Appendix for "Fiscal Adjustment to Monetary Shocks"

A Additional Tables and Figures

Table A.1: Federal transfers

	1969	1993	2007
Total (billion dollars)	70	792	1758
Social benefits	**66%**	**75%**	**73%**
Social Security	38%	38%	33%
Medicare	10%	19%	24%
Unemployment insurance	3%	4%	2%
Railroad retirement	2%	1%	1%
Pension benefit guaranty	0%	0%	0%
Veterans' life insurance	1%	0%	0%
Workers' compensation	0%	0%	0%
Military medical insurance	0%	0%	0%
Veterans' benefits	8%	2%	2%
Food Stamp Program (FSP)	0%	3%	2%
Black lung benefits	0%	0%	0%
Supplemental Security Income	0%	3%	2%
Refundable tax credits	0%	1%	3%
Other	2%	2%	2%
To the rest of the world	1%	1%	1%
Grants-in-aid to state and local governments	**19%**	**20%**	**20%**
General public service	n.a.	0%	0%
National defense	n.a.	0%	0%
Public order and safety	n.a.	0%	0%
Economic affairs	n.a.	1%	1%
Housing and community services	n.a.	0%	1%
Medicaid	n.a.	10%	11%
Prescription drug plan	n.a.	0%	0%
Other health	n.a.	1%	1%
Recreation and culture	n.a.	0%	0%
Education	n.a.	2%	2%
Income security	n.a.	6%	4%
Other transfers to the rest of the world	**6%**	**3%**	**2%**
Capital transfer payments	**8%**	**3%**	**5%**

Note: based on NIPA tables 3.2, 3.12U and 3.24U. Detailed data on grants-in-aid is unavailable before 1993.

Table A.2: Calibration

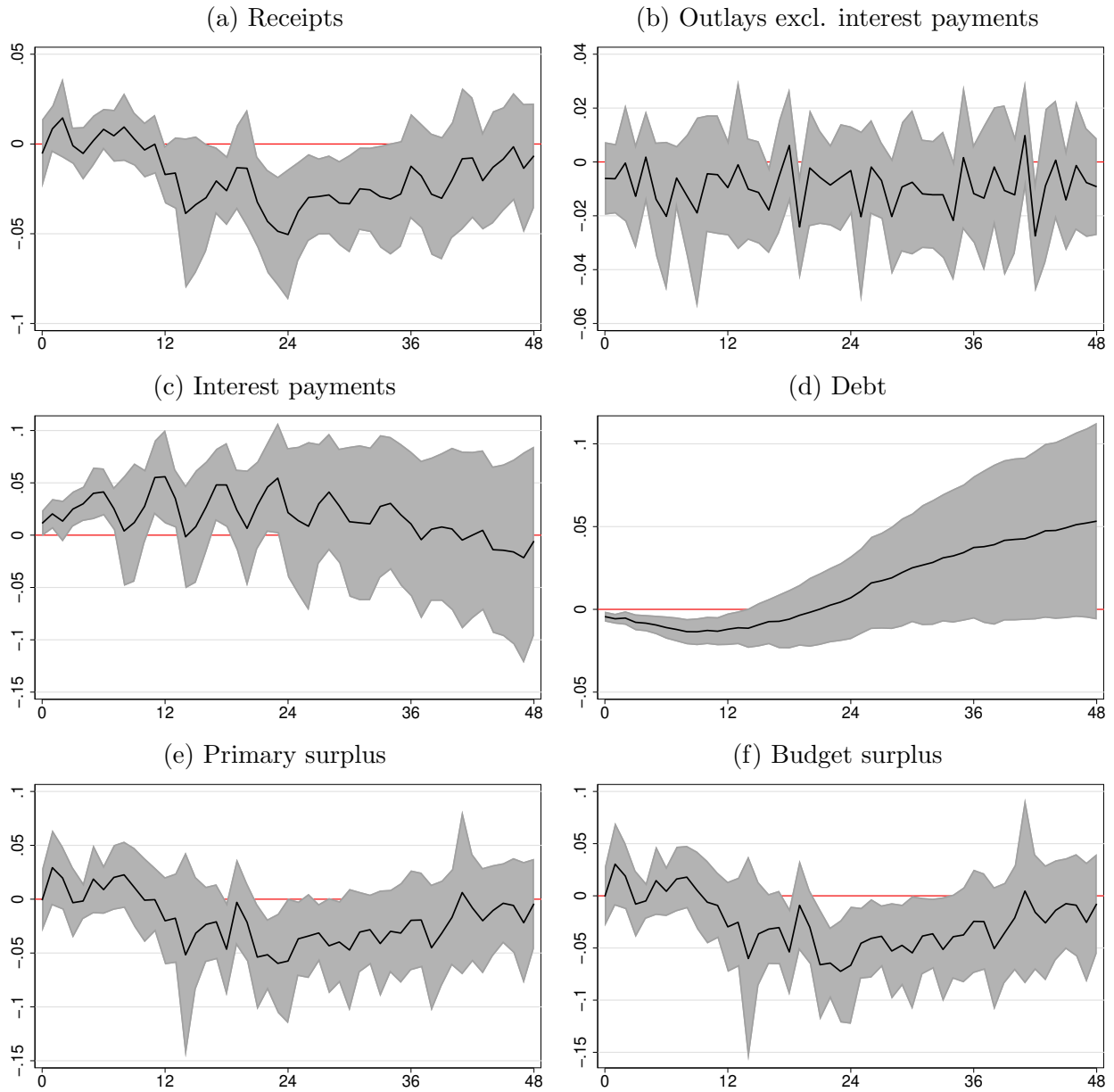|	Parameter	Target	Comment
i^*	0.005	Sample mean	Annual: 7%
π^*	0.004	Sample mean	Annual: 4%
g^*/d^*	0.046	Average outlays to debt ratio	Annual: 55%
t^*/d^*	0.048	Steady state budget constraint	Annual: 57%
ρ	0.978	Weighted average maturity of debt	45 months
τ	1.41	Response of receipts	Elasticity of taxes w.r.t. output

