

The Effectiveness of Monetary and Fiscal Policy Shocks on U.S. Inequality: The Role of Uncertainty

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Abstract

The study examines the effect of monetary and fiscal policy on inequality conditioned on low and high uncertainty. We use U.S. quarterly time series data on different measures of income, labour earnings, consumption and total expenditure inequality as well as economic uncertainty. Our analysis is based on the impulse responses from the local projection methods that enable us to recover a smoothed average of the underlying impulse response functions. The results show that both contractionary monetary and fiscal policies increase inequality, and in the presence of relatively higher levels of uncertainty, the effectiveness of both policies is weakened. Thus, pointing to the need for policy-makers to be aware of the level of uncertainty while conducting of economic policies in the U.S.

Keywords: Inequality; Monetary and Fiscal Policies; Uncertainty.

JEL Codes: C22, E24, E40, E62.

1. Introduction

The world at large is characterised by different sorts of inequality. This ranges from income, wealth, consumption and gender inequality amongst others. Both wealth and income inequality have steadily increased in most Organization for Economic Cooperation and Development countries since the 1970s (OECD, 2015) with a greater rise in the United States relative to Europe (O'Farrell and Rawdanowicz, 2017). Although, the literature is filled with various causes of inequality, there is a growing concern that economic policies may have distributional impacts on economic agents. This is even reflected in the current trend whereby policy makers focus on distributional effect rather than the conventional aggregate considerations (Mersch 2014, Bullard 2014, Forbes 2015, Bernanke 2015).

The effect of fiscal policy on inequality seems to have been established, however, the effect of monetary policy on inequality is not very clear given that there exists several channels through which this may happen. Coibion et al. (2017) highlighted five theoretical channels

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through which monetary policy may affect inequality namely the *income composition channel*, *financial segmentation channel*, *financial segmentation channel*, *savings redistribution channel* and *earnings heterogeneity channel*. The first three channels predict increasing inequality given an expansionary monetary policy shock while the last two channels predict a reduction in inequality following an expansionary monetary policy shock. These channels were summarized into two general distributive channels of monetary policy by Nakajima (2015): inflation and income channels. Inflation channel contains the financial segmentation channel, the portfolio composition channel, and the savings redistribution channel. Income channel includes the income composition channel and the earnings heterogeneity channel.

While economic policies are expected to affect macroeconomic variables in general and inequality in particular, the question as to the effectiveness of these policies in the presence of uncertainty requires attention. For instance, it has been observed that the 2007-2009 recession led to a rising uncertainty in the world at large and US in particular, a situation which resulted to a sharp slash of the Federal funds rate in an effort to slow down the fall of real GDP in the US (Jurado et al., 2015; Castelnuovo and Pellegrino, 2017). Uncertainty about economic policies may affect macroeconomic variables through different transmission channels namely: the precautionary savings (Bloom, 2014; Fernández-Villaverde et al., 2015; Basu and Bundick, 2017), real-option effects arising from fixed costs or partial irreversibilities (Bloom, 2009; Bloom, et al., 2007) and aggregate price flexibility (Bachmann, et al., 2013; Vavra, 2014; Castelnuovo and Pellegrino, 2017).

The review of literature in the next section indicates a dearth of analysis on the relationship between economic policy uncertainty and inequality, though a vast literature exists between the former and macroeconomic variables. Therefore, the focus of this study and its contribution is to provide empirical evidence on the effect of monetary and fiscal policies on inequality under low and high levels of uncertainty for the first time. The rest of the paper is organised as follows: Literature review is presented in Section 2. Data and empirical methods are discussed in Section 3, while Section 4 is devoted to results, with Section 5 concluding the paper.

2. Literature Review

On the empirical front, a large number of studies have examined the effect of economic policy on macroeconomic variables in the presence of uncertainty and document that effect of policy on macroeconomic variables is not the same under uncertainty. Recent ones include Fernández-Villaverde et al. (2015), Jurado et al. (2015), Balcilar et al. (forthcoming), Tenreyro and Thwaites (2016), Baker et al. (2016), Aastveit et al. (2017), Castelnovo and Pellegrino (2017), Ozturk and Sheng (2017) amongst others.

