Do Tax Increases Tame Inflation?

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Abstract

"Yes" for personal income taxes but "No" for corporate income taxes. Using narrative-identified US federal tax changes post-WWII and disaggregated sectoral data on consumer and producer prices, we show that higher average personal income tax rates lower prices across a broad range of sectors, but higher average corporate tax rates do not. There is also significant sectoral heterogeneity in the size of the effects. Finally, only personal tax increases lower inflation expectations, while corporate tax increases lead to persistent declines in stock prices. Our results are consistent with personal taxes affecting aggregate demand and corporate taxes persistently affecting supply conditions.

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1 Introduction

Inflation is at a four-decade high in many countries. To what extent did recent fiscal stimulus actions contribute to today's current inflationary woes? And could tax increases help lower inflation? Despite intense research on the macroeconomic effects of tax changes on real outcomes, comparatively little evidence exists for prices and inflation.[1] This article asks the question: "Do Tax Increases Tame Inflation?". Based on U.S. federal tax changes post-WWII our answer is: "Yes" if personal income taxes are increased but "No" if corporate income taxes are increased.

Tax changes can have a range of effects. Raising taxes might lower disposable income, worsen firms' cash flows and, with credit constraints, lead to lower consumption and investment. Inflation could fall.[2] On the other hand, raising distortionary labor and capital taxes could discourage labor supply and hinder investment incentives. These supply-side channels might lead to increased costs and *higher* prices. Which effect dominates empirically?

To examine this question, we analyze a broad range of aggregate and disaggregated price indices. We examine heterogeneity in the effects of tax changes on sectoral consumer, producer and stock prices, as well as the response of inflation expectations. We use exogenous variation in U.S. federal tax policy changes between 1950–2006 identified Romer and Romer (2010) and decomposed into personal and corporate tax changes by Mertens and Ravn (2013). By combining the identification approach from Mertens and Ravn (2013) with local projections to estimate longer-term impacts, Cloyne et al. (2022) show that corporate tax changes produce highly persistent effects on productivity and GDP via increased R&D and innovation. Personal tax changes generate more transitory effects. In this article we build on this approach.

First, using 190 subcomponents of the Personal Consumption Expenditure deflator, we show that higher average personal income rates lower prices across a broad range of sectors, but higher average corporate tax rates do not. In fact, higher corporate taxes often lead to persistently *higher* prices. Sec-

[1]Earlier exceptions include Mountford and Uhlig (2009), Mertens and Ravn (2012, 2013), Guajardo et al. (2011), Cloyne (2013), Nguyen et al. (2021) and Perotti (2005). Results vary and most papers focus on headline inflation rates and aggregate tax changes.

[2]In addition, if tax increases raise the expected present value of real primary surpluses, the Fiscal Theory of the Price Level suggests that inflation should fall. See, e.g., Cochrane (2022), Bianchi and Melosi (2022).

ond, consistent with longer-term productivity effects, the impacts on prices of a corporate tax increase are strongest for durable goods and capital equipment. Personal tax increases have stronger effects on non-durable goods prices. Third, personal tax increases lower inflation expectations but have noisy and insignificant effects on stock prices. Corporate tax increases persistently lower stock prices, with limited effects on inflation expectations. Overall, personal tax changes seem to affect a broad range of prices through demand channels, while the price effects of corporate tax increases reflect persistent supply-side effects.

2 Empirical Approach

We follow the approach in Cloyne et al. (2022), which combines the identification strategy of Romer and Romer (2010) and Mertens and Ravn (2013) while estimating dynamic effects using local projections. Because tax changes might generate persistent effects on supply conditions we are interested in both the shorter- and longer-term impacts. Local projections are well suited to this task.[3] In terms of identification, Romer and Romer (2010) measure exogenous variation in U.S. federal tax policy by isolating policy reforms that were not responding to current or prospective economic conditions using narrative evidence on policymakers' motivations. Mertens and Ravn (2013) decompose these data into personal and corporate reforms and use them as proxies for the true shocks to average personal and corporate income tax rates. This approach also provides a convenient way to identify the effects of each tax shock separately, while allowing for endogenous feedback to both average tax rates.

We estimate a sequence of local projections for each horizon h:

$$\mathbf{Y}_{t+h} = c^{(h)} + \sum_{j=1}^{P} \mathbf{B}_j^{(h+1)} \mathbf{Y}_{t-j} + \mathbf{u}_{t+h}^{h}. \tag{1}$$

$\mathbf{Y}$ is a vector of variables of interest, including GDP, prices and the tax rates.[4] For $h = 0$ this structure is equivalent to the vector autoregression

[3] See, for example, Jordà et al. (2020).

