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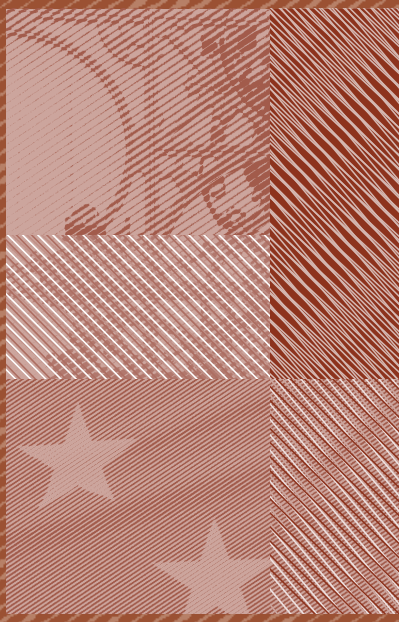

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Abstract

This paper estimates the dynamic aggregate effect of exogenous shocks to two key components of public expenditure in the United States: government income transfers and government spending. The identification strategy positions the structural shocks to public expenditures in an SVAR framework with exogenous measures of public expenditure changes. Transfers shocks are based on a new narrative variable of legislated increases in U.S. social security benefits. I demonstrate that shocks to different types of public expenditure do not have the same macroeconomic impact. The estimated government spending multiplier is between 0 and 1, while increases in transfers generate a multiplier effect above 1.

Keywords: government expenditures, transfer payments, social security.

JEL classification: E2, E62, H55, H56, I38.

Resumen

Este trabajo estima el efecto agregado dinámico de *shocks* exógenos a dos componentes clave del gasto público en Estados Unidos, las transferencias de renta y el gasto gubernamental en bienes y servicios. La estrategia de identificación instrumenta los *shocks* estructurales al gasto público en un marco SVAR con medidas exógenas de cambios en el gasto público. Los *shocks* de las transferencias se basan en una nueva variable narrativa de aumentos legislados en la seguridad social de Estados Unidos. Demuestro que *shocks* a diferentes tipos de gasto público no tienen el mismo impacto macroeconómico. El multiplicador estimado del gasto gubernamental en bienes y servicios está entre 0 y 1, mientras que incrementos en las transferencias generan un efecto multiplicador por encima de 1.

Palabras clave: gasto público, transferencias de renta, seguridad social.

Códigos JEL: E2, E62, H55, H56, I38.

1 Introduction

Government spending and government income transfers represent the two key components of public expenditures in the United States. Figure 1 shows that these categories account jointly for about 80% of total public expenditures. Within public expenditures, government income transfers have become the most important category over time. However, the existing literature on the aggregate effects of public expenditures shocks has focused on government spending shocks (recent examples include Perotti 2007, Mountford and Uhlig 2009, Ramey 2011, Fisher and Petters 2010, Auerbach and Gorodnichenko 2011, Nakamura and Steinsson 2014, Wilson 2012, and Suárez-Serrato and Wingender 2014, Chodorow-Reich, Feiveson, Liscow, and Woolton 2012). This paper instead estimates the dynamic aggregate effect of exogenous shocks to different public expenditures in the United States over the post-WWII sample. Specifically, I estimate the response of aggregate expenditure components and labor market indicators to increases in government spending and government income transfers.

Evidence on the aggregate effects of government income transfers shocks is scarce and has focused on the effect that changes in income have on private consumption expenditures. In the framework of the permanent income hypothesis, Poterba (1988) estimates that a $1 increase in transitory income due to the U.S. tax rebates of 1975 raised spending of non-durables and services by about 12 to 24 cents. Wilcox (1989) finds that a predictable 10% increase in U.S. social security benefits raises durable goods purchases by 3% in the same month. More recently, Romer and Romer (2016) construct a series of legislated increases in social security benefits in the U.S. from 1951 to 1991 and study the effect of innovations to their narrative variable on private consumption. This paper extends Romer and Romer (2016) along two dimensions. First, I estimate and compare the aggregate effect of exogenous shocks to different public expenditures. Secondly, I expand the set of outcome variables to include output, investment, consumption of durables, non-durables and services, imports, and several labor market indicators. Moreover, this paper complements parallel work in Párraga-Rodríguez (2016). There I estimate the aggregate effect of government income transfers shocks but for a sample of EU countries over 2007-2015.

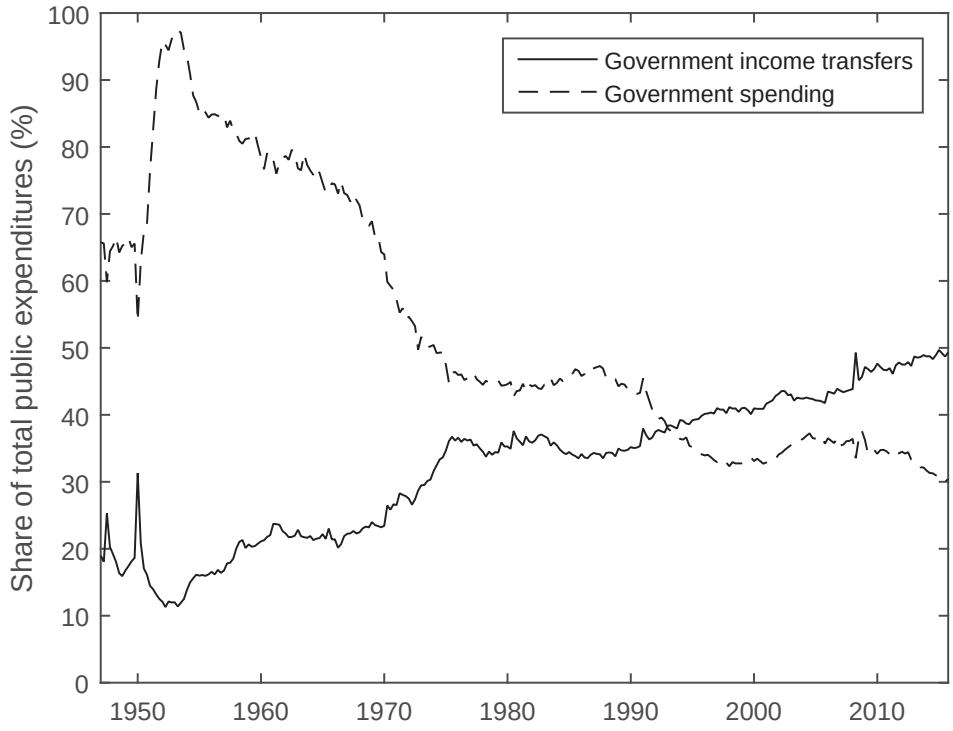

Figure 1: U.S. Federal Government Main Expenditures as Percentage of Total Public Expenditures from 1947:I-2015:II.

I adopt the identification strategy of Mertens and Ravn (2013) and identify the structural shocks to public expenditures in an SVAR framework with exogenous measures of public expenditure changes. The 'Proxy SVAR' is an attractive estimator because it does not impose direct short-run assumptions, as in the SVAR approach of, for example, Perotti (2007). Moreover, the instruments do not need a one-to-one mapping with the structural shocks, as in the narrative approach of Ramey (2011) or Romer and Romer (2016). Structural shocks to government spending are instrumented with a measure of U.S. defense spending shocks by Ramey (2011), and available from 1969:I. Military spending has been widely accepted in the profession as a good source of exogenous variation for government spending in the U.S. because it is induced by geopolitical events most likely unrelated to the state of the U.S. economy. On the other hand, finding a good instrument for structural shocks to transfers is no trivial task. The strong link between inflation and the narrative variable by Romer and Romer (2016) motivates estimating a new

measure of exogenous shocks to government income transfers. The new measure is based on the residuals of regressing an extension of the narrative series on inflation. Unlike the original narrative series, the new measure cannot be predicted by aggregate variables representing the state of the economy.

The principal contribution of this paper is an estimate of the fiscal multiplier for different components of public expenditures, especially for government income transfers. The estimated impact multiplier for both types of public expenditure is close to 0.2. However, differences build up over time. Four quarters later, transfers have an accumulated multiplier effect equal to one, while it is only 0.7 for government spending. Moreover, an estimated positive response of output to transfers shocks yields a gradually rising cumulative multiplier, with a maximum effect of 2.8 by the end of the forecast horizon. In contrast, the government spending multiplier reaches its maximum cumulative effect at one between the sixth and twelve quarter. Thereafter, I find that a government spending shock induces a fall bellow trend of output, which translates into an accumulated multiplier effect below unity.

The different estimates could be explained by the different transmission mechanism that government spending and income transfers have. On one hand, government spending contributes directly to aggregate demand producing and providing services to the public. The estimates though indicate that increases in government spending do not sufficiently enhance private spending to generate a multiplier effect larger than one. On the other hand, government income transfers affect indirectly aggregate demand through changing individuals' disposable income and their spending decisions. The estimates are consistent with household level evidence that benefits recipients are likely to have higher marginal propensities to consume than other individuals (for example, Hausman 2016, Bodkin 1959, Johnson, Parker and Soulesles 2006, Johnson, McClelland, Parker, and Souleles 2013). I find a positive response of private spending to increases in transfers, especially consumption of durable goods. I also find a positive response of nonresidential investment. Moreover, the estimated transfers multiplier reaches values larger than one despite a neutralizing response of monetary policy, and a negative response of labor supply by labor market participants due to the self-financed nature of increases in transfers.

The remaining of the paper is organized as follows. Section 2 explains the econometric framework and gives details about the narrative variables. Section 3 presents evidence on the effect of shocks to different components of public expenditures; section 3.3 presents an analysis in terms of multipliers. Section 4 offers concluding remarks.