However, there is little or no study that have examined the role of uncertainty in the relationship between economic policy and inequality. The available related studies are those that investigate the link between monetary policy and inequality (Saiki and Frost, 2014; Villarreal, 2014; Nakajima, 2015; Coibion et al., 2017; Mumtaz and Theophilopoulou, 2017; Davtyan, 2017; O'Farrell and Rawdanowicz, 2017 amongst others) and between fiscal policy and inequality (Wolff and Zacharias, 2007, Afonso et al., 2010; Doerrenberg and Peichl, 2014 amongst others) but without conditioning the impact on uncertainty. For instance, Saiki and Frost (2014) provide evidence that unconventional monetary policy raises income inequality in Japan in the short run. In particular, they show that by increasing the monetary base, unconventional monetary policy widens income inequality through resulting higher asset prices, benefiting the rich who usually hold these equities and acquire capital gains.

Coibion et al. (2017) examined the effects of monetary policy shocks on consumption and income inequality in the United States using data using micro level survey data from 1980:Q3 to 2008:Q4. Their findings show that contractionary monetary policy has an increasing effect on the different measures of inequality used. Also monetary policy shocks account for a large component of the historical cyclical variation in income and consumption inequality. Using micro level quarterly data from 1969 to 2012, Mumtaz and Theophilopoulou (2017) investigated the role of monetary policy shocks in explaining the observed increase in inequality in the UK. Results based on structural VAR as well as FAVAR show that contractionary monetary policy shocks lead to an increase in the level and volatility of earnings, income and consumption inequality. Their findings also suggests that the policy of quantitative easing may have adverse distributional effects.

On the contrary, Davtyan (2017) using US data from 1983 to 2012 and VECM found that a contractionary monetary policy shock decreases Gini index of income inequality up to 0.4

percentage points. Further, O'Farrell and Rawdanowicz (2017) show via simulation results that monetary policy easing has small and ambiguous effects on income and net wealth inequality via financial channels with effects depending on the relative size and distributions of assets, liabilities, and income. While the empirical evidence is mixed, the foregoing review also suggests that none of these studies considered the effect of monetary and/or fiscal policy on inequality under uncertainty. This is the gap this current study seeks to fill in the literature.

3. Data and Empirical Model

We used U.S. quarterly data from 1980:1 to 2008:4 with the sample coverage being determined by the availability of data on U.S. inequality. Our data on economic uncertainty was obtained from: www.policyuncertainty.com, while data on inequality were obtained from Coibion et al. (2017) constructed using the Consumer Expenditure Survey (CEX) data, which in turn is available for download from: <http://lorenzkueng.droppages.com/>. We consider both income and consumption inequality with each measured in three different forms namely: Gini coefficients of levels, cross-sectional standard deviations of log levels, and differences between individual percentiles of the cross-sectional distribution of log levels, specifically the 90th to 10th percentile differential. On the income side, both labour earnings and total income inequality are considered. Similarly, on the consumption side both consumption expenditure and total expenditure inequality are considered.¹ For uncertainty, we use the news-based US economic policy uncertainty data,² as developed by Baker et al., (2016), though there are of course other measures of uncertainty available, but those do not necessarily relate to policy-making (see, Pierdzioch and Gupta (2017) for a detailed discussion in terms of the alternative measures of uncertainty, which in any case do tend to be very highly correlated irrespective of the approach undertaken to construct the latent variable of uncertainty). To construct the index, Baker et al., (2016) perform month-by-month searches of several newspapers³, for

¹ More details about the inequality data can be found in Coibion et al. (2017).

² Our results were qualitatively similar when we used categorical uncertainty dealing with monetary and fiscal policies, over 1985:1 to 2008:4, developed also by Baker et al., (2016) (available at: http://www.policyuncertainty.com/categorical_epu.html) specifically rather than overall economic uncertainty, and the monetary policy uncertainty measures developed by Husted et al., (2017) (available at: <https://www.federalreserve.gov/econresdata/notes/ifdp-notes/2016/measuring-monetary-policy-uncertainty-the-federal-reserve-january-1985-january-2016-20160411.html>) covering 1985:1 to 2008:4, and Istrefi and Mouabbi (forthcoming) (available at: <https://sites.google.com/site/sarahmouabbi/interest-rate-uncertainty> or <https://sites.google.com/site/sarahmouabbi/interest-rate-uncertainty>) over the period of 1993:2 to 2008:4. Since, these indices are available monthly, we used temporal aggregation to convert to quarterly frequency. Complete details of these results are available upon request from the authors.