[4] $\mathbf{Y}$ includes the main variables from Mertens and Ravn (2013): the average corporate income tax rate, the average personal income tax rate, the two tax bases, real GDP, real government spending and real federal debt. As in Cloyne et al. (2022) we also add a principal component from a large quarterly US Macro and Financial dataset to guard

setup in Mertens and Ravn (2013). The identification problem is that the reduced form residuals are combinations unobserved structural disturbances. In other words $\mathbf{u}_t = \mathbf{A}\mathbf{e}_t$, where $\mathbf{e}_t$ is the vector of "structural" shocks and not all elements of the matrix $\mathbf{A}$ are identified. The relevant elements of $\mathbf{A}$ can, however, be identified using the narrative exogenous tax reforms as instruments. As shown by Jordà (2005), the impulse response function at horizon h can be computed as $\hat{\mathbf{B}}_1^h \mathbf{A}_i$ where $\mathbf{A}_i$ refers to the relevant component pertaining to tax shock i and $\hat{\mathbf{B}}_1^h$ is estimated for each h using the local projection specification above. Following Cloyne et al. (2022), we use Bayesian methods for estimation.[5]

When considering a limited number of outcome variables for prices, we add each price index of interest (in logs) to $\mathbf{Y}$ one at a time. To study the 190 subcategories of the PCE deflator, we extend the specification above to a factor model approach. $\mathbf{Y}$ then contains 4 factors from the large set of PCE components. For this specification, the observation equation that links the factors to the disaggregated PCE data, $\mathbf{x}$, is:

$$\mathbf{x}_t = c + b\tau + \Lambda \mathbf{F}_t + \xi_t \tag{2}$$

where c is an intercept, τ is a time-trend, $\mathbf{F}_t$ are the $R = 4$ non-stationary factors, Λ is a matrix of factor loadings and ξ_t are idiosyncratic components that are allowed to be $I(1)$ or $I(0)$.[6] The response of $\mathbf{F}_t$ is estimated using the augmented equation (1), which can be substituted in equation (2) to produce IRFs of all variables in $\mathbf{x}_t$.[7]

3 Do Tax Increases Tame Inflation?

We start by examining the short- and longer-term implications of tax increases for consumer prices. We estimate the factor-augmented local projection specification outlined above and plot the response of the headline PCE deflator, as well as 190 subcomponents. These data are available from 1960-2006, which we take from Baumeister et al. (2013).

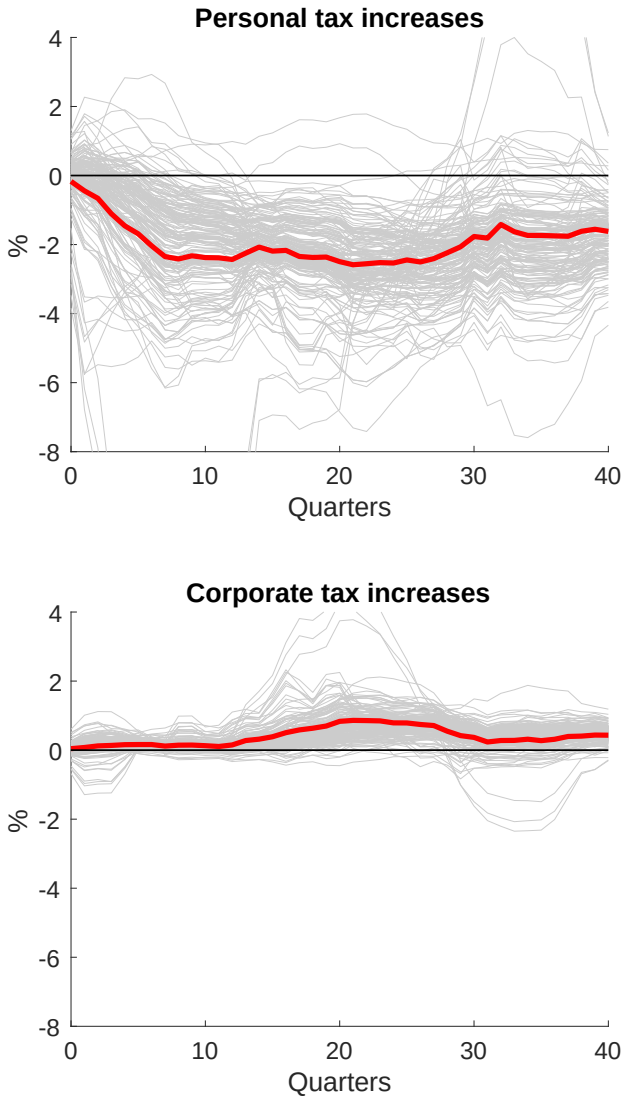
against information insufficiency.

[5]We use flat priors, $P = 4$, standard errors are adjusted for heteroskedastity and our "lag augmented" specification addresses potential serial correlation in the residuals (Montiel Olea and Plagborg-Møller (2021)).

[6]The factors are estimated using the non-stationary factor model of Barigozzi et al. (2021). $R = 4$ based on the Bai and Ng (2002) criteria.