2 Econometric framework

2.1 Baseline specification

The aim of this paper is to estimate the dynamic aggregate effect of exogenous shocks to different components of public expenditures. The system of simultaneous equations describing the dynamics between public expenditures and other macroeconomic variables of interest can be expressed by:

$$\mathbf{A}_0\mathbf{Y}_t = \mathbf{c}_0 + \mathbf{c}_1 t + \sum_{j=1}^{p} \mathbf{A}_j \mathbf{Y}_{t-j} + \varepsilon_t \tag{1}$$

The matrix $\mathbf{A}_0$ describes the contemporaneous correlation across the n endogenous variables contained in $\mathbf{Y}_t$. The deterministic term $\mathbf{c}_t = \mathbf{c}_0 + \mathbf{c}_1 t$ includes a linear time trend. $\mathbf{A}_j$, $j = 1, ..., p$, are the $n \times n$ coefficients matrices. The orthogonal structural shocks ε_t are assumed to be $i.i.d.$ with zero mean and normalized covariance matrix, i.e. $E[\varepsilon_t] = 0$, $E[\varepsilon_t \varepsilon_t'] = I$, $E[\varepsilon_t \varepsilon_s'] = 0$ for $s \neq t$ and I is the identity matrix. Premultiplying the system by $\mathbf{B} \equiv \mathbf{A}_0^{-1}$ we have the reduced form representation to be estimated:

$$\mathbf{Y}_t = \mu_0 + \mu_1 t + \sum_{j=1}^{p} \Phi_j \mathbf{Y}_{t-j} + \mathbf{u}_t \tag{2}$$

where $\mu = \mathbf{B}\mathbf{c}$, $\Phi_j = \mathbf{B}\mathbf{A}_j$, for $j = 1, ..., p$, and the $n \times 1$ vector of reduced form residuals $\mathbf{u}_t = \mathbf{B}\varepsilon_t$.

Identifying restrictions are required to compute economically meaningful impulse responses. The existing literature offers several alternatives. The SVAR approach pioneered by Blanchard and Perotti (2002) uses institutional knowledge to directly impose the value of some elements in **B**. Alternatively, Mountford and Uhlig (2009) impose sign restrictions. The appeal of the SVAR approach resides in its simplicity, however, Mertens and Ravn (2014) and Ramey (2011) document two important shortcomings: fiscal foresight and uncertainty regarding the imposed fixed parameters. The narrative approach as of Romer and Romer (2010) uses the narrative record to construct a measure of the structural shock of interest and estimates the aggregate response to changes in such measure. I instead adopt the identification strategy of Mertens and Ravn (2013) and instrument the structural shock to either public expenditure in the SVAR with an exogenous measure of changes in the public expenditure. The Proxy SVAR is an attractive estimator because it avoids direct assumptions on the elements of **B**, as in the traditional SVAR approach. Moreover, and unlike the narrative approach, the Proxy SVAR does not assume that the proxies have a one-to-one mapping with the true structural shocks. It does not require that each proxy is correlated with only a single structural shock either. Put it differently, the proxy SVAR does a superior control of measurement error regarding the narratively identified shocks compared to the narrative approach.

The identifying strategy complements the $n(n+1)/2$ independent restrictions from estimating the covariance matrix of the reduced form residuals with $(n-k)k$ additional identifying restrictions from k proxies for the structural shocks of interest. While insufficient to identify all coefficients in **B**, the additional restrictions allow to identify sufficient coefficients to estimate impulse responses to the structural shocks of interest, in this case, shocks to public expenditures. Let $\mathbf{m_t}$ be the $k \times 1$ vector of proxy variables and partition the structural shocks $\varepsilon_t = [\varepsilon'_{1t}, \varepsilon'_{2t}]'$ such that ε_{1t} contains the k shocks to public expenditures. The key requirement for identification is that the proxy variables need to be correlated with the structural shocks of interest but uncorrelated with all other shocks. That is,

$$E[\mathbf{m_t}\varepsilon'_{1t}] = \Omega \tag{3}$$

$$E[\mathbf{m_t}\varepsilon'_{2t}] = 0 \tag{4}$$

Notice that the inability to recover all the coefficients in **B** comes from not placing further assumptions on Ω except from invertibility.

I estimate separately the aggregate effect of shocks to government spending and transfers. The baseline VAR for transfers includes social security benefits to persons, output, and as controls for tax and monetary policy the Barro-Redlick average marginal income tax rate, the federal funds rate and the Consumer Price Index for urban wage earners and clerical workers.[1]

Government income transfers include very different types of benefits. For example, transfers in cash like old age pensions differ substantially from medical benefits. Another example is that recipients of unemployment benefits are engaged in labor market activities, while recipients of old age pensions and disability insurance are out of the labor force. I focus on social security benefits to facilitate the economic interpretation of the results. Social security benefits also have the largest share among government income transfers (see Figure A1 in the appendix). Moreover, the broader the definition of transfers, the less relevant the instrument becomes. The structural shocks to transfers are based on an extension of the Romer and Romer (2016) narrative of U.S. social security benefits increases. The sample consists of quarterly observations from 1951:I-2007:IV.

To study the aggregate effect of government spending shocks, the baseline VAR replaces social security benefits with government consumption expenditures and gross investment. The structural shocks to government spending are instrumented with a measure of U.S. defense spending shocks by Ramey (2011), available from 1969:I-2007:IV.

Given the limited number of observations, I follow Burnside, Eichenbaum and Fisher (2004), and Ramey (2011) strategy to estimate the effect of an expenditure shock on other variables of interest, adding them, one at a time, to the baseline VARs. This estimation strategy balances the number of parameters to be estimated and the inclusion of enough variables to avoid significant omitted variable bias. The additional variables include the other public expenditure, consumer expenditures in

[1] I use the CPI for urban wage earners because this is the index of reference for the cost-of-living-adjustments of social security benefits in the U.S. In the appendix I explore alternative price indexes.

non-durable goods and services, durable-goods purchases, imports, residential and non-residential private investment, total hours per worker, employment per capita, labor force per capita, a measure of the real wage and productivity. Precise data definitions can be found in the Data Appendix. According to Akaike's information criterion, the lag length is set to four in all specifications.

2.2 Narrative measures

This section elaborates on the measures used as instruments for the structural shocks to public expenditures in the SVARs.

2.2.1 Government income transfers shocks

The proxy for the structural shocks to government income transfers is based on the series by Romer and Romer (2016). Using documents from the Social Security Bulletin, reports from the U.S. Congress, the Economic Report of the President and presidential speeches they identify the motivation, timing, and size of legislated changes in social security benefits in the United States from 1951:I to 1991:IV.[2] The narrative series includes benefit increases in the old-age and survivors insurance program (OASI), the disability insurance program (DI), and the Supplemental Security Income (SSI) program. In turn, Romer and Romer (2016) classify benefit increases into whether they were permanent or temporary. Given that consumption theory like the life-cycle permanent income model predicts very different impact from permanent and temporary income changes, Romer and Romer (2016) compare their effects. The goal of this paper though is to compare the dynamic aggregate effect of different components of public expenditures and from now on focuses on permanent income changes.[3] To account for anticipation effects, I follow Mertens

[2] Romer and Romer (2016) construct a monthly series. I sum the monthly values within a quarter to create the quarterly series.

[3] Romer and Romer (2016) find that temporary benefit increases have a much smaller impact on consumption than permanent increases. They argue that one explanation could be the size of permanent and temporary benefit increases. Being the later much larger their findings are consistent with previous evidence that consumers would behave as predicted by the permanent income hypothesis (rule-of-thumb consumers) for relatively large (small) income changes.

and Ravn (2012) and exclude all social security benefits changes with more than 90 days between their enactment and the actual increase.[4] Moreover, consistent with Romer and Romer (2016) methodology I extend this narrative series until 2007:IV with all benefits increases due to automatic cost-of-living adjustments. Table A2 in the appendix contains more details about these additional observations. The extended series overlaps more quarters with the series for government spending shocks and facilitates comparing the estimates.

Romer and Romer (2016) classify as exogenous the changes in Social Security benefits to keep up with past inflation, or to increase the insurance provided by the Social Security programs, i.e. ideological motivation of fairness or equity. However, a major concern regrading the Romer and Romer (2016) series is the link between inflation and increases in benefits. To the extent that inflation responds to the state of the economy, there exists concern that macroeconomic developments might be leading the increases in benefits motivated by a desire to keep up with past inflation. For example, a Granger causality test of the extended narrative series on inflation has a p-value of 0.00, thus rejecting the null that inflation does not Granger cause the narrative series.[5] Romer and Romer (2016) argue that there is no reason to expect increases in benefits to keep up with past inflation to be systematically correlated with contemporaneous macroeconomic conditions. Until adopting automatic indexation in 1974, increases in benefits to mitigate the loss of purchasing power due to past inflation were ad hoc and irregularly spaced. Thereafter, automatic indexation at discrete intervals weakens the relationship between increases in benefits and short-run macroeconomic developments. In other words, automatic indexation is not deliberately countercyclical because the cost-of-living adjustments are limited by law to take place once a year. Indexation is automatic as opposed to previous irregular increases in benefits. Moreover, Romer and Romer (2016) exclude all changes explicitly undertaken with a countercyclical motivation.

[4] From a total of 58 observations, 14 changes in social security benefits were legislated at least 90 days before their implementation. I verified how important these observations are for the results and the estimates are similar whether they are included.

[5] The inflation rate is based on the CPI for urban wage earners and clerical workers. Alternative tests on real output per capita, and the unemployment rate result in an p-value of 0.71 and 0.24 respectively. P-values for tests using the original series are 0.01, 0.14 and 0.34 respectively. All regressions include 12 lags of the narrative variable and the aggregate.