³ The newspapers searched are: the Wall Street Journal, the New York Times, the Washington Post, the Chicago Tribune, the LA Times, and the Boston Globe, along with USA Today, the Miami Herald, the Dallas Morning Tribune, and the San Francisco Chronicle.

terms related to economic and policy uncertainty. In particular, the authors search for articles containing the term ‘uncertainty’ or ‘uncertain’, the terms ‘economic’, ‘economy’, ‘business’, ‘commerce’, ‘industry’, and ‘industrial’ as well as one or more of the following terms: ‘congress’, ‘legislation’, ‘white house’, ‘regulation’, ‘federal reserve’, ‘deficit’, ‘tariff’, or ‘war’. In other words, to meet the criteria for inclusion, the article must include terms in all three categories pertaining to uncertainty, the economy and policy. Uncertainty data is monthly but we converted them to quarterly by taking averages, and define high uncertainty if the value is above mean, and low uncertainty for values below the mean, by multiplying aggregate uncertainty with two dummy variables, which takes the value of one if above the mean and zero otherwise, and another dummy variable when the opposite holds to give us high and low levels of economic uncertainty.

To analyse the effect of economic uncertainty on the effectiveness of policy on the various forms and measures of inequality as discussed above, we identify fiscal (tax) (e^{FP}) and monetary (e^{MP}) policy shocks following Romer and Romer (2004, 2010) and Coibion et al. (2017) respectively.⁴ However, differently from them, we interacted the policy shock with our uncertainty index (*UNCERTAINTY*). This policy shock is purged of the anticipatory effects related to economic conditions. By interacting the policy shock with an uncertainty index, we allow the impact of monetary and fiscal policy to change with the degree of uncertainty. The response of inequality to monetary and fiscal policy shocks under high ($UNCERTAINTY_{High}$) and low ($UNCERTAINTY_{Low}$) uncertainties at different horizons h , are estimated using local projection methods. Our empirical model for analysing the effect of monetary policy under uncertainty is give is specified as:

$$y_{t+h} - y_{t+h-1} = c^{(h)} + \sum_{j=1}^J \alpha_j (y_{t-j} - y_{t-j-1}) + \sum_{i=1}^I \beta_i^{(h)} (e_{t-i}^{MP} \times UNCERTAINTY_{High}) + \sum_{p=1}^P \beta_p^{(h)} (e_{t-p}^{MP} \times UNCERTAINTY_{Low}) + error_{t+h}, \quad h = 0, \dots, H \quad (1)$$

and for the effect of fiscal policy under uncertainty we use:

⁴ , The fiscal and monetary policy shocks were obtained from: <http://econweb.ucsd.edu/~vramey/research.html#govt> and <http://lorenzkueng.droppages.com/>, respectively

$$y_{t+h} - y_{t+h-1} = c^{(h)} + \sum_{j=1}^J \alpha_j (y_{t-j} - y_{t-j-1}) + \sum_{i=1}^I \beta_i^{(h)} (e_{t-i}^{FP} \times UNCERTAINTY_{High}) + \sum_{p=1}^P \beta_p^{(h)} (e_{t-p}^{FP} \times UNCERTAINTY_{Low}) + error_{t+h}, \quad h = 0, \dots, H \quad (2)$$

where y is the variable of interest (labour earnings, income, consumption or total expenditure inequality). e_t^{MP} and e_t^{FP} are respectively quarterly monetary and fiscal policy innovations. $UNCER$ is the US policy uncertainty which is defined to be either low or high. UN_ECON is the aggregate economic policy uncertainty which is also defined to be either low or high. The indicator for high uncertainty is 1 if the particular measure of uncertainty is above the sample mean and 0 otherwise. Similarly the indicator for low uncertainty is 1 if the particular measure of uncertainty is below the sample mean and 0 otherwise. We set the number of horizons (h) to 20, $J = 2$, $I = 20$ and $P = 20$. The system of equations across horizons were jointly estimated and this allows us to test the null hypothesis that the impulse response is equal to zero for all horizons using 1 and 1.65 standard deviation confidence intervals, as well as p -values. Due to time aggregation in the CEX data, we allow a contemporaneous response of inequality to policy shocks. Therefore, the accumulated impulse responses to monetary and fiscal policy shock under uncertainty are given by $\{\hat{\beta}_0^{(h)}\}_{h=0}^H$.