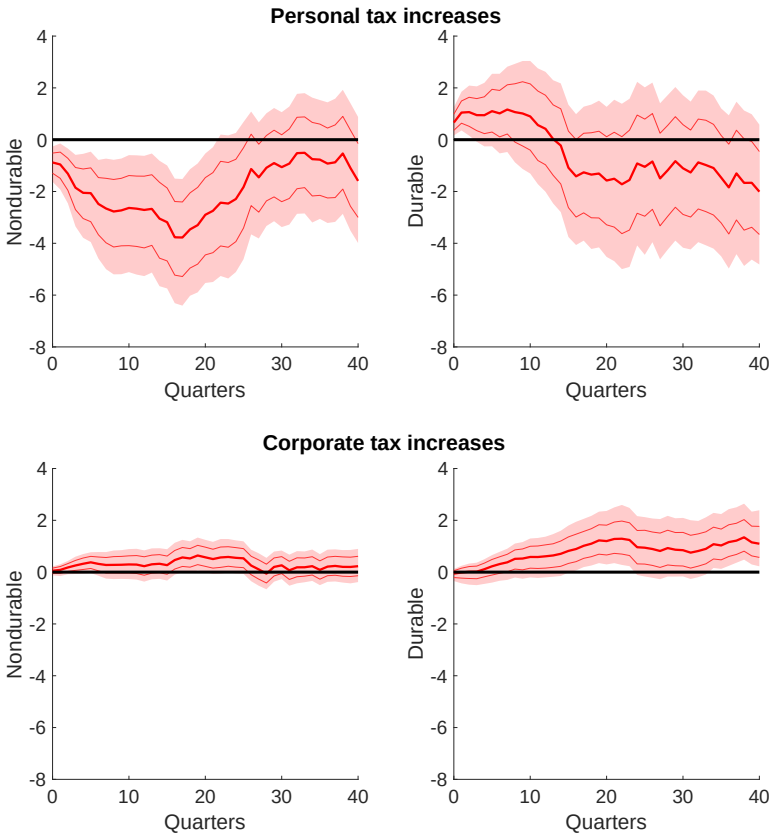
[7]Aikman et al. (2018) use a factor-augmented LP, although in a different context.

Figure 1: Response of Consumer Prices



Notes: Percentage response of the Personal Consumption Expenditures deflator (red) and 190 subcomponents (grey lines). Estimation uses factor-augmented local projections as discussed in the text. The sample period is 1960-2006. The top panel shows the effect of a 1pp increase in the average personal income tax rate. The bottom panel shows the effects of a 1pp increase in the average corporate income tax rate.

Figure 2: Consumer Prices by Sector



Notes: Percentage response of PCE price indices for durable and non-durable goods prices. IRFs are estimated using the baseline local projection specification discussed in the text. The sample period is 1950-2006. Top panel: effect of a 1pp increase in the average personal income tax rate. Bottom panel: effects of a 1pp increase in the average corporate income tax rate. Red areas denote 68% and 90% credible sets.

Figure 1 shows the results. Each panel reports the percentage response of prices to a 1pp increase in the average personal income tax rate or the average corporate income tax rate.[8] The central red line is the response of the (log) aggregate PCE deflator. Each gray line refers to one of the 190 subsectors. In the appendix, Figure A.1 shows the same red lines together

[8]The tax rates increase by 1pp and then return to zero after around 4-5 years.

Figure 3: Producer Prices by Sector

Notes: Percentage response of PCE price indices for non-durables (food and non-food), durables and capital equipment. IRFs are estimated using the baseline local projection specification discussed in the text. The sample period is 1950-2006. Top panel: effect of a 1pp increase in the average personal income tax rate. Bottom panel: effects of a 1pp increase in the average corporate income tax rate. Red areas: 68% and 90% credible sets.

with the associated error bands.

Figure 1 shows that personal tax increases are broadly dis-inflationary, with the vast majority of sectors seeing prices fall over time. Some of the most volatile responses are for food and energy. Given the shape of the IRF, inflation falls in the short-term. On the other hand, corporate tax increases do not lower prices. The effect on prices and inflation is limited in the short-term but tends to become *positive* in the medium-term. There is some

evidence of a short-term fall in prices for a limited number of products, e.g. fresh foods.

Figure 2 examines the broad non-durable and durable sub-categories of PCE prices. These broader categories are available from the Bureau of Economic Analysis from 1950-2006 and we use the baseline specification in equation 1. The effect of an increase in personal taxes is stronger for non-durable goods prices. On the other hand, neither set of prices fall in response to corporate tax increases. A persistent positive effect on prices is also much more pronounced for durable goods.