I take additional steps to address the potential endogeneity issues. First, I remove the predictable response to inflation from the increases in benefits. The new measure of exogenous shocks to transfers are the residuals of regressing the non-zero observations of the narrative series on a constant and the lag of inflation. To be consistent with the calculation of cost-of-living adjustments, the inter-annual change in CPI for urban wage earners is used as the measure for inflation. The new series cannot be predicted by inflation or other aggregates such as real output per capita or the unemployment rate. Moreover, I include controls for monetary and tax policy in the baseline VARs, that is, the Federal Funds rate, the price level, and the Barro-Redlick average marginal income tax rate. Notice that including the price level accounts for other influences not removed from the new measure of exogenous shocks, and that might affect both benefits increases and inflation. Finally, because of the self-financed nature of Social Security benefits, including the average marginal income tax rate also accounts for the potential bias from a coupling of increases in benefits and higher taxes.[6]

A good instrument also needs to have explanatory power over the VAR residuals. I adopt Ramey (2011)'s strategy to test the relevance of the candidate proxy variables as an instrument for the structural shocks to public expenditures. Compared to the standard narrative literature, the proxy SVAR instruments the latent shocks to public expenditures instead of the aggregate series of public expenditures. The tests are based on a regression of the reduced form residuals from the baseline VAR on the proxies. The new measure of exogenous shocks to social security benefits has an F-statistic equal to 16.5 (second row Table 1). Moreover, the results for the relevance tests offer additional validation to extending the narrative series. Extending the narrative series improves the proxy's explanatory power compared to the original series (first row Table 1).

[6]Social Security in the United States are federal programs financed with payroll taxes, also known as Federal Insurance Contributions Act (FICA) taxes. The Social Security trust funds provide an accounting mechanism for tracking all income to and disbursements from the trust funds. The Social Security Act limits trust fund expenditures to benefits and administrative costs. Between 1985 and 2010 the Social Security trust funds had persistent surpluses. In 1982 the assets of the largest trust fund (OASI) were nearly depleted. The deficit was addressed with a temporary borrowing from other federal trust funds and enacted legislation to strengthen OASI Trust Fund financing. The borrowed amounts were repaid with interest within 4 years. See www.ssa.gov.

Table 1: Relevance Tests for the Candidate Proxy Variables

	F-test	p-value
Original sample	9.05	0.003
Extended sample	16.48	0.000

Notes: A shorthand for the proxies on the left. Original sample from 1951:I-1991:IV. Extended sample from 1951:I-2007:IV.

Figure 2 compares the extended narrative variable (gray line) with the new measure of transfers shocks based on the non-predictable residuals (black line). The figure plots the demeaned narrative shocks and expressed as percentage of last quarter total taxable personal income. The first observation in 1952 correspond to an increase in social security benefits to keep up with the inflation that had occurred during the Korean War. The next two observations in the 1950s also correspond to discretionary increases in benefits to keep up with inflation. The observations in the 1960s reflect extensions of benefits to improve the insurance component of the Social Security programs. In 1971 we find again another discretionary increase in benefits to keep up with inflation. Since 1975, the observations correspond to automatic cost-of-living adjustments. Until 1983 the indexation of social security benefits was effective in June, thereafter the increases are effective in December. Compared to the narrative series, the non-predictable residuals correct downwards the cost-of-living adjustments and give more importance to the early observations.

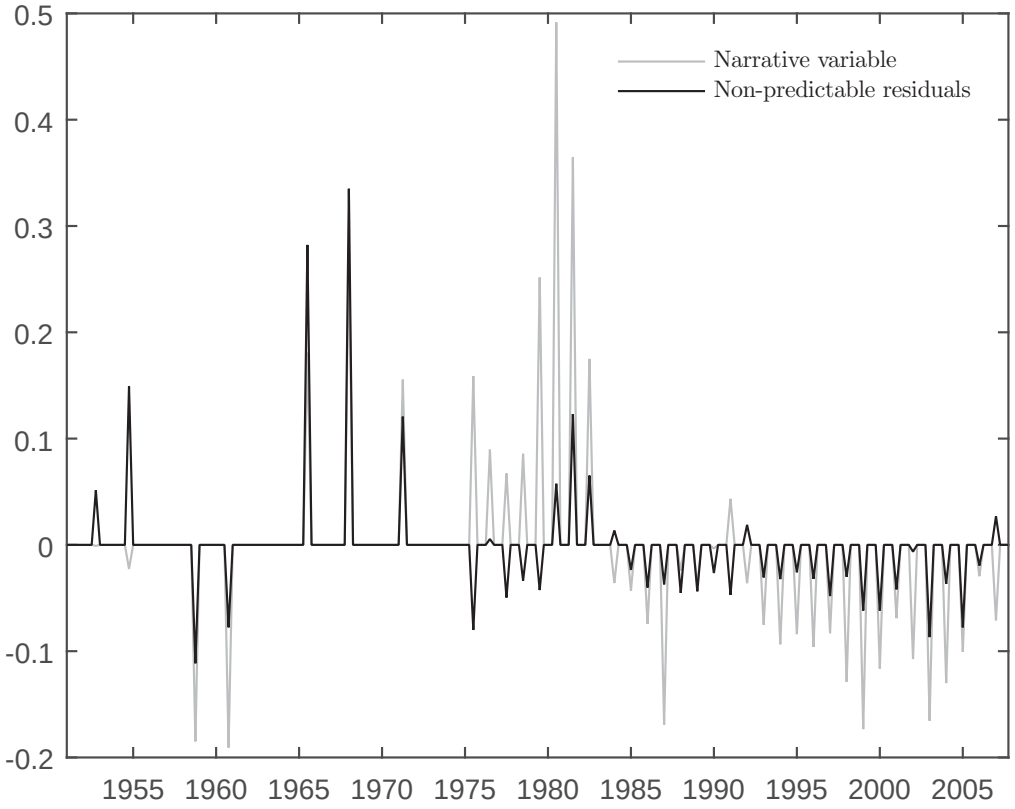

Figure 2: Proxy Variables for Social Security Benefits Shocks, U.S. 1951:I-2007:IV

2.2.2 Government spending shocks

Ramey (2011) estimates two variables that serve as potential instruments for government spending structural shocks. First, using *Business Week* and other newspaper sources, Ramey (2011) constructs a variable for military spending news as a measure of government spending shocks from 1890 to 2013. Alternatively, the second variable is based on the survey of professional forecasters predictions about U.S. defense spending. This second variable covers the period 1969-2008. The narrative measures are based on spending forecasts, which approximate the changes in expectations at the time and account for anticipation effects.

Ramey's variables rely on the identifying assumption that U.S. national military spending is dominated by foreign political events, and as such, most likely to be unrelated with the state of the U.S. economy. Recently, Nakamura and Steinsson (2014) exploit the regional differences in military procurement across U.S. states to estimate the government spending multiplier. Their observations contribute as

evidence that U.S. foreign military interventions are unlikely to be related to the state of the U.S. national economy. On the other hand, Albornoz and Hauk (2014) find that the party of the government, and the presidential approval rate are key factors determining the willingness of the U.S. to foreign military interventions. As for the candidate proxies for transfers shocks, we can test the predictability of the narrative variables related to government spending. The tests illustrate that either of Ramey (2011)'s narrative variables cannot be predicted by aggregates representing the estate of the economy (Table 2).

Table 2: Predictability Tests for Candidate Proxy Variables

	Output	Inflation	Unemp. rate
Based on SPF	0.72	0.89	0.24
Based on newspapers	0.88	0.96	0.51

Notes: p-values for Granger causality tests. A shorthand for the aggregate variable is stated at the top. A shorthand for the narrative variables is stated on the left. Regressions include twelve lags of the narrative variable and the selected aggregates. Sample for the narrative variable based on SPF 1969I:2007:IV. Sample for the narrative variable based on newspapers 1951I:2007IV.

Table 3: Relevance Tests Candidate Proxy Variables

	F-test	p-value
Based on SPF	176.33	0.00
Based on newspapers	4.84	0.03

Notes: A shorthand for the narrative variable is stated on the left. Sample for the narrative variable based on SPF 1969I:2007:IV. Sample for the narrative variable based on newspapers 1951I:2007IV.

Table 3 reports the relevance tests of defense news shocks as proxy for structural shocks to government spending. Again, the F-test and associated p-value are from regressions of the reduced form residuals from the baseline VAR on each candidate. The VAR including the news variable based on the professional forecasters survey is from 1969:I-2007:IV. The news variable based on newspapers is available for a longer sample from 1951:I-2007:IV. Despite the interest in using the longer sample, the tests clearly select the news variable based on professional forecasts.

As reported by Ramey (2011), the exclusion of the WWII from the sample period affects considerably the explanatory power of the instrument based on newspaper sources (see her table III on pg. 28).[7] The proxy variable is the demeaned narrative variable and expressed as percentage of last quarter gross domestic product.

3 The aggregate effect of public expenditures shocks

Discriminating between government spending and income transfers provides a richer analysis of the aggregate effect of public expenditure shocks. Section 3.1 presents the estimates for government income transfers shocks. Section 3.2 describes the aggregate impact of government spending shocks. All impulse responses are for a 1 percent increase in either public expenditure, and the forecast horizon is set to 20 quarters. Solid lines report the point estimates; broken lines report bootstrap-computed 95 percent confidence intervals. Section 3.3 compares the estimates in terms of the multiplier effect.

3.1 The aggregate effect of government income transfers shocks

Figure 3 shows the effect of an increase in social security benefits. The initial increase of 1 percent is reduced by half in four quarters, then social security benefits gradually revert to the pre-shock level. An increase in social security benefits implies a positive output response. Output rises 0.15 percent on impact and has peak response in the second quarter of 0.2 percent. Although the output response is positive during the entire forecast horizon, it is only significant the first four quarters. Benefits increases also trigger a positive response of aggregate expenditure components. Consumption of nondurables and services, and durable goods purchases show a significant increase in the short-run. Consistent with evidence at the household level, durable goods purchases respond more than private consumption of non-

[7] Fisher and Peters (2010) constructs an alternative narrative measure based on the accumulated excess returns of large US military contractors. However, this instrument results in less explanatory power for government spending (see Table 2 in their paper).

durables and services; the impact responses are 0.57 and 0.07 percent respectively.[8] The estimated consumption response is lower than estimates by Romer and Romer (2016). They find that a permanent benefit increase of 1 percent raises aggregate consumption by 1.2 percent in the month the checks arrive. The effect persists after four months. However, their estimates are also mainly driven by a rise in durables consumption. In Párraga-Rodríguez (2016) I also find that innovations to old age pensions trigger a larger response of durables purchases than non-durables. Non-residential investment increases significantly during the first 6 quarters, with peak increase in the fourth quarter of 0.45 percent. One explanation for this positive response of nonresidential investment could be that businesses, like policymakers (as explained below), see increases in social security benefits as expansionary. Moreover, Romer and Romer (2010) also find a strong response of investment to tax cuts which, as they argue, could be explained if investment depends strongly on overall economic conditions.