Figure A.1: An Example of the data

Table FFO-1. - Summary of Fiscal Operations

(In millions of dollars)

Fiscal year or month	Budget receipts, expenditures, and lending								Means of financing - net transactions				
	The expenditure account			Loan account 1/					Borrowings from the public - Federal securities				
	Net receipts 2/	Net expenditures 2/	Surplus or deficit (-)	Loan disbursements	Loan repayments	Net lending 2/	Outlays 2/	Budget surplus or deficit (-)	Public debt securities	Agency securities	Investments of Government accounts 4/	Special notes 5/	Total borrowings from the public
	(1)	(2)	(1)-(2) (3)	(4)	(5)	-(4)+(5) (6)	(2)-(6) (7)	(3)+(6) (8)	(9)	(10)	(11)	(12)	(9)+(10) -(11)-(12) (13)
1961............	94,389	96,597	-2,208	7,869	6,671	-1,198	97,795	-3,406	2,640	-292	605	316	1,427
1962............	99,676	104,462	-4,786	9,621	7,271	-2,351	106,813	-7,137	9,230	1,450	627	284	9,769
1963............	106,560	111,456	-4,896	9,646	9,791	145	111,311	-4,751	7,659	196	1,428	339	6,088
1964............	112,662	118,039	-5,377	10,237	9,693	-545	118,584	-5,922	5,853	508	2,864	405	3,092
1965............	116,833	117,181	-347	10,911	9,662	-1,249	118,430	-1,596	5,561	704	2,330	-126	4,061
1966............	130,856	130,820	36	14,628	10,796	-3,832	134,652	-3,796	2,633	4,041	3,244	354	3,076
1967............	149,552	153,201	-3,649	17,676	12,623	-5,053	158,254	-8,702	6,314	5,079	9,035	-482	2,838
1968............	153,671	172,802	-19,131	20,327	14,297	-6,030	178,833	-25,161	21,357	5,944	5,320	-1,119	23,100
1969............	187,792	183,080	4,712	13,167	11,691	-1,476	184,556	3,236	6,142	-10,150	8,522	-1,384	-11,146
1970 (Est.)......	199,386	194,985	4,401	9,489	6,589	-2,900	197,885	1,501	9,232	-1,642	8,590	-	-1,000
1971 (Est.)......	202,103	200,088	2,014	7,921	683	200,771	1,331	8,171	-402	8,969	-	-1,200
1968-Dec.........	15,836r	14,473r	1,363r	1,577	1,649	71	14,402r	1,435r	1,166	-5,203	-267r	-185	-3,586
1969-Jan.........	15,845	15,798	47	633	670	37	15,761	84	1,383	-33	724	-1,000	1,626
Feb.........	14,590	14,361	230	756	383	-373	14,734	-144	-648	195	1,433	-	-1,887
Mar.........	13,727	15,637	-1,910	724	723	-2	15,639	-1,912	782	-91	272	-	418
Apr.........	23,596	15,922	7,674	796	746	-50	15,972	7,625	-1,080	-559	817	-	-2,456
May.........	13,346	15,279	-1,932	936	451	-485	15,764	-2,418	1,599	-137	2,946	-	-1,485
June........	23,805	13,895	9,910	992	1,365	373	13,522	10,283	-6,345	-188	2,054	-	-8,587
July........	12,542	15,542	-3,001	470	318	-152	15,695	-3,153	3,292	1,316	170	-	4,438
Aug.........	14,999	16,790	-1,791	585	269	-316	17,106	-2,107	3,175	-829	1,667	-	679
Sept........	20,406	17,167	3,239	775	327	-448	17,616	2,790	498	-643	230	-	-375
Oct.........	11,832	17,602	-5,769	819	477	-342	17,944	-6,112	3,709	-47	-727	-	4,388
Nov,........	14,332	15,225	-894	613	377	-236	15,461	-1,130	3,718	-141	883	-	2,695
Dec.........	16,704	15,232	1,472	687	827	140	15,092	1,612	113	-85	2,041	-	-2,012
Fiscal 1970 to date...........	90,818	97,562	-6,744	3,950	2,595	-1,355	98,917	-8,099	14,505	-429	4,265	-	9,811

