Appendix for “Fiscal Adjustment to Monetary Shocks”

A  Additional Tables and Figures

Table A.1: Federal transfers

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

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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Target</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>$i^*$</td>
<td>0.005</td>
<td>Sample mean</td>
</tr>
<tr>
<td>$\pi^*$</td>
<td>0.004</td>
<td>Sample mean</td>
</tr>
<tr>
<td>$g^<em>/d^</em>$</td>
<td>0.046</td>
<td>Average outlays to debt ratio</td>
</tr>
<tr>
<td>$t^<em>/d^</em>$</td>
<td>0.048</td>
<td>Steady state budget constraint</td>
</tr>
<tr>
<td>$\rho$</td>
<td>0.978</td>
<td>Weighted average maturity of debt</td>
</tr>
<tr>
<td>$\tau$</td>
<td>1.41</td>
<td>Response of receipts</td>
</tr>
</tbody>
</table>

Figure A.1: An Example of the data
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.


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”.


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


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

9


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:


\(^1\)Since this happens 9 times, the re-treatment only affects 18 months in total.


B.2 NIPA Tables


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.


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:

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

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

With \( \rho = 0 \):

\[ \hat{\int}t = \frac{\hat{r}_{t-1}}{r^*} + \hat{d}_{t-1} \]  
(C7’)

The linearized budget constraint in real terms is:

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

The law of motion of debt is:

\[ \hat{d}_t = (1 - \rho)\hat{d}_t + \rho\hat{d}_{t-1} \]  
(C9)