), "When inequality matters for macro and macro matters for inequality", *NBER Macroeconomics Annual*, Vol. 32 No. 1, pp. 1-75, doi: 10.1086/696046.

Amisano, G. and Giannini, C. (1997), "From VAR models to structural VAR models", in *Topics in Structural VAR Econometrics*, Springer, Berlin, Heidelberg, pp. 1-28.

Arestis, P. (2018), "Importance of tackling income inequality and relevant economic policies", in *Inequality: Trends, Causes, Consequences, Relevant Policies*, pp. 1-42, doi: 10.1007/978-3-319-91298-1_1.

Atkinson, A.B. (1997), "Bringing income distribution in from the cold", *The Economic Journal*, Vol. 107 No. 441, pp. 297-321, doi: 10.1111/1468-0297.00159.

Autor, D.H. (2014), "Skills, education, and the rise of earnings inequality among the 'other 99 percent'", *Science*, Vol. 344 No. 6186, pp. 843-851, doi: 10.1126/science.1251868.

Autor, D.H. (2019), "Work of the past, work of the future", *American Economic Review Papers and Proceedings*, Vol. 109, pp. 1-32, doi: 10.1257/pandp.20191110.

Betson, D. and Haveman, R. (1984), "The role of income transfers in reducing inequality between and within regions", in *Economic Transfers in the United States*, University of Chicago Press, pp. 283-326, available at: http://www.nber.org/chapters/c8811

Bor, J., Cohen, G.H. and Galea, S. (2017), "Population health in an era of rising income inequality: USA, 1980–2015", *The Lancet*, Vol. 389 10077, pp. 1475-1490, doi: 10.1016/s0140-6736(17)30571-8.

Boyle, P., Cooke, T.J., Halfacree, K. and Smith, D.A. (2001), "Cross-national comparison of the impact of family migration on women's employment status", *Demography*, Vol. 38 No. 2, pp. 201-213, doi: 10.2307/3088301.

Breen, R. and García-Peñalosa, C. (2005), "Income inequality and macroeconomic volatility: an empirical investigation", *Review of Development Economics*, Vol. 9 No. 3, pp. 380-398, doi: 10.1111/j.1467-9361.2005.00283.x.

Breitung, J.A. (2001), "Convenient representation for structural vector autoregressions", *Empirical Economics*, Vol. 26 No. 2, pp. 447-459, doi: 10.1007/s001810000065.

Caines, C., Hoffmann, F. and Kambourov, G. (2017), "Complex-task biased technological change and the labor market", *Review of Economic Dynamics*, Vol. 25, pp. 298-319, doi: 10.1016/j.red.2017.01.008.

Clark, W.A. and Withers, S.D. (2002), "Disentangling the interaction of migration, mobility, and labor-force participation", *Environment and Planning A*, Vol. 34 No. 5, pp. 923-945, doi: 10.1068/a34216.

Congressional Budget Office (2022), "The distribution of household income 2019", Washington, DC.

Cynamon, B.Z. and Fazzari, S.M. (2015), "Rising inequality and stagnation in the US economy", *European Journal of Economics and Economic Policies: Intervention*, Vol. 12 No. 2, pp. 170-182, doi: 10.4337/ejeep.2015.02.03.

Drejerska, N., Chrzanowska, M. and Wysoczański, J. (2023), "Cash transfers and female labor supply—how public policy matters? A bibliometric analysis of research patterns", *Quality and Quantity*, Vol. 57 No. 6, pp. 5381-5402, doi: 10.1007/s11135-022-01609-0.

Ennser-Jedenastik, L. (2017), "How women's political representation affects spending on family benefits", *Journal of Social Policy*, Vol. 46 No. 3, pp. 563-581, doi: 10.1017/S0047279416000933.

Esping-Andersen, G. (2007), "Sociological explanations of changing income distributions", *American Behavioral Scientist*, Vol. 50 No. 5, pp. 639-658, doi: 10.1177/0002764206295011.

Fortin, N.M., Lemieux, T. and Lloyd, N. (2021), "Labor market institutions and the distribution of wages: the role of spillover effects", *Journal of Labor Economics*, Vol. 39 No. S2, pp. S369-S412, doi: 10.1086/712923.