4. Results and Discussion

The accumulated impulse responses of each form of inequality (income, labour earnings, expenditure and consumption) and each measure of inequality (the standard deviation, Gini, and 90th to 10th percentile differential) to a one percentage point (100 b.p.) contractionary monetary policy shock under low and high policy uncertainties are presented in Figure 1. The four forms of inequality are presented column wise, while the three measures are presented row wise. Similarly Figure 2 depicts the effect of the fiscal policy shock under low and high uncertainties. We also report p -values for the test of the null hypothesis that monetary policy shocks have no effect on each form of inequality across all ($h = 0, \dots, 20$) horizons. Results showing the one and 1.65 standard deviation confidence intervals for low and high uncertainties for monetary and fiscal policy shocks with the confidence intervals are presented in Figures A1 to A4 in the Appendix. The results in Figure 1 show that generally, all forms and measures of inequality rise in response to a one percentage point contractionary monetary policy shock

under both high and low uncertainty. The only clear exception being those of earnings inequality, which declined immediately following a shock and remain negative basically up to the 8th horizon. In general, our results are in line with Coibion et al., (2017), though when interacting with uncertainty affects the strength of the impact of monetary policy. Overall, the impact of monetary policy under high and low uncertainty is statistically significant as evidenced by the low p -values as well as the confidence intervals (Figures A1 and A2 in the Appendix). The response of inequality to a monetary policy shock tends to be higher under low uncertainty relative to high uncertainty. The response of 90-10th differential expenditure inequality is highest with about 0.4 percentage point rise under low uncertainty and 0.2 percentage point rise under high uncertainty. To put things alternatively, an expansionary monetary policy should significantly reduce inequality, but its ability to do so would be compromised if uncertainty is high.

Figure 2 also depicts statistical significance of the impact of fiscal policy under both low and high policy uncertainties. Here we observed that in general inequality rises with a one percentage point increase in tax shock, though it is not always evident that inequality's response to a contractionary fiscal policy shock is more on impact when uncertainty relatively low. However, at the same time, there are also cases, where under higher uncertainty, the effect of tax policy is so weakened that inequality actually decreases following a contractionary fiscal policy shock.⁵ A possible explanation could be that, since under high uncertainty the economy is in recession, forward-looking agents believe that the tax hike is temporary and is likely to be reversed in the near future, which results in expansion of the economy and hence, reduce inequality. The largest response of about 0.45 percentage point is again observed to 90-10th differential expenditure inequality under high uncertainty. Overall, unlike monetary policy, there seems to be no guarantee that an expansionary fiscal policy in terms of a tax reduction, could reduce inequality, as the level of uncertainty seems to be vital in this case.

⁵ We also interacted the fiscal policy shock with the news-based measure of partisan conflict developed by Azzimonti (forthcoming) (available at: <https://www.philadelphiafed.org/research-and-data/real-time-center/partisan-conflict-index>). The Partisan Conflict Index tracks the degree of political disagreement among U.S. politicians at the federal level by measuring the frequency of newspaper articles reporting disagreement in a given month. Higher index values indicate greater conflict among political parties, Congress, and the President. We used temporal aggregation to convert the monthly data to quarterly frequency. Interestingly, we observed, over 1918:Q1 to 2008:4, that the strength of the tax shock is stronger under higher degrees of partisan conflict than lower levels of the same. This could possibly be due to the fact that partisan conflict and uncertainty are negatively correlated, since with higher partisan conflict agents might believe that policies are less likely to change, and hence, there is lower level of policy uncertainty, as discussed comprehensively in Azzimonti (forthcoming). Complete details of these results are available upon request from the authors.

Figure 1: Impulse responses of inequality measures to a contractionary monetary policy shock under low and high levels of uncertainty