A similar story also emerges using the subcomponents of the Producer Price Index. The results for non-durables, durables and capital equipment are shown in Figure 3. Consistent with Figure 2 corporate tax increases lead to a persistent rise in producer prices for durables goods, as well as a persistent increase in the price of capital equipment. Again, the effect of an increase in personal taxes is stronger for non-durable goods producer prices.

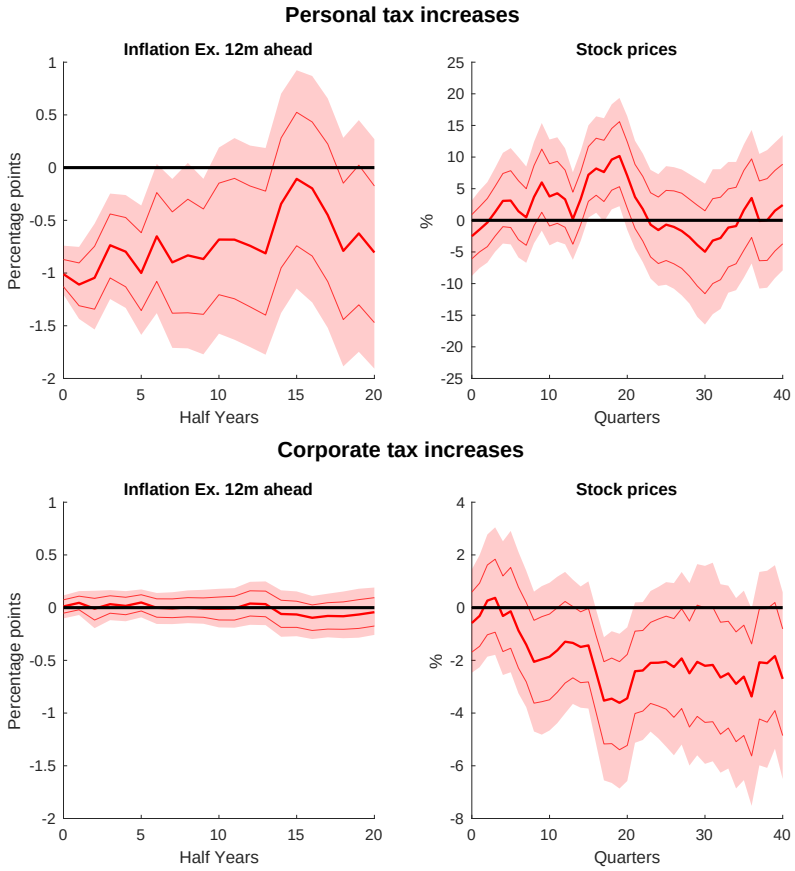
It is also an interesting question whether personal and corporate income taxes have contributed to the volatility of inflation in the U.S. post-WWII. In Appendix Figure A.7 we show the forecast error variance decompositions for headline inflation measures. Both types of tax changes have contributed to the volatility of inflation over these years in the U.S.. In absolute terms, the effects are larger for personal tax changes than corporate tax changes, as might be expected given the magnitudes shown in the impulse responses above.

4 Evidence on expectations and stock prices

Taken together, the results in Figures 1, 2 and 3 are consistent with the notion that demand effects might be driving the fall in prices following a personal income tax hike, but persistent supply effects might be pushing-up prices following an increase in corporate taxes.[9] Cloyne et al. (2022) show that corporate tax changes can generate very persistent movements in productivity through changes in R&D and innovation activities. To the extent that these activities more directly influence durable goods and capital equipment, the heterogeneity discussed above also points in this direction.

[9]These broad conclusions based on disaggregated sectoral prices, stock prices and inflation expectations (discussed below) over the longer-term also echo Mertens and Ravn (2013) who examine the short-term effects on headline inflation only.