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Figure A.2: Results with a year of lags as controls

(a) Receipts

(b) Outlays excl. interest payments

(c) Interest payments

(d) Debt

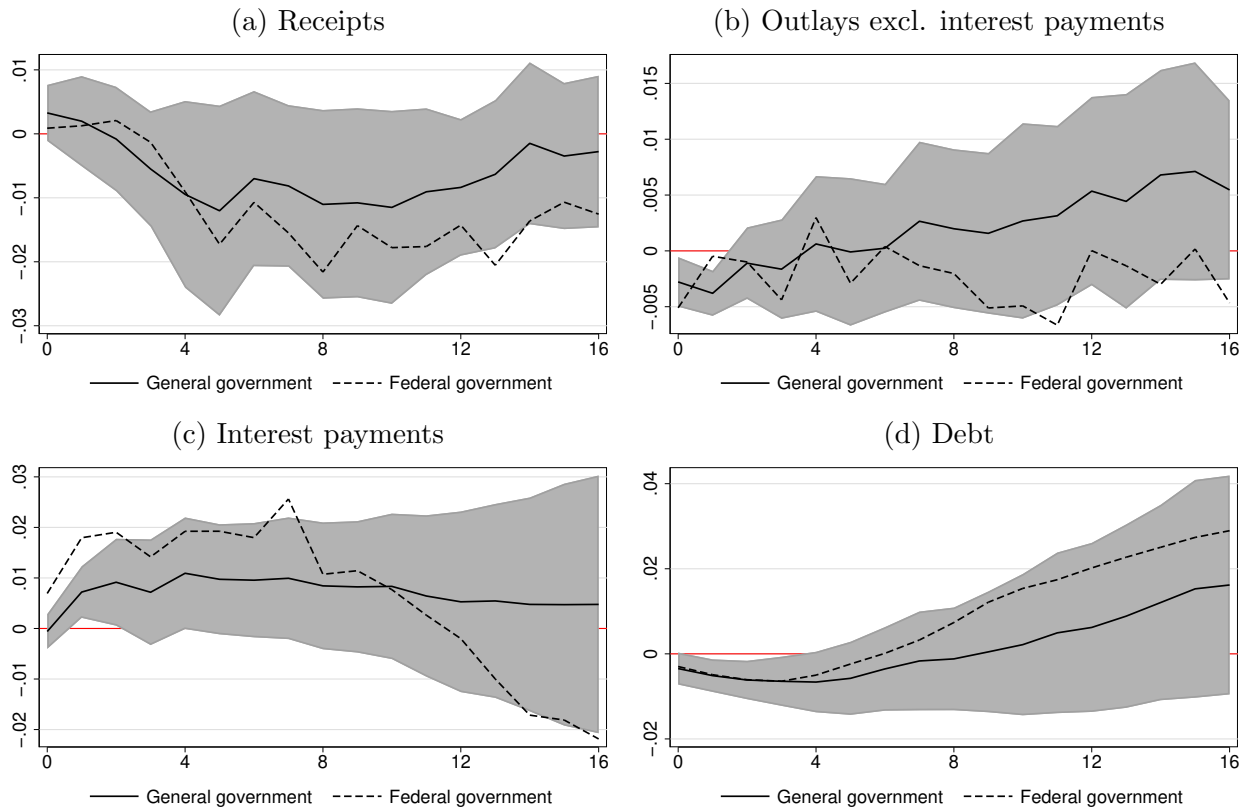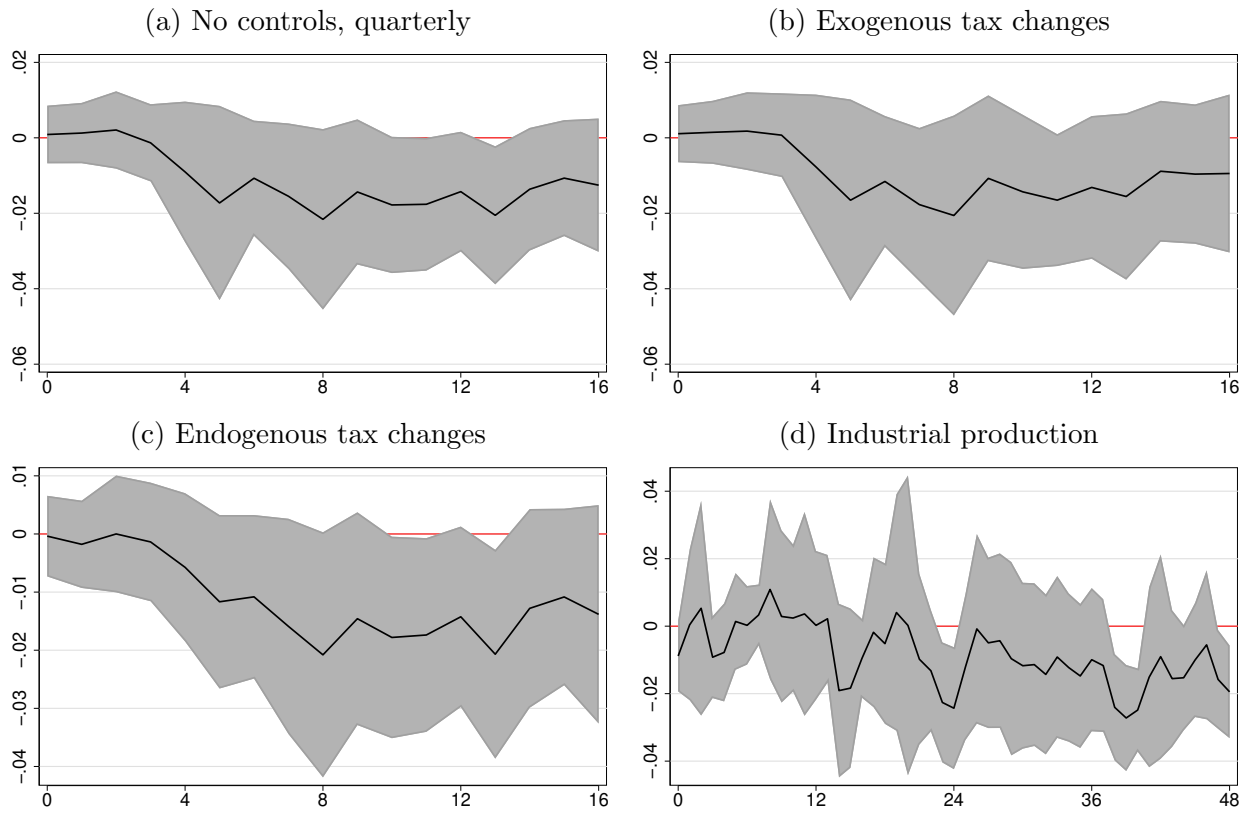(e) Primary surplus