Goldin, C.D. and Katz, L.F. (2007), "Long-run changes in the U.S. wage structure: narrowing, widening, polarizing", *Brookings Papers on Economic Activity*, Vol. 38 2007-2, pp. 135-165.

Greenwood, J., Guner, N., Kocharkov, G. and Santos, C. (2014), "Marry your like: assortative mating and income inequality", *The American Economic Review*, Vol. 104 No. 5, pp. 348-353, doi: 10.1257/aer.104.5.348.

Higgins, S. and Lustig, N. (2016), "Can a poverty-reducing and progressive tax and transfer system hurt the poor?", *Journal of Development Economics*, Vol. 122, pp. 63-75, doi: 10.1016/j.jdeveco.2016.04.001.

Hoffmann, F., Lee, D.S. and Lemieux, T. (2020), "Growing income inequality in the United States and other advanced economies", *The Journal of Economic Perspectives*, Vol. 34 No. 4, pp. 52-78, doi: 10.1257/jep.34.4.52.

Jäntti, M. and Jenkins, S.P. (2010), "Examining the impact of macro-economic conditions on income inequality", *The Journal of Economic Inequality*, Vol. 8 No. 2, pp. 221-240, doi: 10.1007/s10888-009-9113-8.

Johnston, A.C. and Mas, A. (2018), "Potential unemployment insurance duration and labor supply: the individual and market-level response to a benefit cut", *Journal of Political Economy*, Vol. 126 No. 6, pp. 2480-2522, doi: 10.1086/699973.

Joumard, I., Pisu, M. and Bloch, D. (2013), "Tackling income inequality", in *OECD Economic Surveys: Colombia 2013: Economic Assessment*, OECD Publishing, Paris, doi: 10.1787/eco_surveys-col-2013-4-en.

Keynes, J.M. (1936), *The General Theory of Employment, Interest and Money*, Macmillan, London.

Kumhof, M. and Rencière, R. (2010), "Leveraging inequality", *Finance and Development*, Vol. 47 No. 4, pp. 28-31.

Lemieux, T. (2006), "Increasing residual wage inequality: composition effects, noisy data, or rising demand for skill?", *The American Economic Review*, Vol. 96 No. 3, pp. 461-498, doi: 10.1257/aer.96.3.461.

Mankiw, N.G. (2022), *Macroeconomics*, Worth, Macmilan Learning, NY.

McCombie, J.S.L. and Spreafico, M.R.M. (2015), "Income inequality and growth: problems with the orthodox approach", *Paper Presented at the Session, Analyzing Growth and Inequality in the 21st Century, at the INET Conference*, Paris.

Ostry, J.D. (2015), "Inequality and the duration of growth", *European Journal of Economics and Economic Policies: Intervention*, Vol. 12 No. 2, pp. 147-157, doi: 10.4337/ejeep.2015.02.01.

Schwartz, C.R. (2010), "Earnings inequality and the changing association between spouses' earnings", *American Journal of Sociology*, Vol. 115 No. 5, pp. 1524-1557, doi: 10.1086/651373.

Saez, E. (2019), *Striking it Richer: The Evolution of Top Incomes in the United States*, University of California, Berkeley.

Sims, C.A. (1980), "Comparison of interwar and postwar business cycles", *The American Economic Review*, Vol. 70 No. 2, pp. 250-257.

Stiglitz, J. (2015), "Inequality and economic growth", *The Political Quarterly*, Vol. 86 No. S1, pp. 134-155, doi: 10.1111/1467-923X.12237.

## Further reading

Alvaredo, F., Atkinson, A.B., Blanchet, T., Chancel, L., Bauluz, L., Fisher-Post, M. and Piketty, T. (2020), "Distributional national accounts guidelines, methods and concepts used in the world inequality database", Doctoral dissertation, PSE (Paris School of Economics).

## Supplementary material
Supplementary material for this article can be found online.

## Corresponding author
Haydory Akbar Ahmed can be contacted at: hahmed2@stedwards.edu