Figure 4: Expectations and Stock Prices

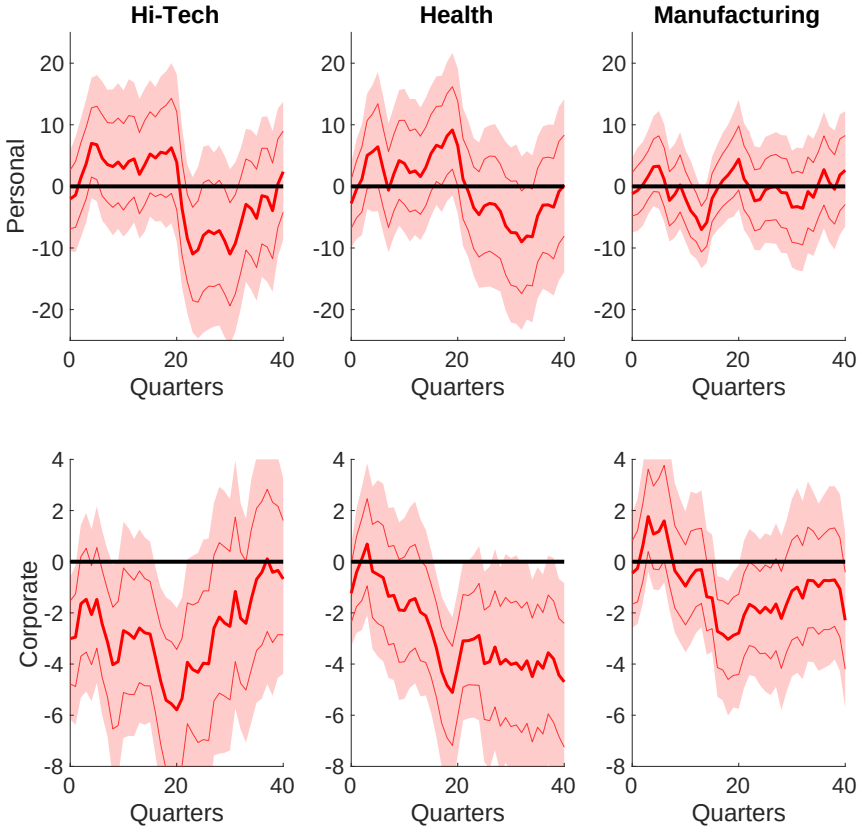


Notes: Response of 12 month ahead inflation expectations (pp) from the Livingston Survey and the (real) S&P 500 index (%). Estimation uses the baseline specification. Livingston Survey data are biannual. Sample period: 1950-2006. Top panel: effects of a 1pp increase in the average personal income tax rate. Bottom panel: effects of a 1pp increase in the average corporate income tax rate. Red areas denote 68% and 90% credible sets.

To provide further evidence in favor of this hypothesis, Figure 4 examines the response of inflation expectations and real stock prices. The Livingston Survey contains inflation expectations of professional economists back to 1950. For real stock prices we use the S&P 500 index deflated by CPI.[10]

[10]The Livingston Survey is biannual. Given the more limited sample, we therefore only include taxes, GDP and inflation expectations in $\mathbf{Y}$. For stock prices, the results are also

Figure 5: Evidence on Stock Prices: Selected Industries



Percentage response of stock prices: IRFs from selected industries 1950-2006. Source: Fama-French dataset `https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html`. Fama-French returns are cumulated to obtain the level. Red areas denote 68% and 90% credible sets.

To the extent that corporate tax increases are expected to hinder productivity, expected inflation may not decline and stock prices might be negatively affected. The stock market response might be persistent if it takes time for the productivity effects to become fully apparent. These effects can be seen in the second row of Figure 4.

very similar using the nominal index.

Going further, Figure 5 examines heterogeneity in the response of stock prices using Fama-French industry level data. The fall in stock prices is particularly clear for hi-tech and health industries, sectors that are likely to have a high R&D intensity.

Overall, personal income tax increases have a clear negative effect on inflation expectations but noisy and insignificant effects on stock prices.

5 Conclusions

We have shown that personal tax increases lead to relatively fast reductions in prices for a broad range of goods and services, and especially for non-durable goods. Corporate tax increases, however, have a limited effect on prices and inflation in the short-run, and actually push up prices over the longer-term. These inflationary forces are stronger for durable goods. A persistent rise in prices is also consistent with persistently lower productivity, falling stock prices and a limited movement in inflation expectations. This suggests that supply-side factors are at work for corporate tax changes. For personal tax changes, a Keynesian story would work via the Phillips Curve where higher taxes would lower aggregate demand for goods and services, leading to lower prices. To the extent that a tax increase generates an increase in the present value of expected future real primary surpluses, the Fiscal Theory also predicts lower inflation. Overall, demand-side stories therefore seem more consistent with the results for personal tax increases above.

Will tax increases always reduce inflation? The answer is no. In the U.S. post-WWII, we find that personal tax hikes reduce prices and inflation, but corporate tax hikes do not. Corporate tax increases may also generate higher prices for many years.

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Appendix

A Data sources

Data	Source
Main macro data in $\mathbf{Y_t}$	Replication data for: Mertens and Ravn (2013).
Large quarterly data set of US Macro and Financial variables.	Data set for: Mumtaz and Theodoridis (2020)
Inflation expectations	Livingston Survey, variable `G_BP_To_12M`. Source: `https://www.philadelphiafed.org/surveys-and-data/real-time-data-research/livingston-survey`
Fama-French stock returns	Ken French data library `https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html`
Detailed subcomponents of the PCE deflator	Data set for: Baumeister et al. (2013)
Sectoral PCE price indices	U.S. Bureau of Economic Analysis Table 1.6.4.: Price Indexes for Gross Domestic Purchases
Subcomponents of the Producer Price Index	U.S. Bureau of Labor Statistics: `https://www.bls.gov/ppi/databases/`
CPI, PPI, GDP deflator, PCE deflator	`https://fred.stlouisfed.org`. Variables: `CPIAUCSL`, `PPIACO`, `GDPDEF`, `DPCERD3Q086SBEA`
S&P 500	`STOCK:_SPXTRD` S&P 500 Total Return Index (with GFD extension). Source: Global Financial Data. Converted to real by dividing by CPI.

