A New Identification Of Fiscal Shocks Based On The Information Flow

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Fiscal Policy

Where do we stand?

Despite some methodological advances, there is absolutely no consensus on even the basic effects of fiscal policy on the macroeconomy. Perotti (2001)

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Despite some methodological advances, there is absolutely no consensus on even the basic effects of fiscal policy on the macroeconomy. Perotti (2001)

Almost as useless as no answer, academic economics provided a wide range of answers. As examples, Paul R. Krugman called for much more stimulus spending than actually enacted, [...] while Robert J. Barro argued for no additional spending. Parker (2011)

The Identification of Fiscal Shocks (I)

The classic identification of fiscal shocks

Blanchard, Perotti (2002):

$$\Delta g_t - \widehat{\mathbb{P}}_{t-1}[\Delta g_t | Y_{t-1}, Y_{t-2}, \dots] = \hat{\varepsilon}_t \propto \text{fiscal shock}_t$$

Underlying assumptions:

- Discretionary policy does not respond to output within a quarter
- Innovations recovered by a small VAR are shocks to agents' information set (fiscal shocks)
- Fiscal surprises are informative about fiscal plans

The Identification of Fiscal Shocks (II)

The fiscal foresight issue: fiscal shock can be anticipated

Ramey (2011): (professional) forecast errors as proxy for fiscal shocks

$$\underbrace{\Delta g_t - \mathbb{E}^*_{t-1}\Delta g_t}_{\text{forecast error}} = \varepsilon_t \propto \text{fiscal shock}_t$$

Underlying assumptions:

- Discretionary policy does not respond to output within a quarter
- Rational Expectations
- Perfect Information
- Fiscal surprises are informative about fiscal plans

The Identification of Fiscal Shocks (III)

Perotti (2012): decomposition of the forecast error into

$$\underbrace{\Delta g_t - \mathbb{E}^*_{t-1}\Delta g_t}_{\text{forecast error}} = \underbrace{(\Delta g_t - \mathbb{E}^*_t \Delta g_t)}_{\text{nowcast error}} + \underbrace{(\mathbb{E}^*_t \Delta g_t - \mathbb{E}^*_{t-1}\Delta g_t)}_{\text{revision of expectations (news)}}$$

Government spending forecasts convey little information on future government spending, and so does their revision. Perotti (2012)

The Information Flow

The Information Flow

Overview

- New measures of the information flow on fiscal policy at different horizons: *before*, *upon* and *after* the actual change
- Account for real time information flow and informational/cognitive limitation
- Embed the new measures into a Large Bayesian VAR
- Identify fiscal changes that are related to shocks to the agents' information set at different horizons

The Information Flow

Contributions

- Document deviation form full information (Le Bihan, Andrade (2010), Colbion, Gorodnichenko (2012))
- New framework to think of fiscal shocks and some reconciliation
- To understand fiscal policy we need to learn about expected changes (Gambetti (2012), Ben Zeev, Pappa (2014)) - fiscal plans not fiscal surprises (Alesina, Favero, Giavazzi (2012))
- Quite large multipliers, no puzzles on exchange rates (Forni, Gambetti (2014)) and prices

The Information Flow

$$\underbrace{\Delta g_t - \mathbb{E}^*_{t-2}\Delta g_t}_{\substack{\text{forecast error} \\ \text{2 periods ahead}}} = \underbrace{\left(\Delta g_t - \mathbb{E}^*_t \Delta g_t\right)}_{\substack{\text{nowcast error} \\ \notin \mathcal{I}_t}} +$$

$$+ \underbrace{\left(\mathbb{E}^*_t \Delta g_t - \mathbb{E}^*_{t-1}\Delta g_t\right)}_{\substack{\text{nowcast revision} \\ \text{(news at t)} \in \mathcal{I}_t}} +$$

$$+ \underbrace{\left(\mathbb{E}^*_{t-1}\Delta g_t - \mathbb{E}^*_{t-2}\Delta g_t\right)}_{\substack{\text{forecast revision} \\ \text{(news at t-1)} \in \mathcal{I}_{t-1}}}$$