(f) Budget surplus

Note: response to a 100 basis point increase in the FFR target. The grey area is the 95% confidence interval with Driscoll-Kraay standard errors. Time is in months.

Figure A.3: Results with Coibion et al. (2017) shocks
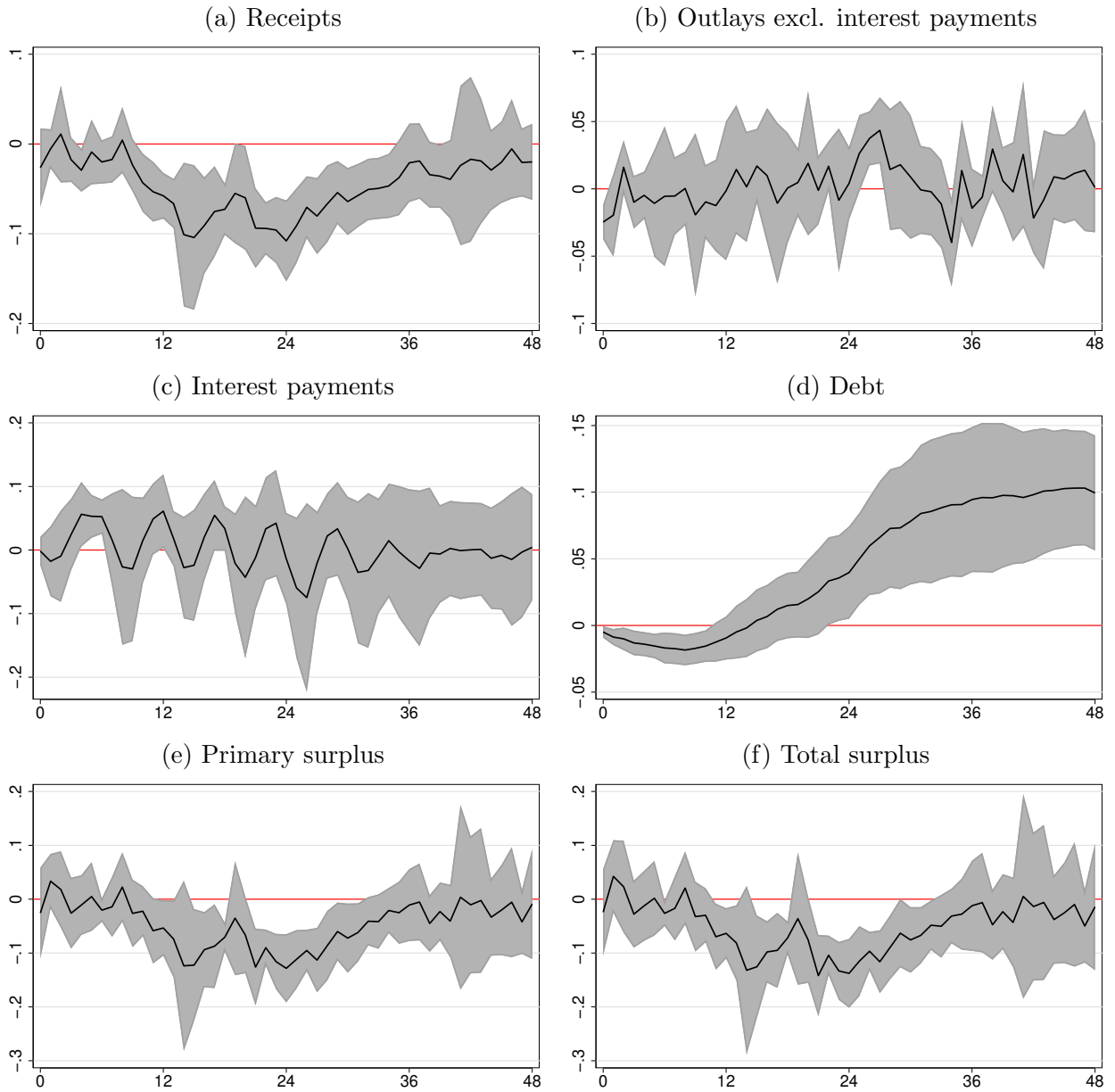
(a) Receipts

(b) Outlays excl. interest payments