B Further Results

B.1 Response of the aggregate PCE deflator

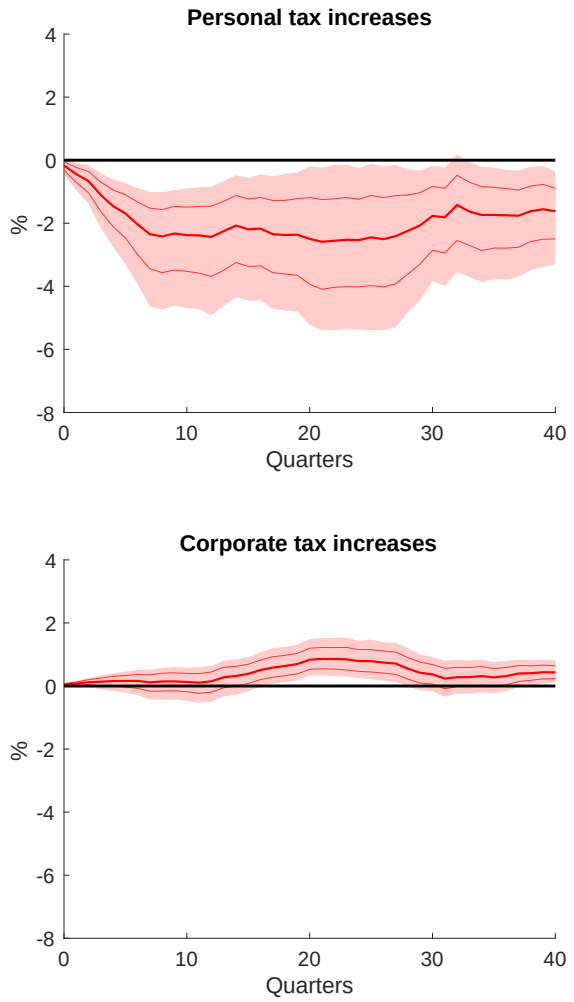

Figure A.1: Response of the aggregate PCE deflator in Figure 1 (1960-2006). Red areas denote 68% and 90% credible sets.

B.2 Response of the aggregate PPI

Figure A.2: Response of the aggregate PPI: 1950-2006. Red areas denote 68% and 90% credible sets.

B.3 Response of 53 PPI subsectors: 1950-2006

Figure A.3: Response of 53 PPI subsectors (gray lines): 1950-2006. Response of aggregate PPI: solid red line. Red areas denote 68% and 90% credible sets.