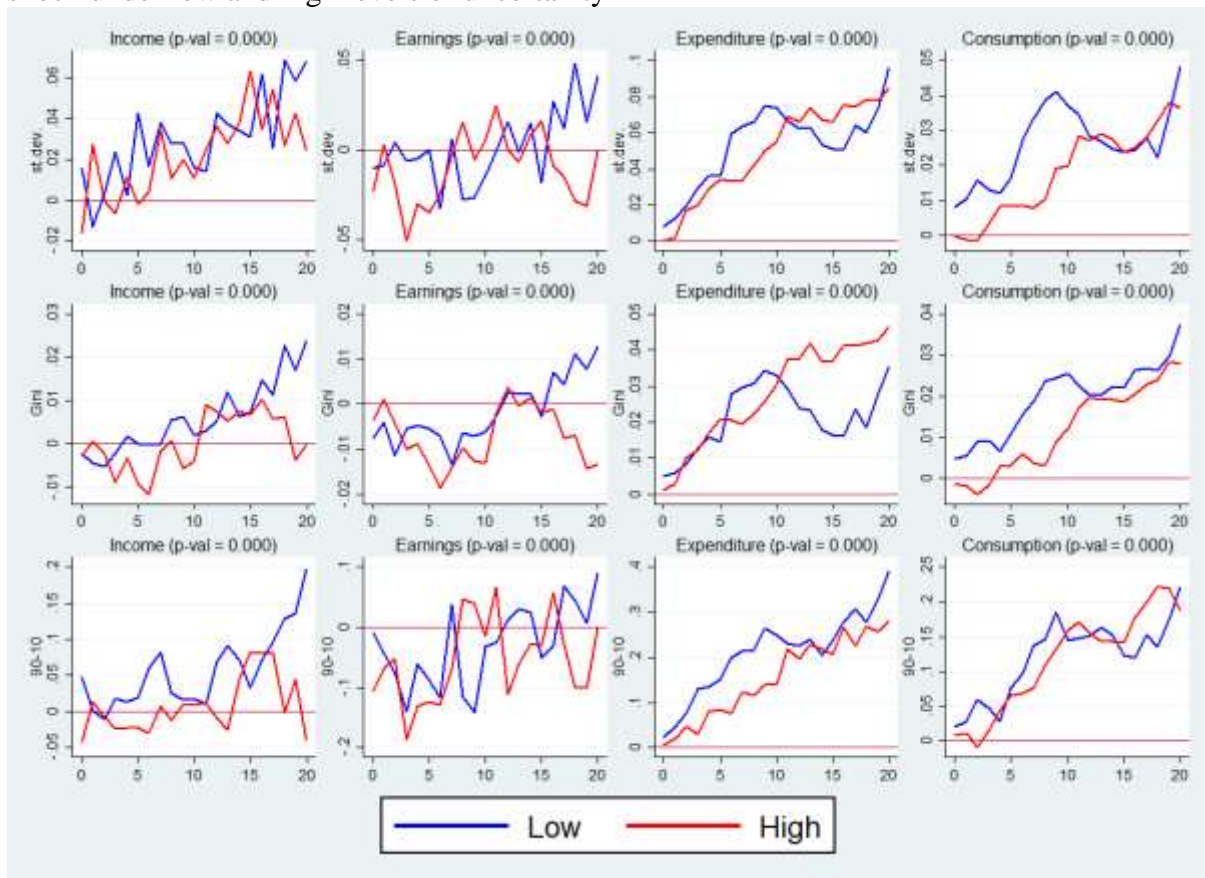
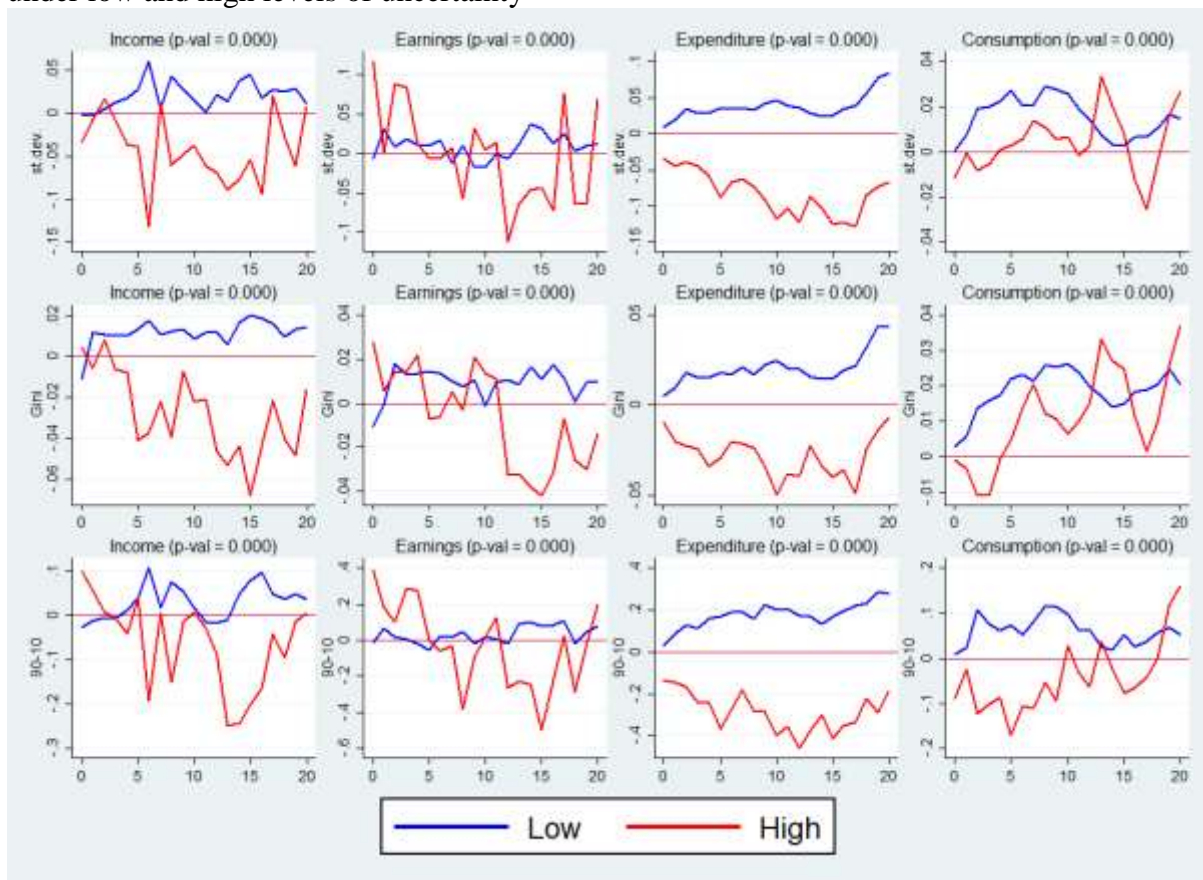