(c) Interest payments

(d) Debt

(e) Primary surplus

(f) Total surplus

Note: response to a 100 basis point increase in the FFR target. The grey area is the 95% confidence interval with Driscoll-Kraay standard errors. Time is in months.

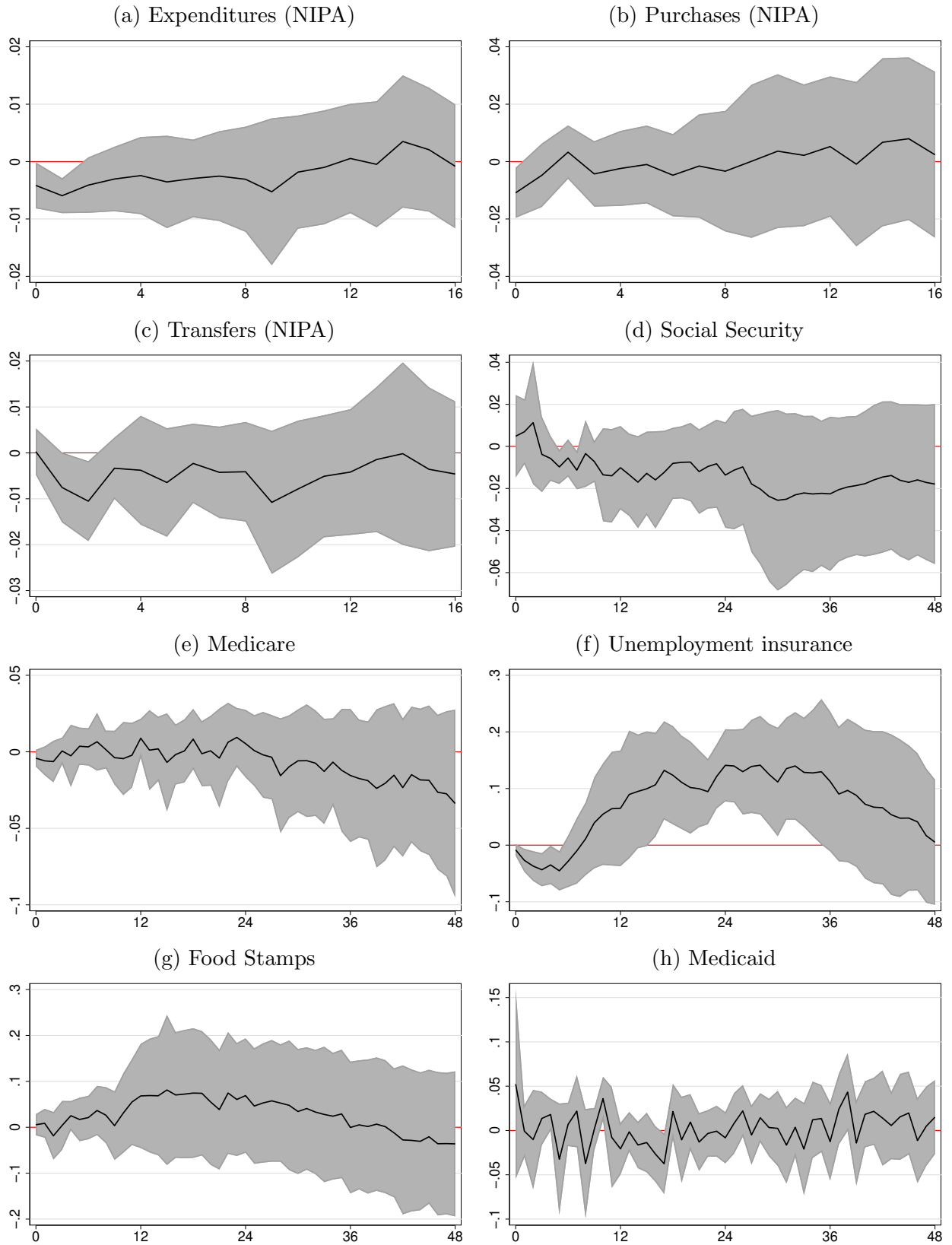Figure A.4: Results including state and local governments