The narrative of Romer and Romer (2016) finds that increases in social security benefits often include increases in payroll taxes in their legislation. Consistent with this evidence, the rise in social security benefits is tax-financed. An increase in social security benefits is accompanied by a significant and steady increase in the Average Marginal Income Tax Rate, which rises 0.17 percentage points upon impact. The combined response of output and the average marginal tax income rate imply an increase in tax revenues. This response of the AMITR is also consistent with results obtained using total tax revenues instead.

On the other hand, the narrative analysis does not find contemporaneous increases of other public expenditures. The rise in government spending questions identifying assumption (4) and could suggest that the output response might be due to higher government spending. However, the instruments for government spending and income transfers shocks have a correlation close to zero, i.e. -0.04.[9] Moreover, next section demonstrates that government spending shocks have a weaker impact on output and aggregate expenditure components. For example, an increase in government spending yields a flat response of durable goods purchases. Augmenting

[8] See, for example, Johnson et al (2013, 2006) and Souleles (1999).

[9] Sample available for both variables from 1969:I-2007:IV.

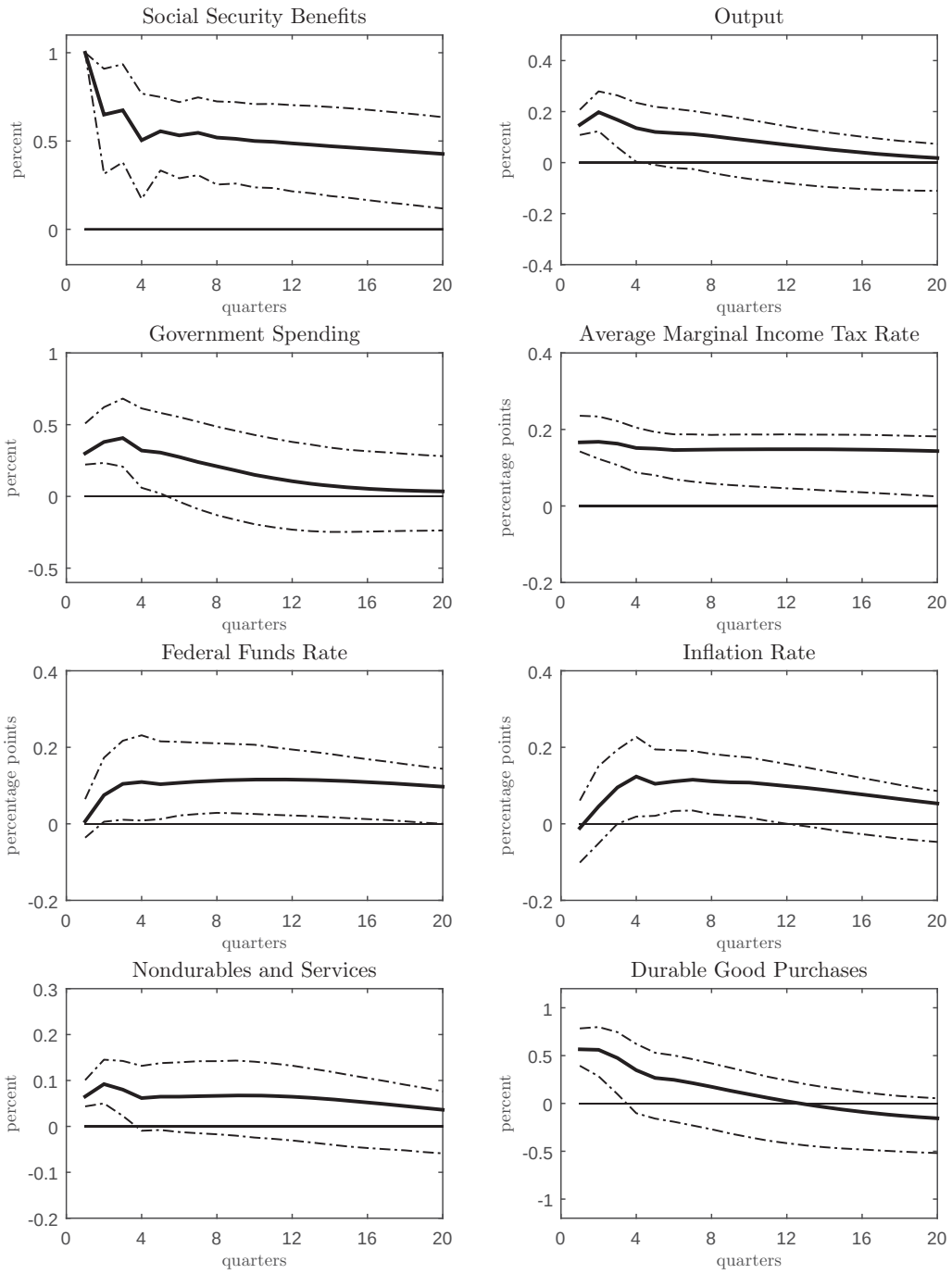

Figure 3: Aggregate Effect Social Security Benefits Shocks

Notes: Impulse responses from VAR. Sample 1951:I-2007:IV. Baseline includes social security benefits, output, AMITR, FF rate, price level. Inflation response computed as the annualized change in the price level. Augmented VARs include all other variables one at a time. Solid lines report point estimates. Broken lines report 95 percent confidence interval.

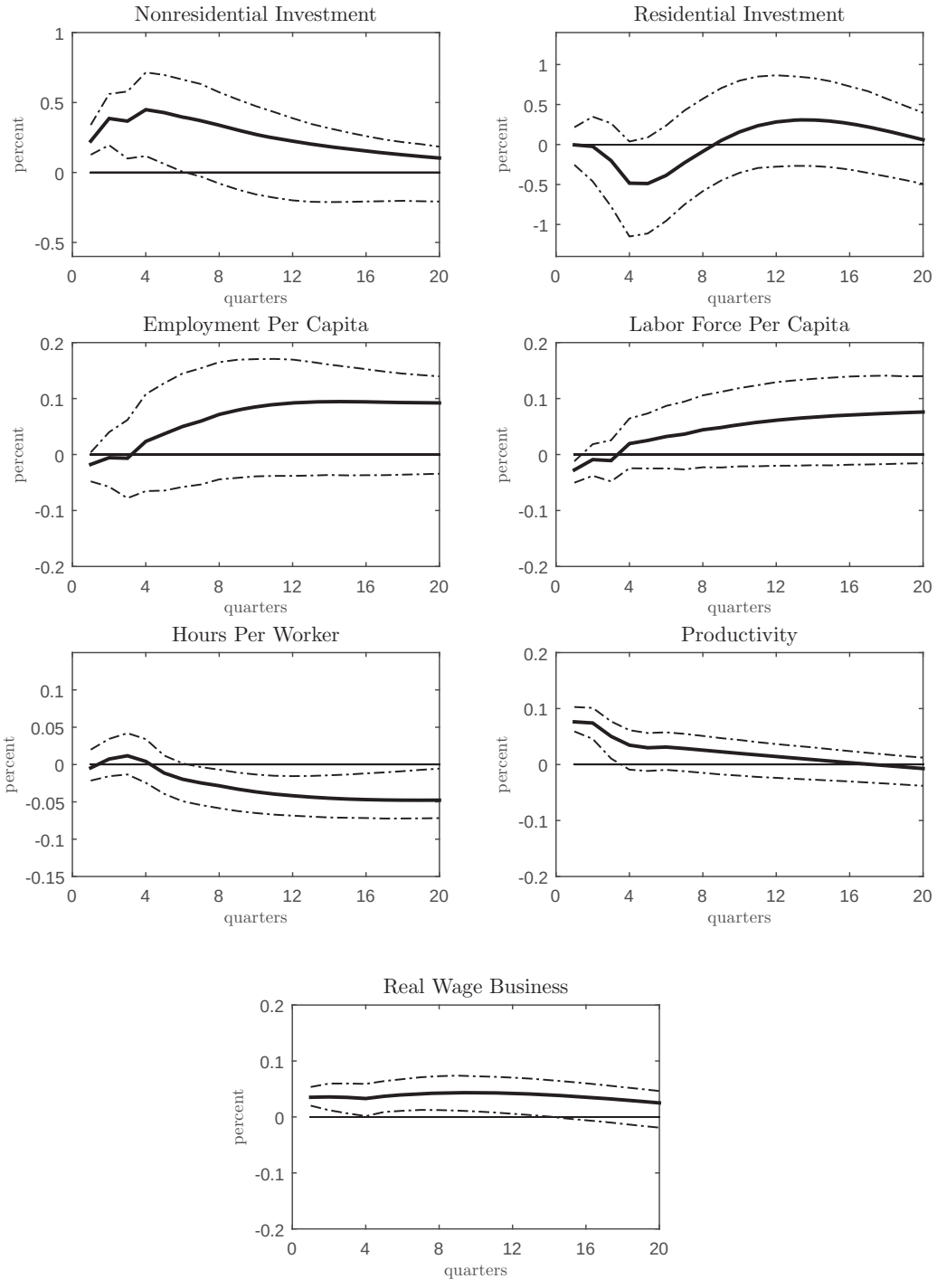

Figure 3 cont'd

the baseline VAR with government spending does not significantly change the output response either. The positive government spending response to increases in social security benefits could simply be an automatic response to higher tax revenues. It could also be due to higher private consumption of services provided by the government and charged below market price such as health-care.