Figure 2: Impulse responses of inequality measures to a contractionary fiscal policy shock under low and high levels of uncertainty



5. Conclusion

The study examines the effect of monetary and fiscal policies on inequality of the U.S. when they are implemented in the presence of uncertainty. To this effect, we use U.S. quarterly data and impulse responses from the local projection method. Our findings indicate a rising inequality in general given a one percentage point increase in monetary policy shock under both low and high levels of uncertainty, with the effect being stronger under the former case. As far as the tax shock, i.e., a contractionary fiscal policy is concerned, inequality also increases, but it is also possible that under higher levels of uncertainty, inequality can even decrease, possibly because the effectiveness of the fiscal policy is compromised at higher degrees of uncertainty. These findings, in general, point to the need to curb the levels of uncertainty in the U.S., or for the policymakers to be at least aware of the current levels of uncertainty before undertaking expansionary monetary and fiscal policies to reduce inequality, as the effectiveness of policies are reduced in the wake of heightened uncertainty. This, in turn, would require policymakers to coordinate economic policy in such a way so as to ensure its transparency and stability. In general, our results tend to suggest that,

expansionary monetary policy is likely to be more effective in reducing inequality, than a reduction in the tax rate, irrespective of the level of uncertainty, especially under relatively lower-levels of the same.

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Appendix

Figure A1: Impulse responses of inequality measures to a contractionary monetary policy shock under low level of uncertainty