(a) Receipts

(b) Outlays excl. interest payments

(c) Interest payments

(d) Debt

Note: response to a 100 basis point increase in the FFR target. Lines are point estimates. The grey area is the 95% confidence interval with Driscoll-Kraay standard errors, for the general government sector. Time is in quarters. Data series for general government: (a) total receipts (NIPA), (b) total expenditures minus interest payments (NIPA), (c) interest payments (NIPA), (d) consolidated total liabilities of the general government (Flow of Funds).

Figure A.5: Receipts response with controls

(a) No controls, quarterly

(b) Exogenous tax changes

(c) Endogenous tax changes

(d) Industrial production

Note: response to a 100 basis point increase in the FFR target. The grey area is the 95% confidence interval with Driscoll-Kraay standard errors. Time is in months.

Figure A.6: Outlays response

(a) Expenditures (NIPA)

(b) Purchases (NIPA)

(c) Transfers (NIPA)

(d) Social Security

(e) Medicare

(f) Unemployment insurance

(g) Food Stamps

(h) Medicaid

Note: response to a 100 basis point increase in the FFR target. The grey area is the 95% confidence interval with Driscoll-Kraay standard errors. Time is in months.

Figure A.7: Re-treatment of Social Security payments

(a) Social Security
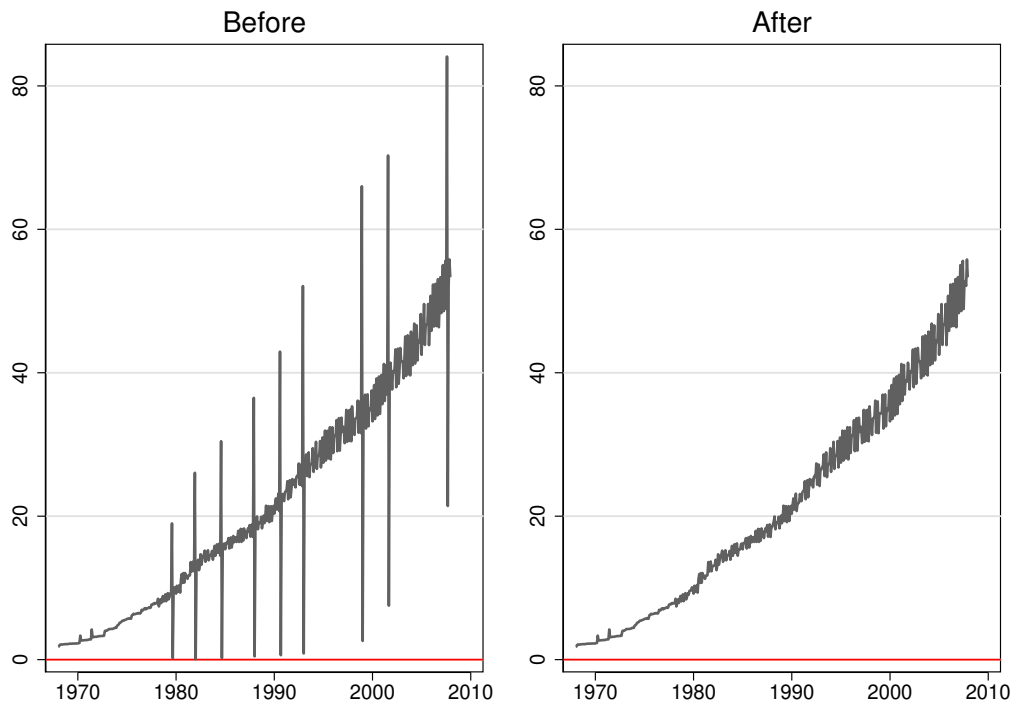
(b) Outlays
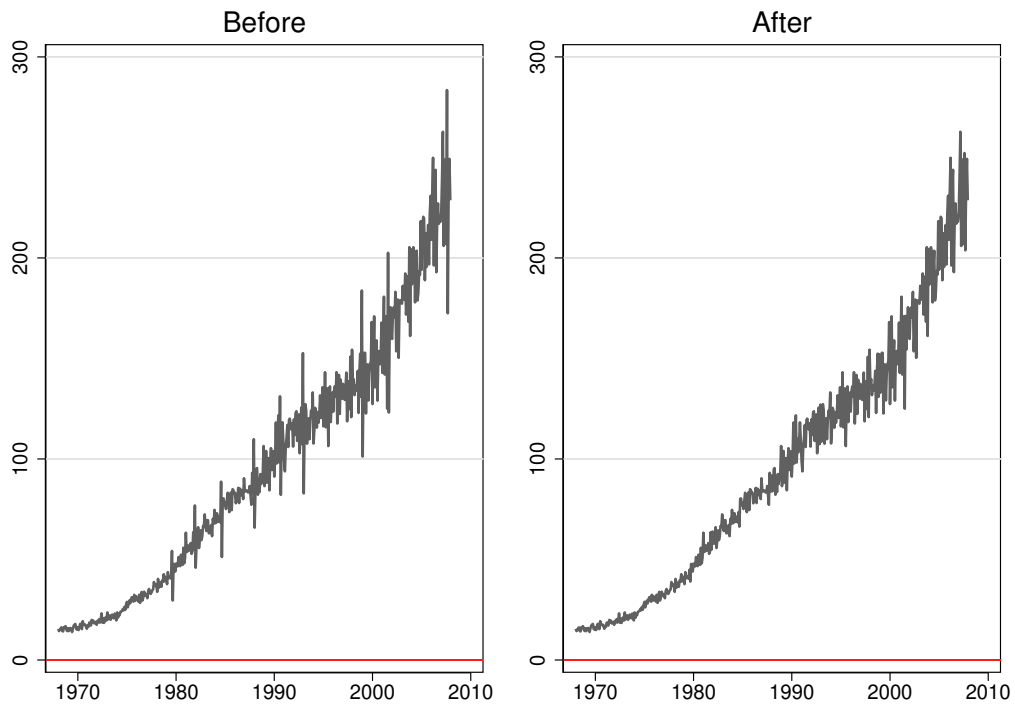
Note: expressed in billion dollars. See section B.1, "Social Security."

B   Data Sources

B.1   Treasury Sources