Benefits increases yield a slight, but persistent rise in the real wage of the business sector. This contributes to higher inflation in the medium term. The inflation rate responds with delay to an increase in social security benefits. By the fourth quarter inflation has a maximum increase of 0.12 percentage points. The response of inflation is significant at standard levels for 8 quarters.[10] More importantly, the inflationary nature of increases in benefits triggers a response of monetary policy. Romer and Romer (2016) document the counteracting monetary policy response to increases in social security benefits examining the minutes of the Federal Open Market Committee (FOMC) meetings. For example, the staff economic report for the meeting on the 10th of August 1965, pg.28, states that

> The mailing of checks to Social Security beneficiaries, including both the new higher scale of payments and lump-sum retroactive benefits, will be adding to disposable personal income shortly. [...] How rapidly, and for what goods or services, recipients of the benefits will spend their funds is a big unknown; we have very little basis for estimating the consumption function for this older age group. But its hard to believe that the bulk of it wont get into the spending stream fairly promptly.

And in pg. 65, we find

> I would not want to ease policy right now, for a considerable degree of new fiscal stimulus lies immediately ahead of us. Some of this will come from the enlarged Social Security payments.

Regarding labor market indicators, increases in benefits trigger a positive response of labor participation and employment from the 4th quarter. The point estimates though are imprecisely estimated and insignificant at the 95 percent confidence level. On the other hand, hours do not respond in the short run but fall in the medium and longer run. The combined effect of higher output with the same hours during the first four quarters yields a significant increase in productivity in the

[10] The response of inflation is computed as the annualized change in the price level.

short run. The negative response of hours in the medium and longer-term indicates that increases in benefits distort labor supply of labor market participants. This is consistent with the view that higher taxes represent a weaker incentive to work (for example, Rogerson 2007; Olovsson 2009; Nickell 2004; Prescott 2004; and Ragan 2013).

To summarize, increases in social security benefits yield a positive output response. While all consumption aggregates show a positive response, households spend a larger fraction of the increased benefits in durable goods. Business see increases in benefits as expansionary and invest in their production capacity. However, increases in benefits also generate inflationary pressures that induce monetary policy to tighten. Finally, increases in benefits are self-financed and distort labor supply of labor market participants in the medium and longer term.

Understanding the sign of the bias

The close link to inflation of the Romer and Romer (2016)'s series raised doubts about the exogeneity of the narrative variable. Yet, if the nature of social security benefits increases implies a positive correlation between the state of the economy and transfers, we would expect a positive bias in the estimates using the narrative variable. Many increases in benefits are motivated by the desire to keep up with past inflation. Then, periods of higher inflation like expansions would translate into larger increases in benefits, and vice versa. Estimates that use the (extended) narrative variable as an instrument for the structural shocks to transfers would overestimate the effect of transfers shocks because part of the positive impact attributed to increases in transfers would be the result of concealed factors associated with a good estate of the economy. To better understand the potential bias, a comparison of the estimates is shown in Figure 4. Broken lines represent the estimates instrumenting the structural shocks to transfers with the narrative measure; to help in the comparison I reproduce again the baseline estimates (solid lines). Thin lines are the bootstrap-computed 95 percent confidence intervals. The paths of social security benefits are virtually the same in either specification. However, the output responses differ. The alternative specification yields a longer-lasting output response;

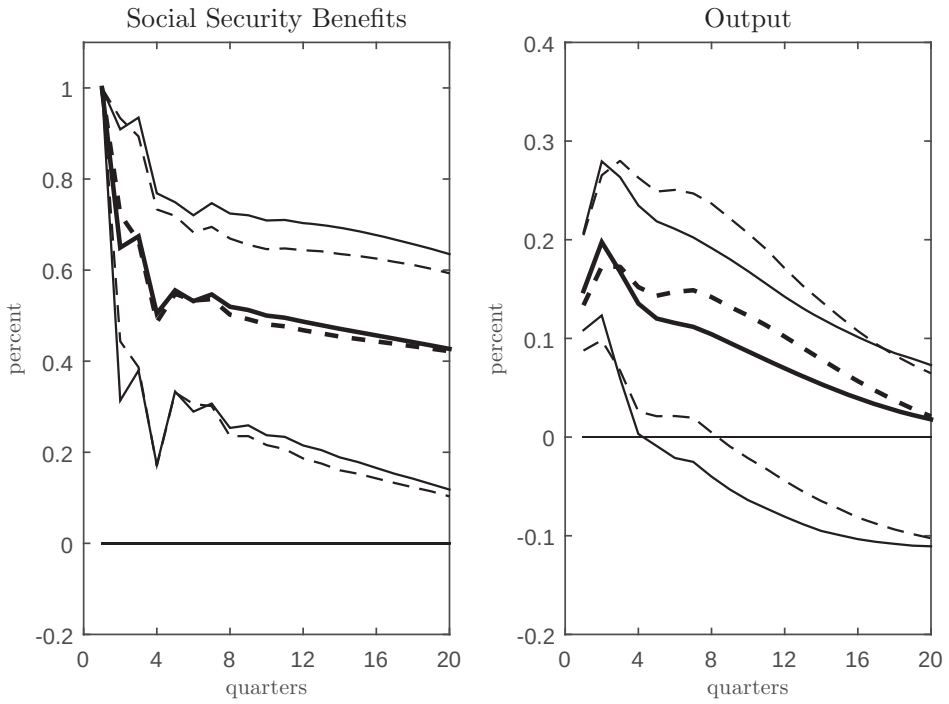

Figure 4: Estimates for the Predictable and Non-Predictable Proxy

Notes: Impulse responses from VAR. Sample 1951:I-2007:IV. Solid lines report baseline estimates. Broken lines report estimates using the extended narrative variable as instrument. Thin lines report 95 percent confidence interval.

the positive output response is bumpier and significant for 8 quarters instead of 4 quarters.

3.2 The aggregate effect of government spending shocks

Figure 5 shows the effect of increasing government spending by 1 percent. The Proxy SVAR methodology yields results that are consistent with the findings under alternative identification strategies. Government spending responds very persistently to its own shock as in Blanchard and Perotti (2002). The output response to increases in government spending is positive in the short run and significant during 3 quarters. Thereafter output declines and falls below trend before returning to the pre-shock level. The peak response of output corresponds to the impact increase of

0.14 percent. If increases in government spending were less persistent, the output response would be much similar to that of Ramey (2011).

Consumption of nondurables and services shows a hump-shaped response, with peak increase in the fourth quarter of 0.14 percent. Unlike increases in transfers, a rise in government spending yields a flat response of durable goods purchases. Imports remain flat for six quarters and then decline, though its response is not significant at standard levels. Nonresidential investment also remains flat for six quarters and then declines, with significant maximum fall of -0.57 percent in the 14th quarter. The response of both investment components is similar to that of Perotti (2007) (see Figure 3 in his paper).

Compared to increases in transfers, government spending increases yield a flat response of wages in the business sector, and inflation. To the exception of an increase of 0.13 percentage points upon impact, the inflation response is not statistically significant. The estimates indicate that monetary policy does not tighten in response to increases in government spending. The response of the Federal Funds rate is not statistically significant. Ramey (2011) also finds a non-significant response of the 3 moth Treasury bill rate. These estimates are in agreement with the narrative evidence. Expanding on the examples provided in the previous section, during the meeting on the 10th of August 1965 the shot-term effects of the step-up in U.S. activities in Vietnam on prices were extensively discussed. The general agreement seemed to be that "the proposed step-up in defense expenditure could be absorbed without any significant inflationary pressures." (Minutes, 8/10/65, p. 54). For this conclusion though, it is important to take into account that post-Korea defense buildups involved less resources compared to the Korean outbreak (see Ramey 2011). Moreover, consistent with other studies also excluding the Korean war from the sample period, I find a flat response of the tax rate (see Ramey 2011, Perotti 2007, or Fisher and Peters 2010). Social security benefits do not respond to increases in government spending either.

Regarding labor market variables, neither employment, labor force or hours show a statistically significant response. Similar to increases in transfers, the combined effect of higher output with the same, or slightly lower, hours results in a significant productivity rise in the short run.