B.4 Response of PCE prices by sector

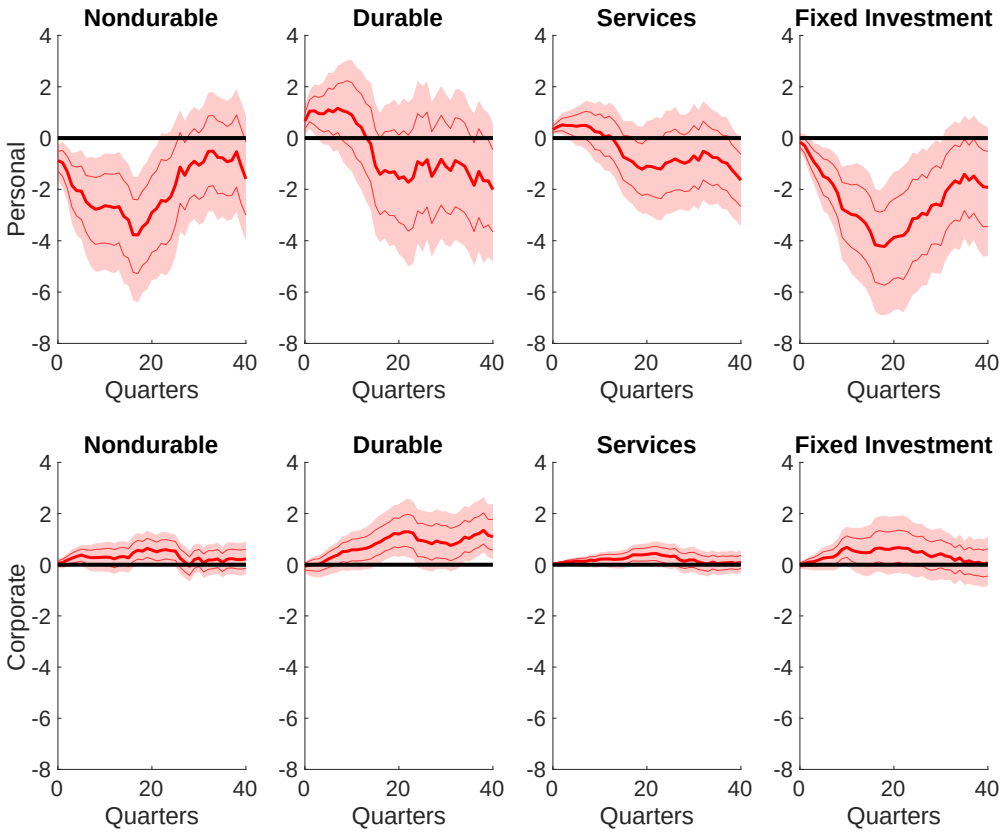

Figure A.4: Percentage response of consumer prices: nondurables, durables, services and investment (1950-2006). Red areas denote 68% and 90% credible sets.

B.5 Headline price measures: 1950-2006

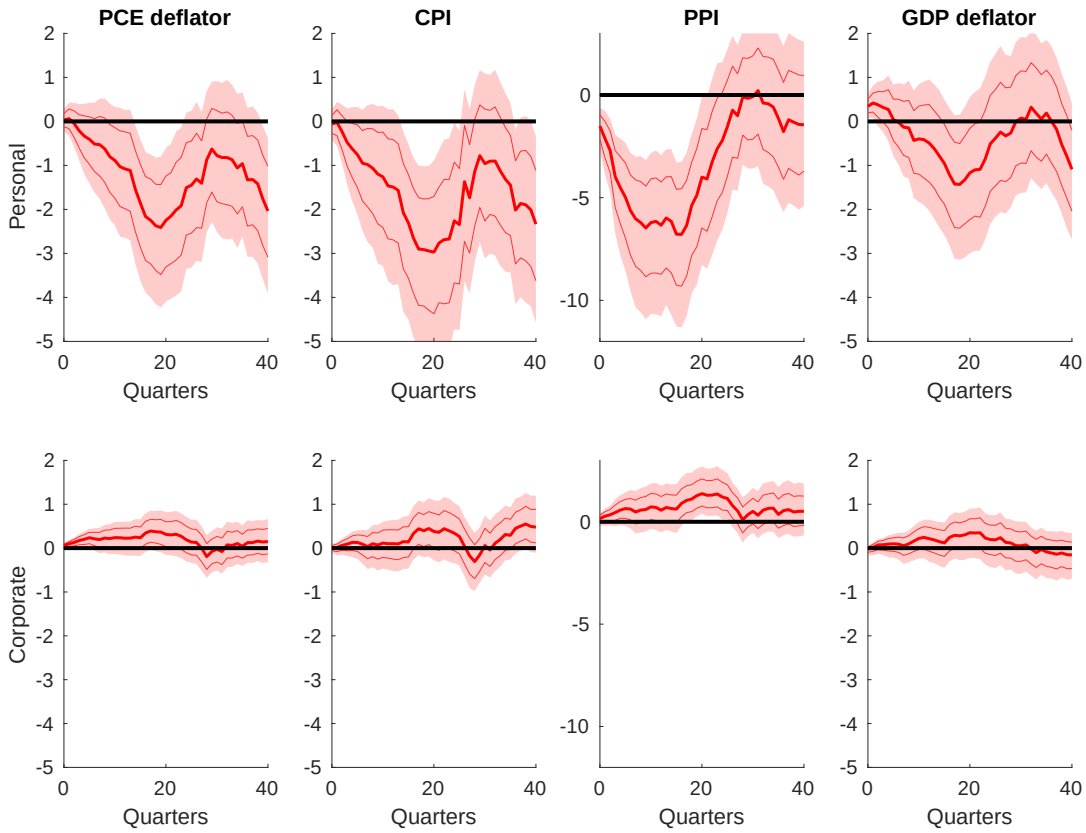

Figure A.5: Percentage response of headline price indices, baseline specification using the full sample 1950-2006. Red areas denote 68% and 90% credible sets.