The exact terminology fluctuated over the years. When it did, I checked the underlying accounting concept stayed the same by comparing values for overlapping dates.

Receipts. *Treasury Bulletin* until October 1980 (February or March edition); table: "Summary of Fiscal Operations" (FF0-1); column: "Net receipts" or "Net budget receipts". *Monthly Treasury Statement* from October 1980; available in Excel format from: `https://fiscal.treasury.gov/reports-statements/mts/current.html`; column B.

Outlays. See receipts. Column in 1968: "Net expenditures" minus "Net lending". Column from 1969 to October 1980: "Outlays" or "Net outlays". Column C after October 1980.

Interest paid by the Treasury. *Treasury Bulletin*; table: "Budget Outlays by Agencies" (table FF0-3); column: "Department of the Treasury - Interest on the public debt".

Interest paid to government accounts. *Monthly Treasury Statement of Receipts and Outlays of the United States Government* in 1983 and 1985; table: "Summary of Receipts and Outlays". Line: "Interest on certain Government accounts" until March 1985, "Interest received by trust funds" afterwards. *Treasury Bulletin* otherwise. Table before 1983: "Undistributed Intrabudgetary Transactions" (FF0-4); column: "Interest credited to certain Government accounts - Total". Table after 1985: "On-budget and Off-budget Outlays by Agency"; column: "Interest received by trust funds".

Federal debt in the hands of the public. *Treasury Bulletin*; table: "Summary of Federal Debt" (FD-1); column: "Securities held by the public - Total".