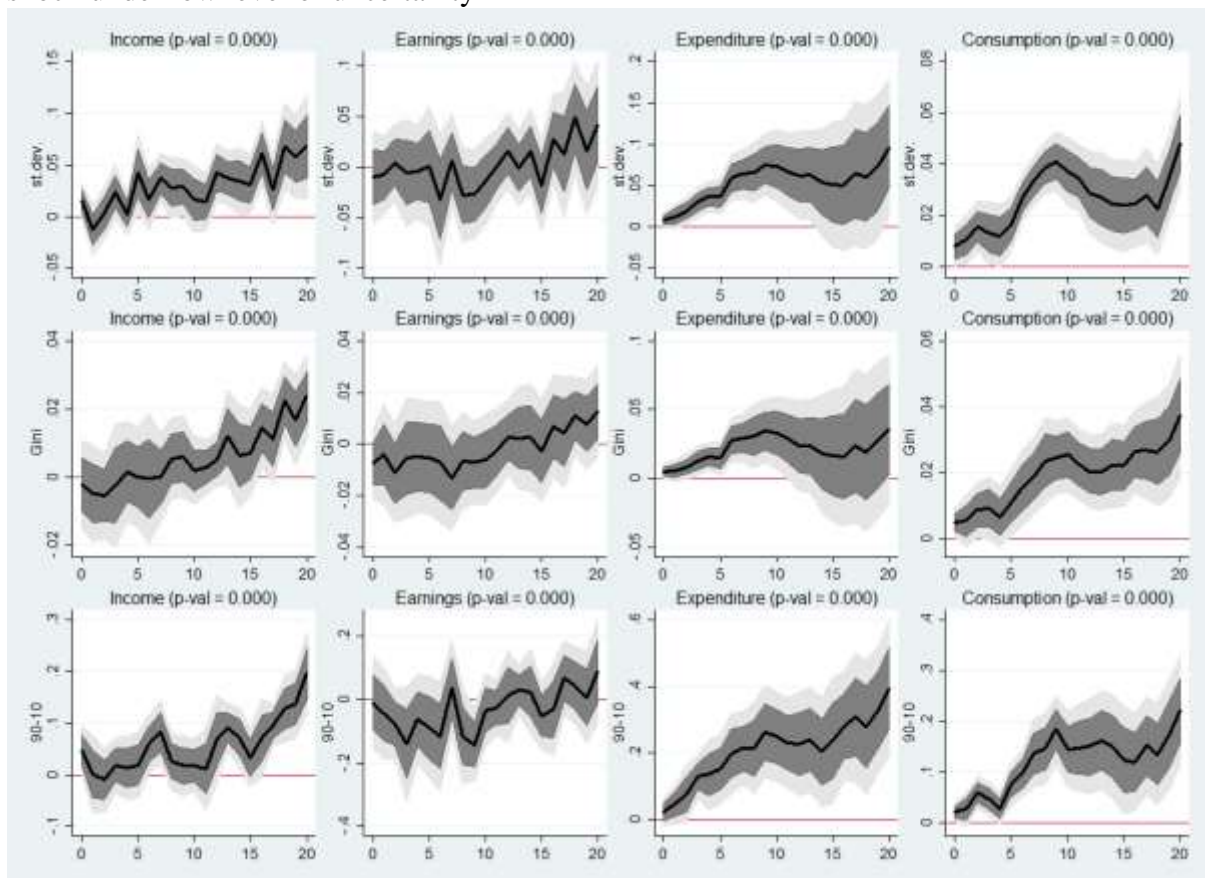


Figure A2: Impulse responses of inequality measures to a contractionary monetary policy shock high level of uncertainty