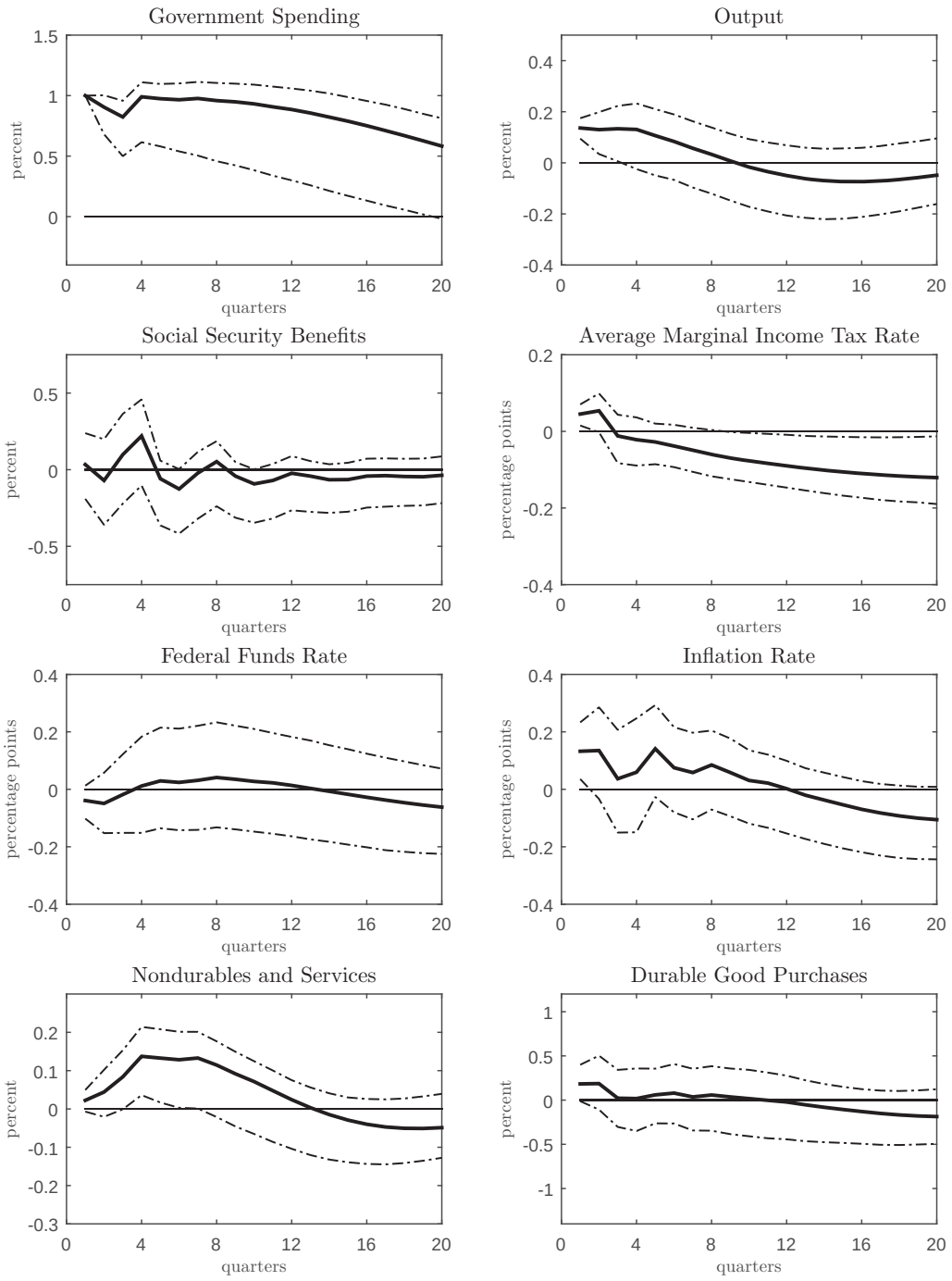

Figure 5: Aggregate Effect Government Spending Shocks

Notes: Impulse responses from VAR. Sample 1969:I-2007:IV. Baseline includes government spending, output, AMITR, FF rate, price level. Inflation response computed as the annualized change in the price level. Augmented VARs include all other variables individually. Solid lines report point estimates. Broken lines report 95 percent confidence interval.

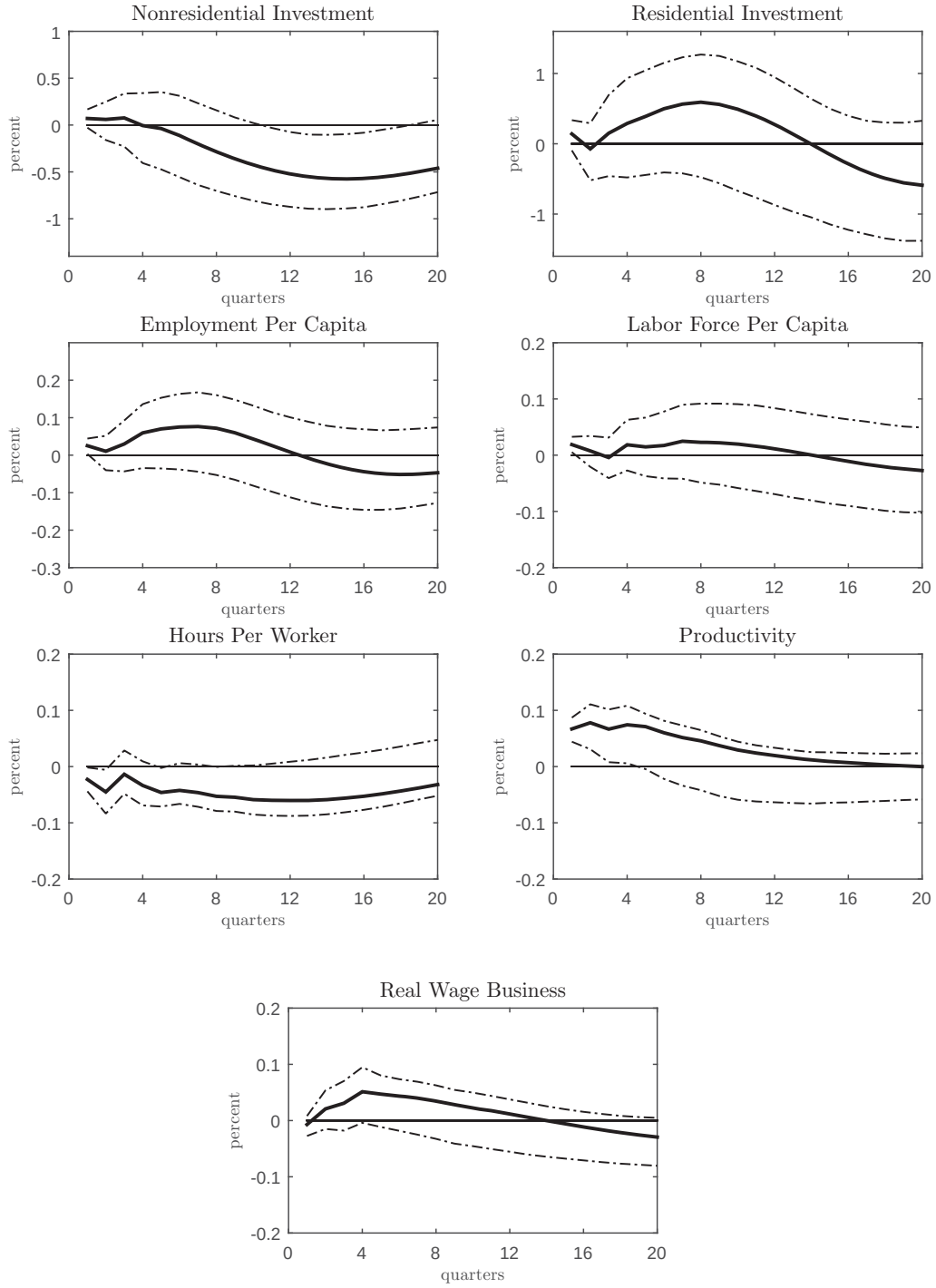

Figure 5 cont'd

3.3 Understanding the difference between public expenditures shocks

A principal contribution of this paper is an estimate of the output multiplier for different public expenditures, especially the transfers output multiplier. The analysis so far has based on a qualitative comparison. The output multiplier is an standardized measure to quantitatively compare the estimates. The output multiplier can be calculated re-scaling the output response to either shock such that the public expenditure rises by 1 percent of GDP. Figure 6 shows the multiplier effect for both public expenditures as well as the cumulative effect for a forecast horizon of 20 quarters. The estimates indicate that both public expenditure shocks yield a similar aggregate effect on impact, with both having an impact multiplier close to 0.2. The differences, however, build up over the forecast horizon. Four quarters later, transfers have an accumulated effect equal to 1.0, while the government spending cumulative multiplier is only 0.7. Furthermore, the positive response of output to transfer shocks yields a gradually rising cumulative multiplier; after eight quarters takes the value of 1.9, and a maximum of 2.8 by the end of the forecast horizon. Allowing for a longer horizon is unlikely to result in a much higher effect because the output multiplier is close to zero, and insignificant, by the end of the forecast horizon. On the other hand, the government spending multiplier reaches its maximum accumulated effect at one between the sixth and twelve quarters. Thereafter, the fall bellow trend of output translates into an accumulated effect of government spending shocks below unity. Finally, it is noticeable the wide confidence intervals for the cumulative multiplier effects at later time periods.

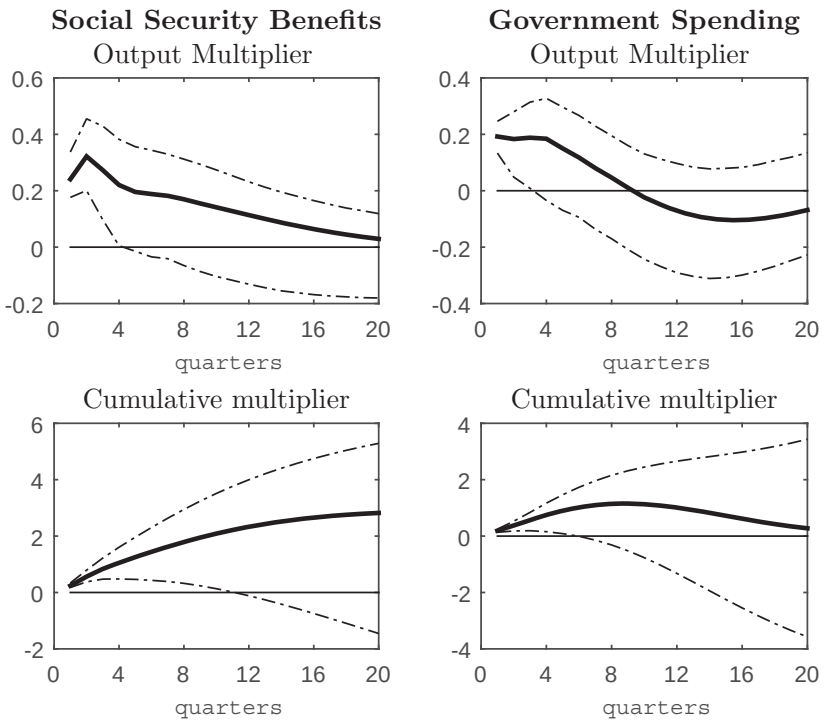

Figure 6: Output Multiplier for Different Public Expenditures

Notes: Transformation of output response from baseline VARs. Sample for social security benefits 1951:I-2007:IV. Sample for government spending 1969:I-2007:IV. Solid lines report multiplier effect. Broken lines report 95 percent confidence interval.