The Information Flow

Nowcast Errors

$$\underbrace{\Delta g_t - \mathbb{E}^*_{t-2}\Delta g_t}_{\substack{\text{forecast error} \\ \text{2 periods ahead}}} = \boxed{\underbrace{(\Delta g_t - \mathbb{E}^*_t \Delta g_t)}_{\substack{\text{nowcast error} \\ \notin \mathcal{I}_t}}} + \underbrace{(\mathbb{E}^*_t \Delta g_t - \mathbb{E}^*_{t-1}\Delta g_t)}_{\substack{\text{nowcast revision} \\ \text{(news at t)} \in \mathcal{I}_t}} + \underbrace{(\mathbb{E}^*_{t-1}\Delta g_t - \mathbb{E}^*_{t-2}\Delta g_t)}_{\substack{\text{forecast revision} \\ \text{(news at t-1)} \in \mathcal{I}_{t-1}}}$$

- Measure of misexpectations
- Modify agents' information set at t+h (*after*)
- Dominate VAR residuals, Difficult to interpret (Rodríguez Mora, Schulstad (2007))

The Information Flow

Nowcast Revisions

$$\underbrace{\Delta g_t - \mathbb{E}^*_{t-2}\Delta g_t}_{\substack{\text{forecast error} \\ \text{2 periods ahead}}} = \underbrace{\left(\Delta g_t - \mathbb{E}^*_t \Delta g_t\right)}_{\substack{\text{nowcast error} \\ \notin \mathcal{I}_t}} +$$

$$+ \boxed{\underbrace{\left(\mathbb{E}^*_t \Delta g_t - \mathbb{E}^*_{t-1}\Delta g_t\right)}_{\substack{\text{nowcast revision} \\ \text{(news at t)} \in \mathcal{I}_t}}} +$$

$$+ \underbrace{\left(\mathbb{E}^*_{t-1}\Delta g_t - \mathbb{E}^*_{t-2}\Delta g_t\right)}_{\substack{\text{forecast revision} \\ \text{(news at t-1)} \in \mathcal{I}_{t-1}}}$$

- Measure of fiscal news on the current quarter
- Modify agents' information set at t (*upon*)
- Have predictive power and are easy to interpret

The Information Flow

Forecast Revisions

$$\underbrace{\Delta g_t - \mathbb{E}^*_{t-2}\Delta g_t}_{\substack{\text{forecast error} \\ \text{2 periods ahead}}} = \underbrace{\left(\Delta g_t - \mathbb{E}^*_t \Delta g_t\right)}_{\substack{\text{nowcast error} \\ \notin \mathcal{I}_t}} +$$

$$+ \underbrace{\left(\mathbb{E}^*_t \Delta g_t - \mathbb{E}^*_{t-1}\Delta g_t\right)}_{\substack{\text{nowcast revision} \\ \text{(news at t)} \in \mathcal{I}_t}} +$$

$$+ \boxed{\underbrace{\left(\mathbb{E}^*_{t-1}\Delta g_t - \mathbb{E}^*_{t-2}\Delta g_t\right)}_{\substack{\text{forecast revision} \\ \text{(news at t-1)} \in \mathcal{I}_{t-1}}}}$$

- Measure of fiscal foresight (Gambetti 2012)
- Modify agents' information set at t-h (*before*)
- Have predictive power and are easy to interpret

Identification

- Nowcast Errors and News are observed proxy for shocks to agents' information set

We would like to identify

- **?????????? Fiscal Changes** – not forecasted and misidentified upon impact
- **????????? Fiscal Changes** – not forecasted but correctly identified upon impact
- **Expected Fiscal Changes** – forecasted changes

Unexpected & Misexpected Surprises

Ekman, Frisen - "Unmasking the Face"

If you have time to **anticipate** *an event and do so correctly, then you cannot be surprised. [...]* **Surprise** *is triggered both by* **unexpected** *and* **misexpected** *events. [...] An unexpected surprise is triggered by an unexpected event, that is an event that happens at the moment the surprised person was not expecting anything in particular to happen. A misexpected surprise is triggered by an event that happens in contrast to some specific anticipation for something different to happen at that moment.*

Identification

- Nowcast Errors and News are observed proxy for shocks to agents' information set

We identify

- **Misexpected Fiscal Changes** – not forecasted and misidentified
- **Unexpected Fiscal Changes** – not forecasted but correctly identified
- **Expected Fiscal Changes** – forecasted changes