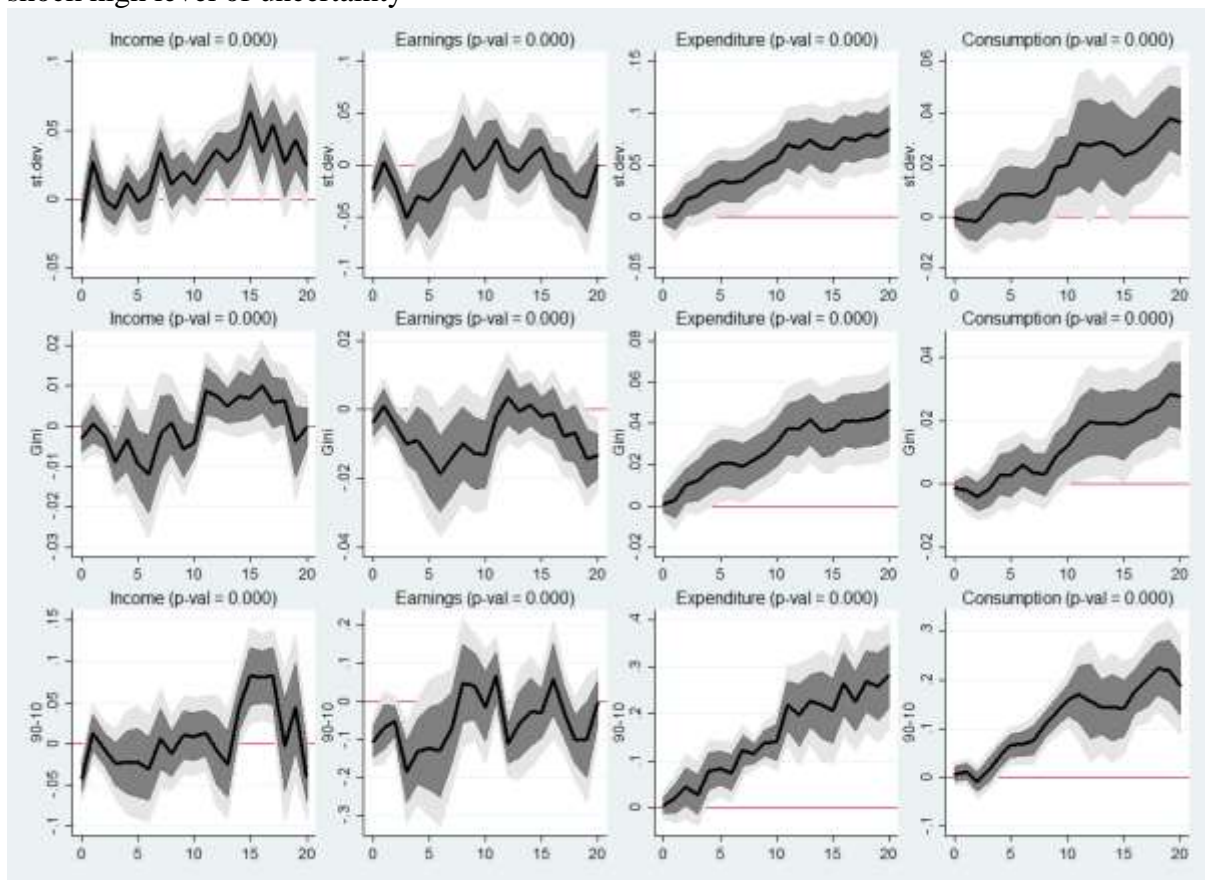


Figure A3: Impulse responses of inequality measures to a contractionary fiscal policy shock under low level of uncertainty

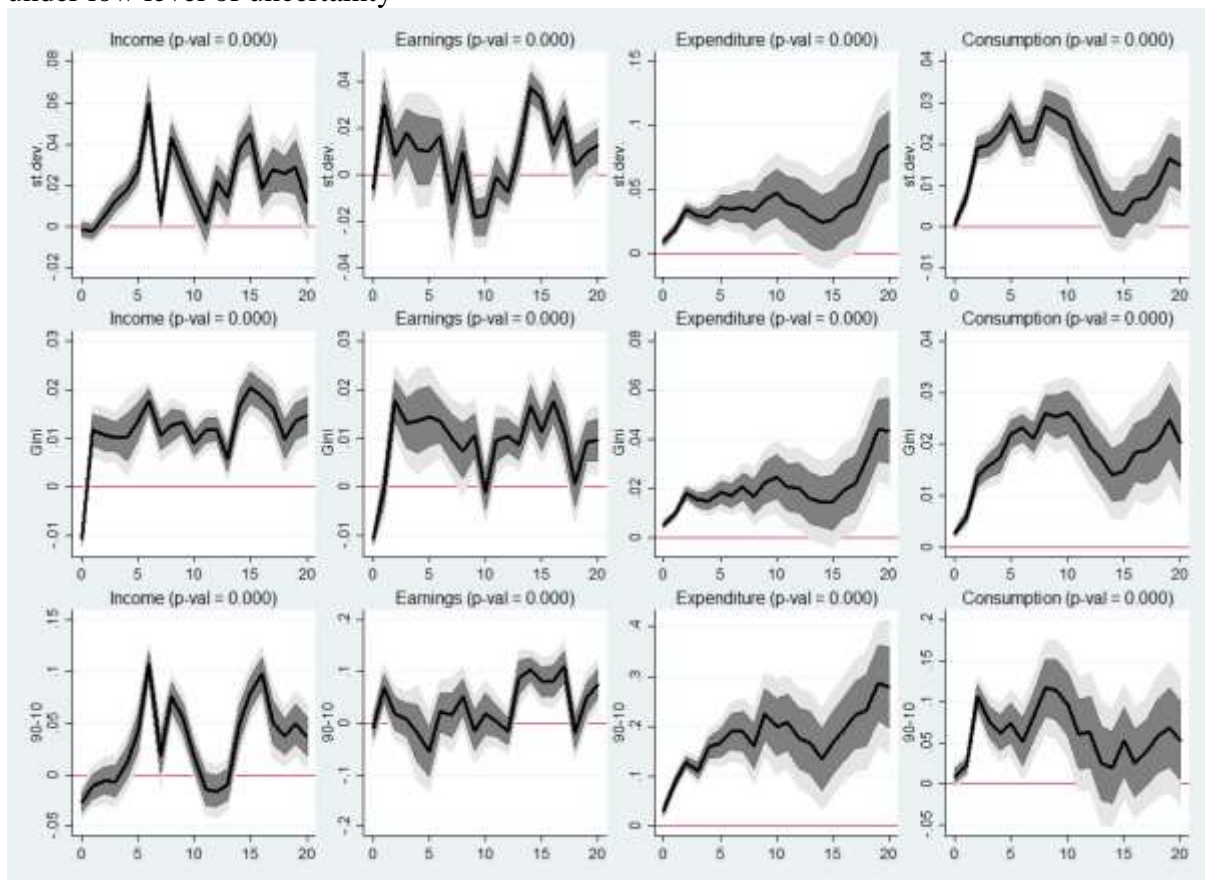


Figure A4: Impulse responses of inequality measures to a contractionary fiscal policy shock under high level of uncertainty