B.6 Headline inflation measures: 1950-2006

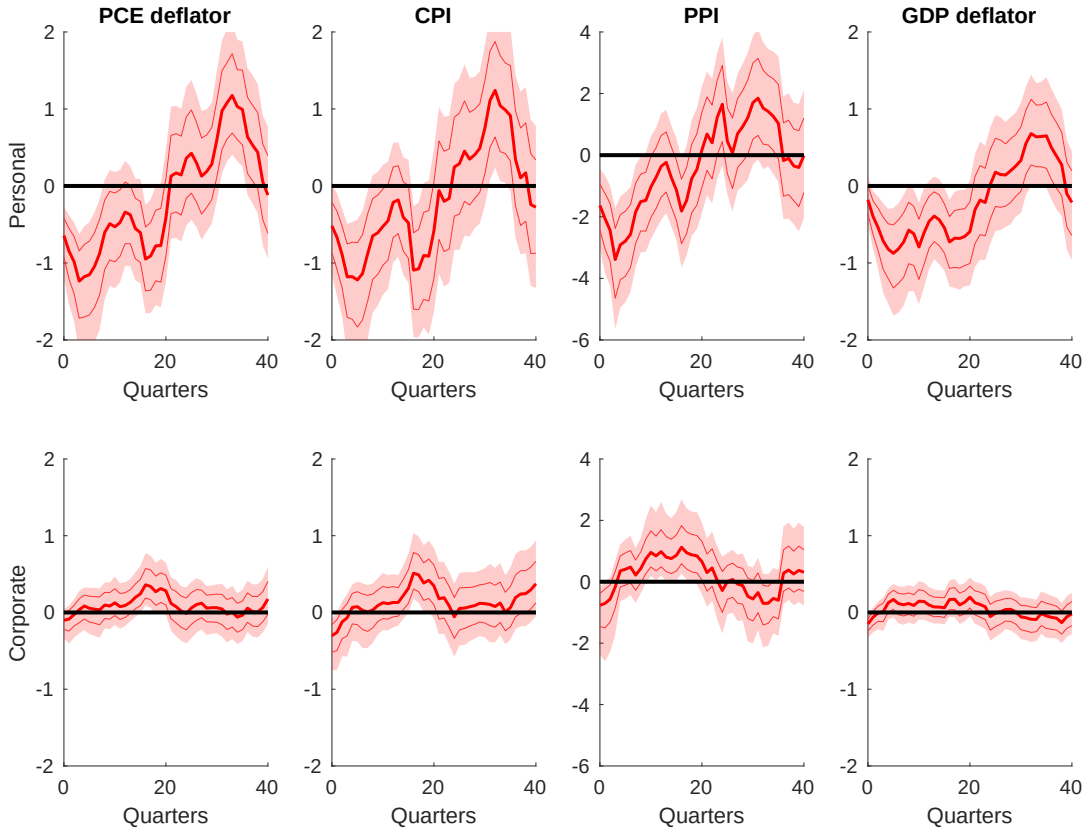

Figure A.6: Percentage point response of headline inflation, baseline specification using the full sample 1950-2006. Red areas denote 68% and 90% credible sets.

B.7 Forecast Error Variance Decompositions for Inflation: 1950-2006

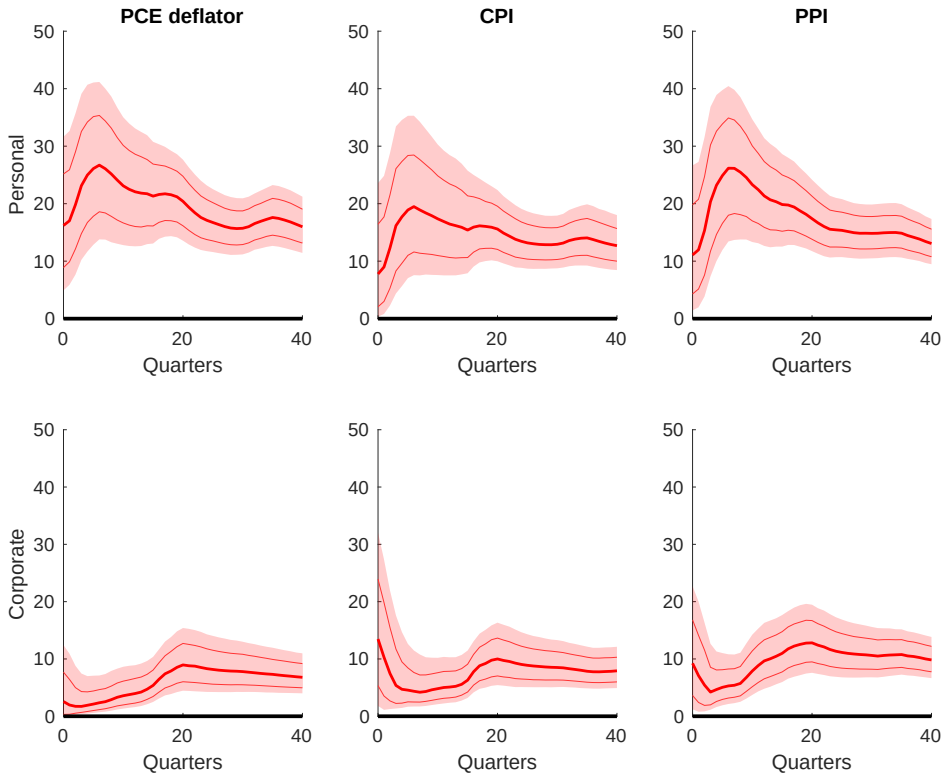

Figure A.7: FEVD for inflation in the full sample 1950-2006. Red areas denote 68% and 90% credible sets.