At this point it is imperative to compare these estimates with other measures of fiscal output multipliers in the existing literature. Ramey (2011) also estimates the aggregate effect of government spending shocks for the narrative variable based on professional forecasts of defense spending and finds a multiplier of 0.8 when using the peak responses. Blanchard and Perotti (2002) find an impact spending multiplier of 0.8, and peak response of 1.3 after fifteen quarters. Nevertheless, the output multiplier for government spending is in its usual range, which according to Ramey (2011a) literature survey ranges between 0.6 and 1.8. It is also important to compare the estimates for the transfers multiplier with estimated tax multipliers (although these measures do not afford a one-to-one comparison). In the SVAR tradition and for total tax revenues, Blanchard and Perotti (2002) find a peak multiplier of 0.8. Using sign restrictions in the SVAR framework, Mountford and Uhlig (2009) also estimate the effect of aggregate taxes and find an impact multiplier of 0.3, which rises to 0.9 after one year and reaches a maximum value of 3.4 after twelve quarters. Romer and Romer (2010) construct a narrative variable of legislated tax changes

and estimate that a tax hike of 1 percent of GDP has a small and not statistically significant effect on output upon impact, but maximum effect of 3.1 percent after ten quarters. Mertens and Ravn (2013) estimate the proxy SVAR for personal income taxes and find a multiplier of 2.0 on impact, rising to a maximum of 2.5 in the third quarter.

An explanation for the different effect of government spending and transfers shocks could be their different transmission mechanism. On one hand, government spending contributes directly to aggregate demand producing and providing services to the public. Then, the effect of increases in government spending depends critically on to what extend government spending replaces private spending. An increase in government spending triggers a positive response of non-durables and services consumption between the fourth and eight quarters. However, increases in government spending also seem to compete directly with private investment. An increase in government spending triggers a negative response of nonresidential investment from the fourth quarter. Altogether, the initial change in aggregate demand does not sufficiently enhance private spending to generate a multiplier effect larger than one.

On the other hand, government income transfers indirectly affect aggregate demand through redistributing income across individuals, and influencing their spending decisions. I find that increases in transfers yield a positive effect on private consumption and investment, specially on durable goods purchases. Altogether, the estimates indicate that transfers generate a multiplier effect greater than one redistributing income towards those individuals with a stronger response to changes in income. This is consistent with household level evidence that benefits recipients are likely to have higher marginal propensities to consume than other individuals due to liquidity constraints or other idiosyncratic characteristics such as different consumption patterns. For example, in a pioneering quasi-experimental approach, Bodkin (1959) looks at the consumption response of WW-II veterans after the receipt of unexpected dividend payments from the National Service Life Insurance in 1950. He finds the marginal propensity to consume nondurables to be as high as 0.72. Hausman (2016) also looks at the consumption response of veterans, but of WW-I, in a natural experiment setting. He finds that within six months of receiv-

ing a large bonus in June 1936, veterans spent between 0.65 and 0.75 cents out of every dollar received, and that they spent a large fraction of their bonus on cars, i.e. durable goods. Parker et al. (2013) exploit the randomization in the assignation of Social Security numbers to estimate the change in household spending following the tax rebates of 2008 in the U.S. They find that on average households spent about 50 to 90 percent of their stimulus payments on durable goods (mainly cars), and about 12 to 30 percent on non-durables consumption goods and services in the quarter of the tax rebate. The estimated spending responses are largest for low-income, old age and borrowing constrained households.[11] Moreover, Budría-Rodríguez et al (2002) and Díaz-Giménez et al (1997) report interesting facts of the income and wealth distribution in the U.S. Along employment status, nonworkers (excluding retirees) tend to be poor in terms of income and wealth, and transfer payments constitute a substantial source of their income. In average, retirees tend to be income-poor but wealth-rich. However, data also points to substantial wealth inequality within this group. Using the Assets and Health Dynamics of the Oldest dataset, De Nardi et al (2010) find that the elderly in the lowest quintiles of a distribution by social security benefits hold very few assets. Also, the benefits-poor elderly run down their assets much faster than the benefits-rich (See Figure 1 in their paper). Finally, Hubbard, Skinner, and Zeldes (1995) and Scholz, Seshadri, and Khitatrakun (2006) argue that social insurance programs induce low-income individuals not to save.

4 Conclusion

This paper has presented evidence on the dynamic aggregate effects of public expenditure shocks discriminating between government spending, and government income transfers in the U.S. for the post-WWII sample. I take on the identification challenge by adopting the identification strategy of Mertens and Ravn (2013).

[11] Johnson et al. (2006) study the effects of the 2001 tax rebates with similar findings.

The results demonstrate the different macroeconomic impact that different public expenditures shocks have. Increases in transfers affect aggregate demand through changing individuals' disposable income and their spending decisions. The positive response of private spending, especially durable goods purchases, results in a transfers multiplier with values well above unity. In contrast, consistent with theory of the crowding-out effect, increases in government spending do not sufficiently enhance private spending to generate a multiplier effect larger than one.

This study was useful in better understanding the macroeconomic effect of shocks to different components of public expenditures. The results have also important policy implications. An estimate for the transfers multiplier well above one compared to an estimate of the spending multiplier between 0 and 1 indicates that for expenditure policies to have an effect on the business cycle, this policies should be directed to changes in transfers. In turn, the results side with the documented importance of transfers in total public expenditures and support recent fiscal efforts like the American Recovery and Reinvestment Act of 2009. To draw stronger conclusions though, future research should explore alternative sources of exogenous variation. For example, recent literature has begun analyzing cross-section variation to identify the macroeconomic effects of government spending and interregional transfers. There is room to explore where government income transfers to persons are involved.

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A1 Data Appendix

The following table describes the data definitions and sources. Most of the data is retrieved form the Bureau of Economic Analysis' NIPA Tables, last downloaded on 23rd June 2014. Another useful source has been the database of the Federal Reserve Bank of St. Louis. Nominal variables are converted into real terms using the GDP deflator (NIPA Table 1.1.9 line 1) and transformed in per-capita terms dividing by total population (Ramey (2011). All variables to the exception of rates are logged.

Series	Source	Definition
Output	BEA	Real GDP (NIPA Table 1.1.3 line 1) divided by population.
Government spending	BEA	Real federal government consumption expenditures and gross investment (NIPA Table 1.1.3 line 23) divided by population.
Government income transfers	BEA	Social security benefits to persons (NIPA Table 2.1 line 18) divided by the GDP deflator and population.
Personal Income Tax Base	BEA	Personal income (NIPA Table 2.1 line 1) less government transfers (NIPA Table 2.1 line 17) plus contributions for government social insurance (NIPA Table 3.2 line 11) deflated by the GDP deflator and divided by population.
Federal Funds rate	Romer and Romer (2010)	They extend back the series to 1950:I.
AMITR	Ramey(2011)	Barro-Redlick average marginal income tax rate. Sum of the Average Marginal Individual Income Tax Rate (AMIITR) and Average Marginal Payroll Tax Rate (AMPTR).
Total Tax Revenues	BEA	Sum of current tax receipts (NIPA Table 3.2 line 2) and contributions for government social insurance deflated by the GDP deflator and divided by population.
CPI	FRED	Consumer Price Index for urban wage earners and clerical workers. Series CWSR0000SA0
Consumption (nondurables and services)	BEA	Sum of real personal consumption expenditures of nondurable goods (NIPA Table 1.1.3 line 5) and services (NIPA Table 1.1.3 line 6) divided by population.
Durable goods purchases	BEA	Real personal consumption expenditures on durable goods (NIPA Table 1.1.3 line 4) divided by population.

Non-residential fixed investment	BEA	Real gross private domestic non-residential investment (NIPA 1.1.3 line 9) divided by population.
Residential fixed investment	BEA	Real gross private domestic residential investment (NIPA 1.1.3 line 13) divided by population.
Employment	Francis and Ramey (2009)	Total economy employment divided by population.
Labor force	FRED	Sum of Employment and number of unemployment (series UNEMPLOY) divided by population.
Hours per worker	Francis and Ramey (2009)	Total economy hours worked divided by employment.
Real wages business	Ramey (2011)	Consistent series back to 1947.
Productivity	FRED	Real output per our of all persons in the nonfarm business sector. Series OPHNFB.
Unemployment rate	FRED	From the Current Population Survey, civilian unemployment rate (series UNRATE).

A2 Extension narrative variable for transfers shocks

Table A2 reports the extension of the Romer and Romer (2016) narrative variable of social security benefits increases from 1992:I to 2007:IV. The cost-of-living adjustments are retrieved directly form the Social Security website (https://www.ssa.gov/oact/cola/ colaseries.html) and expressed in percentage. The benefits increases are expressed as percentage of last quarter total taxable personal income.

Table A2: Extension Series Legislated Increases in Social Security Benefits.

Date	COLAs	Benefits change
Jan-92	3.7	0.20
Jan-93	3.0	0.16
Jan-94	2.6	0.15
Jan-95	2.8	0.15
Jan-96	2.6	0.14
Jan-97	2.9	0.16
Jan-98	2.1	0.11
Jan-99	1.3	0.07
Jan-00	2.5	0.12
Jan-01	3.5	0.17
Jan-02	2.6	0.13
Jan-03	1.4	0.07
Jan-04	2.1	0.11
Jan-05	2.7	0.14
Jan-06	4.1	0.21
Jan-07	3.3	0.17

A3 Government income transfers

Figure A1 shows the evolution over the sample period of the shares of different components of government income transfers. The long run share of Social Security benefits is 40.81%. Data retrieved from Table 2.1 in the NIPA. Social security benefits include old-age, survivors, and disability insurance benefits that are distributed from the federal old-age and survivors insurance trust fund and the disability insurance trust fund. Figure A2 shows that within social security benefits, old-age benefits stand as the most important category. Data from the Social Security Administration.