Fiscal Changes

	Unanticipated	**Anticipated**
Misperceived on impact	*Misexpected Fiscal Changes* $\notin \mathcal{I}_t$ $\sim$ *proxy: nowcast error* $\Delta g_t - \mathbb{E}_t^* \Delta g_t$	
Perceived on impact	*Unexpected Fiscal Changes* $\in \mathcal{I}_t$ $\sim$ *proxy: nowcast revision* $\mathbb{E}_t^* \Delta g_t - \mathbb{E}_{t-1}^* \Delta g_t$	*Expected Fiscal Changes* $\in \mathcal{I}_t$ $\sim$ *proxy: forecast revision* $\mathbb{E}_t^* \Delta g_{t+h} - \mathbb{E}_{t-1}^* \Delta g_{t+h}$

New Measures of Expectations

Survey of Professional Forecasters Data

- Professional forecasters provide quarterly forecasts for the current quarter and four quarters ahead
- Panelists' information sets include advance report of GDP (and components) for the previous quarter
- Deadlines for responses at late in the second to third week of the middle month of each quarter (since 1990:Q2 survey)
- SPF U.S. Federal Government Spending from 1981:Q3 to 2012:Q4 (from 1968:Q4 to 1981:Q2 Defence Spending only)

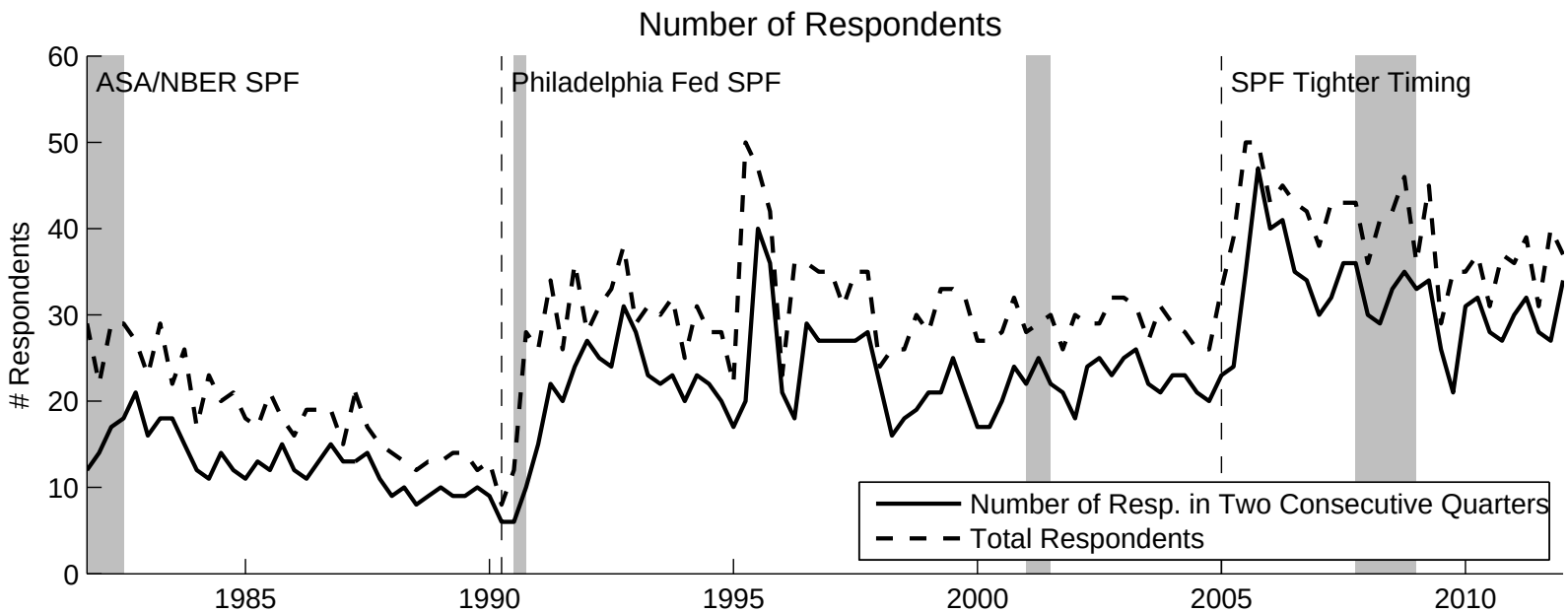
Survey of Professional Forecasters Data

The Dataset

Survey Date	History[1]	Quarterly Forecast				
	Q_{-1}	Q_0	Q_{+1}	Q_{+2}	Q_{+3}	Q_{+4}
...	...	...	...	...	...	...
2012Q2	G_{2012Q1}	G_{2012Q2}	G_{2012Q3}	G_{2012Q4}	G_{2013Q1}	G_{2013Q2}
2012Q3	G_{2012Q2}	G_{2012Q3}	G_{2012Q4}	G_{2013Q1}	G_{2013Q2}	G_{2013Q3}
2012Q4	G_{2012Q3}	G_{2012Q4}	G_{2013Q1}	G_{2013Q2}	G_{2013Q3}	G_{2013Q4}
...	...	...	...	...	...	...

[1] BEA advance estimate

Survey of Professional Forecasters Data



Empirical Measures of Fiscal News

Aggregate Economy

Nowcast Errors

$$\widehat{n.c.err}_t = \text{Median}(\widehat{n.c.err}^i_t)$$

Fiscal News on the current quarter

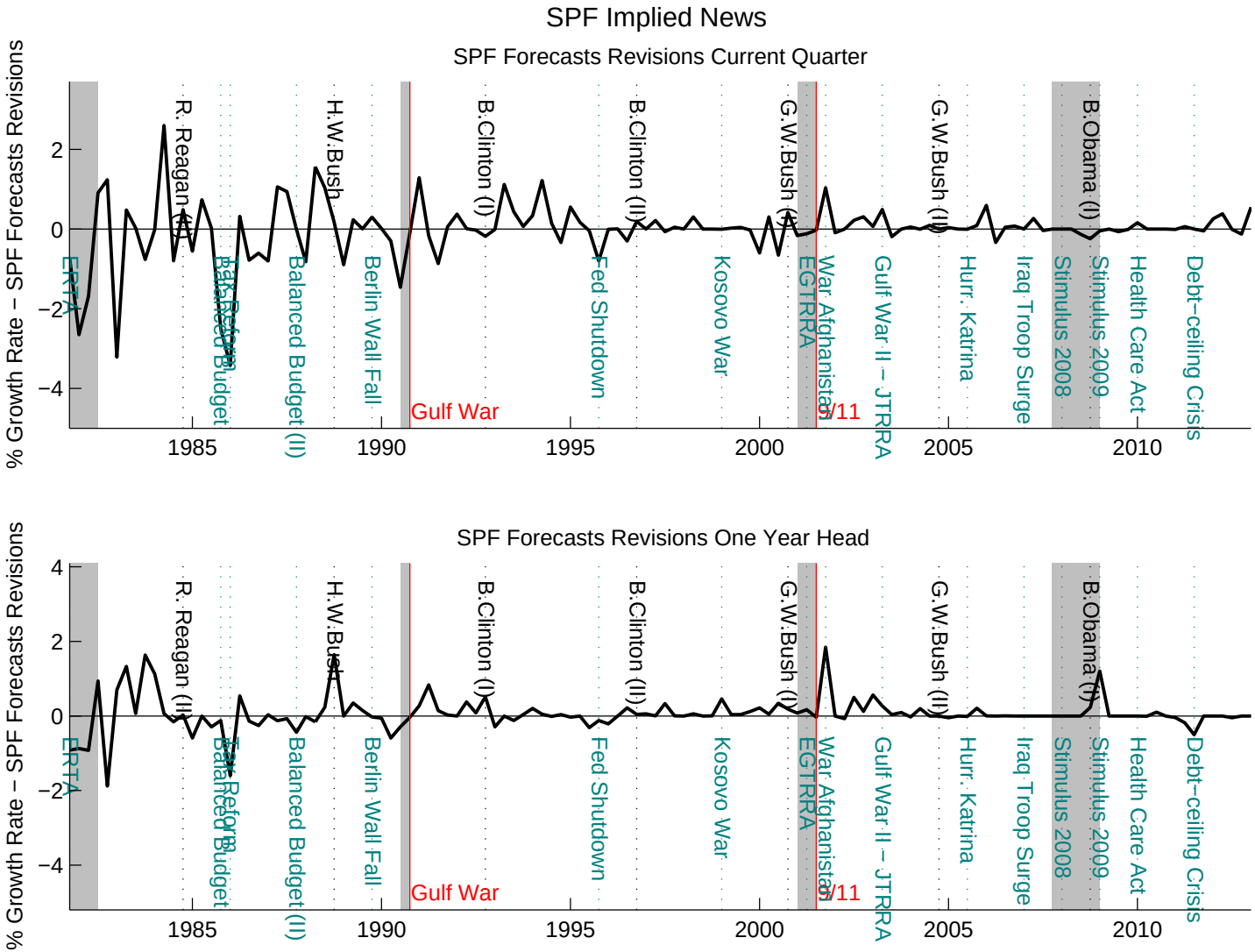
$$\widehat{news}_t(0) = \text{Median}(\widehat{news}^i_t(0))$$