Income taxes. *Treasury Bulletin*; table: "On-budget and Off-budget Receipts by Source"; column: "Net income taxes".

Social insurance taxes. See income taxes. Column: "Net social insurance and retirement receipts".

Social Security. *Monthly Statement of Receipts and Expenditures of the United States Government* until 1973; table: "Budget receipts and Outlays" (table III). *Monthly Treasury Statement of Receipts and Outlays of the United States Government* from 1974; table: "Outlays of the U.S. Government" (table 5). Sum of:

- Old age and survivors insurance. Line: "Heath, Education and Welfare Department: Social Security Administration: Federal old age and survivors insurance trust fund: Benefit payments;"
- Disability insurance. Line: "Heath, Education and Welfare Department: Social Security Administration: Federal disability insurance trust fund: Benefit payments;"
- Supplemental security income program. Line: "Heath, Education and Welfare Department: Social Security Administration: Supplemental security income program."

Over the sample, there are 9 instances of Social Security payments that are customarily made on a given month, but are actually made on the last day of the previous one. For instance, the *Monthly Treasury Statement* of August 1979 (p. 3, footnote 3) states: "Includes benefit payments customarily paid in September. These payments were made on August 31 as provided by the early check provision in Public Law 95-216." To avoid extreme spikes in the impulse response function, I smooth the series by taking an average of those two months.[1] To be consistent, I adjust outlays by the implied change in Social Security payments. Figure A.7 shows the two series before and after re-treatment.

Medicare. See Social Security. Sum of:

- Hospital insurance. Line: "Department of Health and Human Services: Health Care Financing Administration: Federal hospital insurance trust fund: Benefit payments;"
- Supplementary medical insurance. Line: "Department of Health and Human Services: Health Care Financing Administration: Federal supplementary medical insurance trust fund: Benefit payments."

Medicaid. See Social Security. Line: "Department of Health, Education and Welfare: Social and Rehabilitation Service: Public Assistance: Health care services" until 1978; "Department of Health, Education and Welfare: Health Care Financing Administration: Grants to States for Medicaid." The series starts in July 1972 as Medicaid was reported with other public assistance programs before then.

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[1]Since this happens 9 times, the re-treatment only affects 18 months in total.

Unemployment insurance. See Social Security. Line: "Department of Labor: Employment and Training Administration: Unemployment trust fund: Federal-State unemployment insurance: State unemployment benefits."

Food stamps. See Social Security. Line: "Department of Agriculture: Food and Nutrition Service: Food stamp program."

B.2 NIPA Tables

General government. NIPA table 3.1. Receipts: "Total receipts" (line 34). Expenditures: "Total expenditures" (line 37) minus "Interest payments" (line 27). Transfers: "Current transfer payments" (line 22) plus "Capital transfer payments" (line 40). Purchases: expenditures minus transfers.

Federal government. NIPA table 3.2. Same definitions as with general government. Line numbers differ.

B.3 Other

Legislated tax changes. Romer and Romer (2010). I use the measure that includes retroactive tax changes.

Greenbook forecasts. Online appendices of Coibion et al. (2017) and Croushore and van Norden (2018).

Other. FRED:

- Industrial production: *INDPRO*;
- Consumer price index: *CUSR0000SA0L2*;
- Unemployment: *UNRATE*;
- FFR: *FEDFUNDS*;
- Consolidated total liabilities of the general government: *BOGZ1FL374190005Q*.

C   Real Bonds

With real bonds, equations (7) to (9) change while equations (10) and (11) don't. Interest payments are given by:

$$\hat{int}_t = \kappa' \sum_{t_0=-\infty}^{t-1} \rho^{t-t_0-1} \left[(1+r^*)^{t-t_0-1} \sum_{s=0}^{t-t_0-1} E_{t_0} \hat{r}_{t_0+s} + \left((1+r^*)^{t-t_0} - 1 \right) \hat{d}_{t_0}^n \right] \qquad (C7)$$

$$\kappa' = \frac{(1-\rho)(1-\rho(1+r^*))}{r^*}$$

With $\rho = 0$:

$$\hat{int}_t = \frac{\hat{r}_{t-1}}{r^*} + \hat{d}_{t-1} \qquad (C7')$$

The linearized budget constraint in real terms is:

$$\hat{d}_t - \hat{d}_{t-1} = \frac{g^*}{d^*} \hat{g}_t + \frac{(1-\rho)r^*}{1-\rho(1+r^*)} \hat{int}_t - \frac{t^*}{d^*} \hat{t}_t \qquad (C8)$$

The law of motion of debt is:

$$\hat{d}_t = (1-\rho)\hat{d}_t^n + \rho\hat{d}_{t-1} \qquad (C9)$$