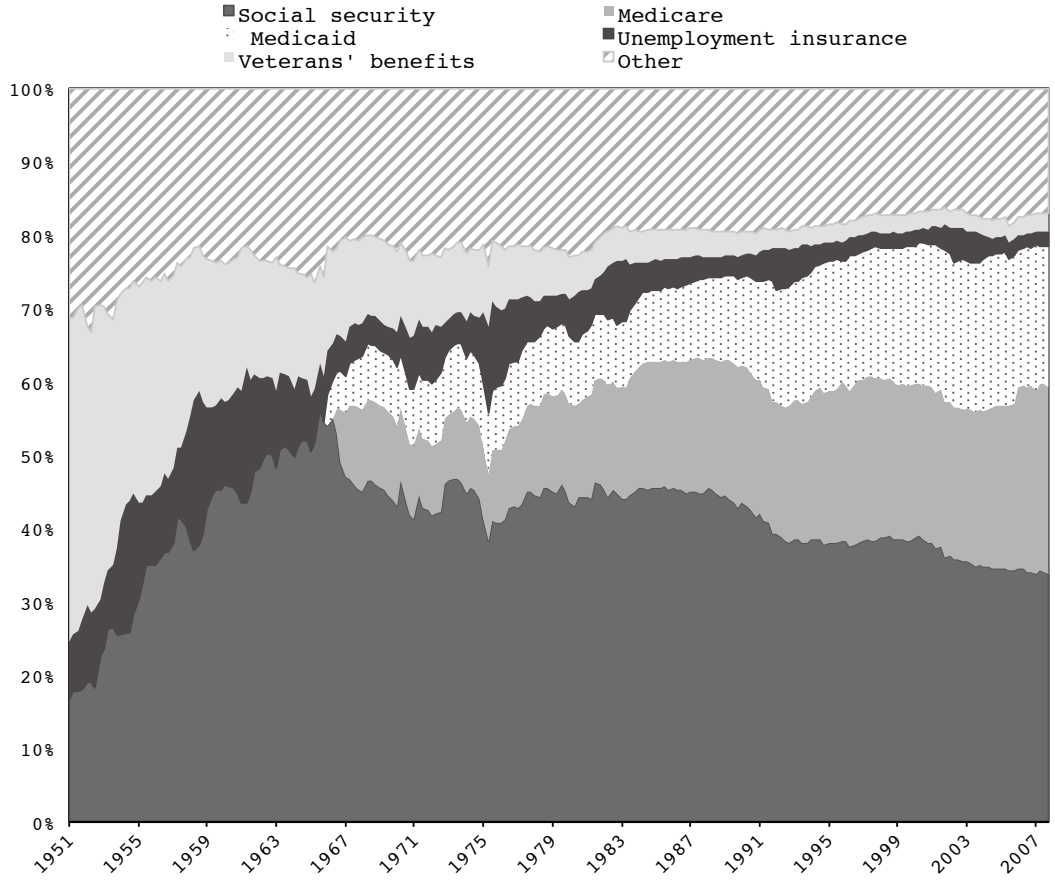

Figure A1: Shares of Social Benefits, U.S. 1951:I-2007:IV

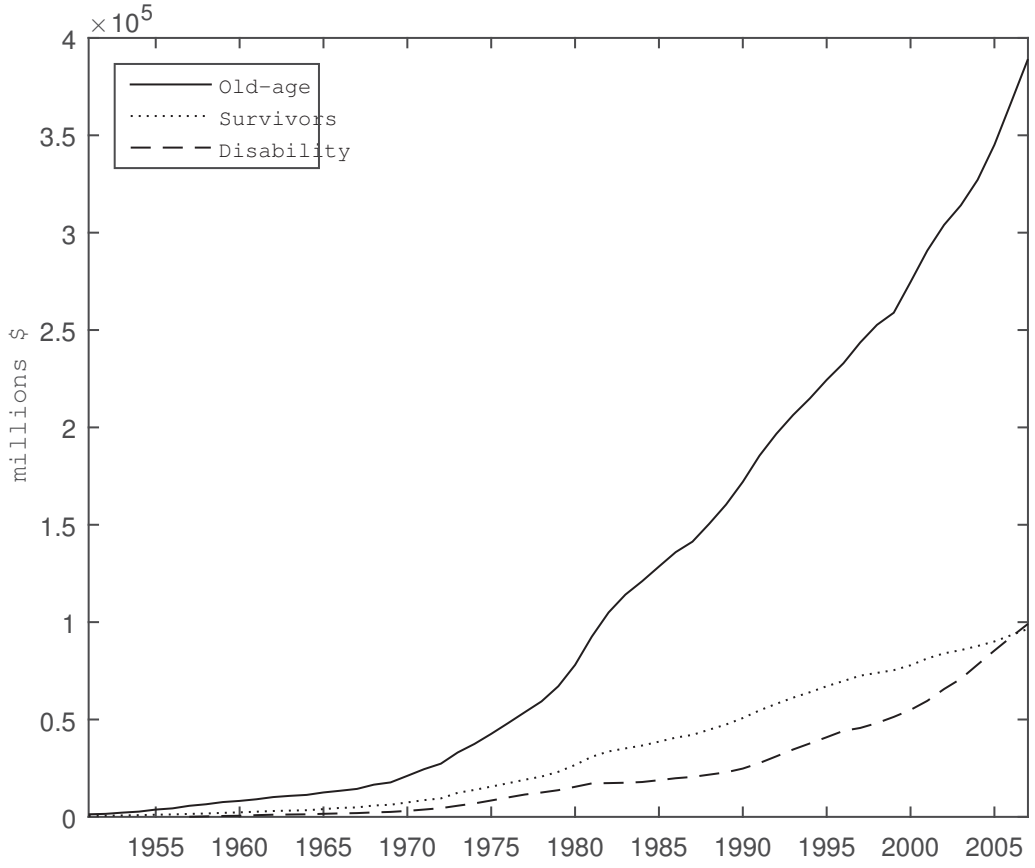

Figure A2: Annual Benefits Paid from the OASI and DI Trust Fund, U.S. 1951:I-2007:IV

A4 Alternative price indices

Figure A3 shows the inflation response for alternative price indices: the CPI for urban wage earners and clerical workers, the personal consumption expenditures implicit deflator (PICE), and the implicit GDP deflator. The CPI and the PICE yield very similar inflation responses. The GDP deflator implies a similar inflation response to a shock to social security benefits, but inflation initially drops in response to a government spending shock. The estimated output responses are not significantly affected by the choice of a particular price index.

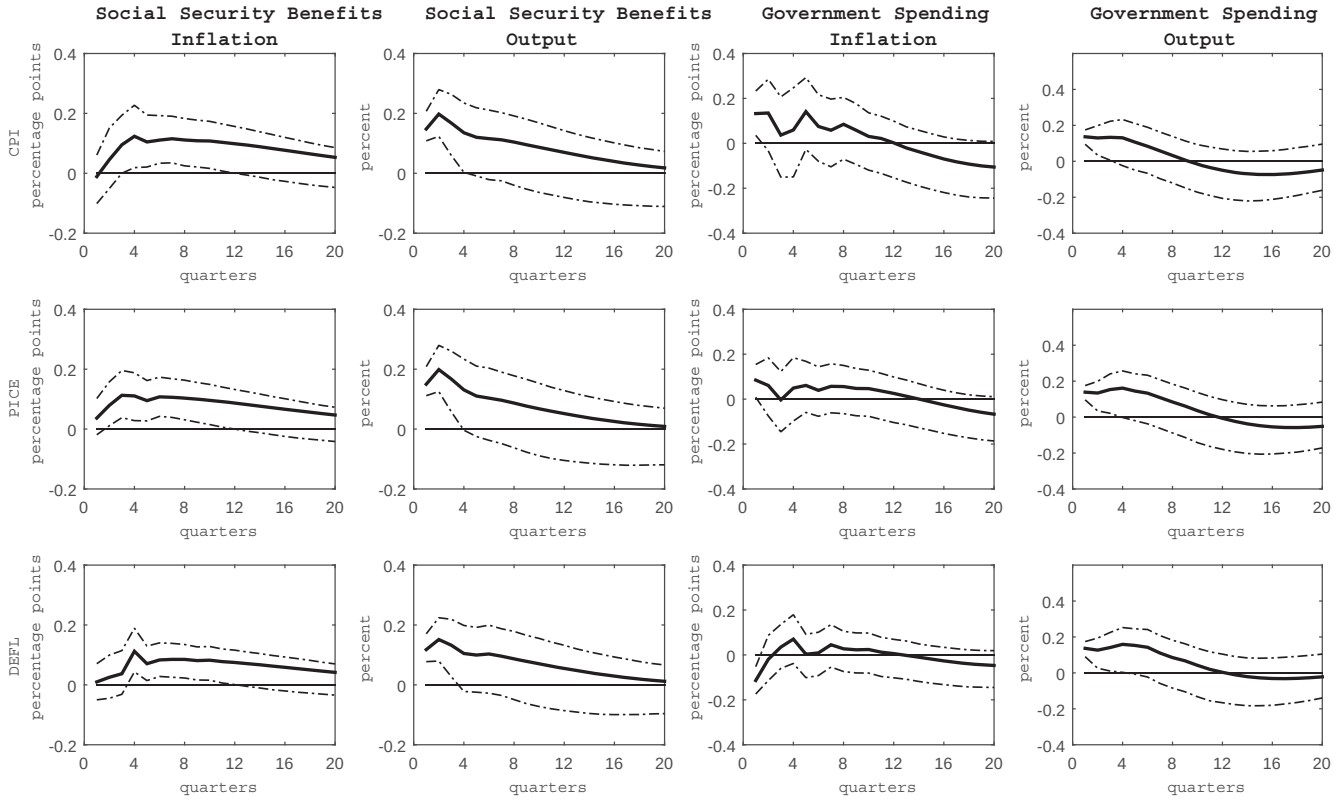

Figure A3: Inflation and Output Responses for Alternative Price Indices

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