Fiscal News three quarters ahead

$$\widehat{news}_t(1,3) = \text{Median}(\sum_{h=1}^{3} \widehat{news}^i_t(h))$$

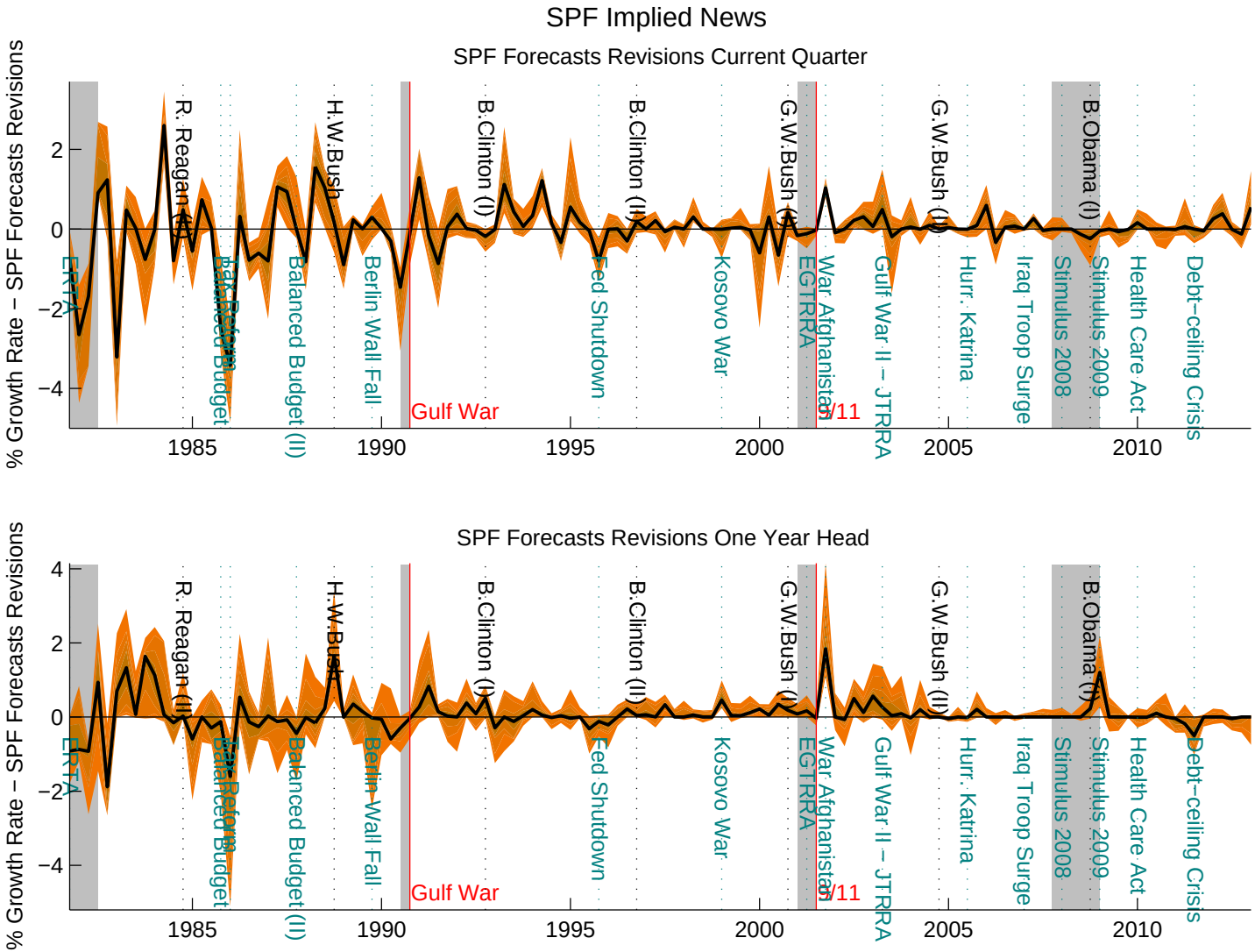
SPF Implied News

Current and Future Quarters



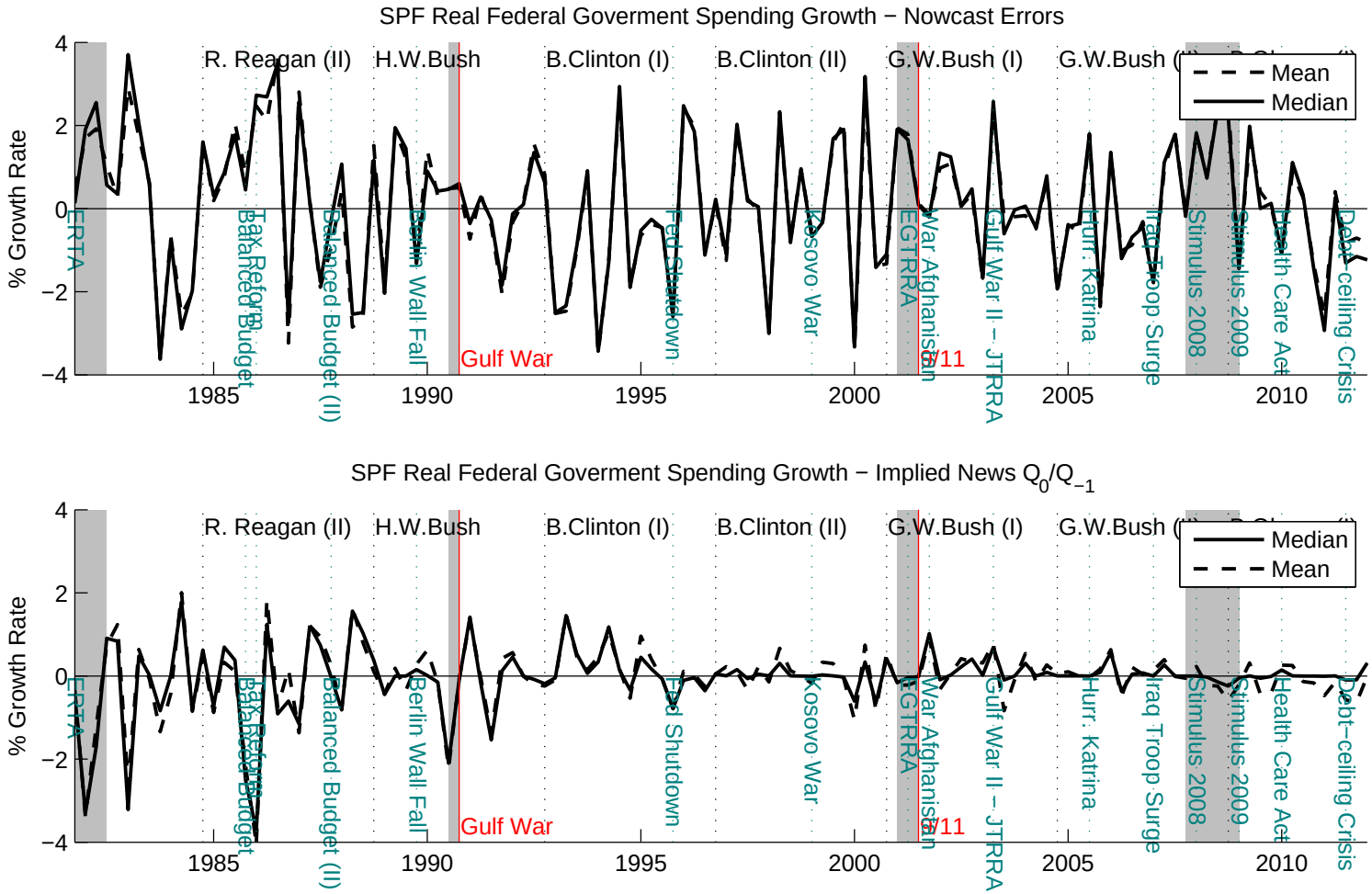
SPF Implied News

Current and Future Quarters



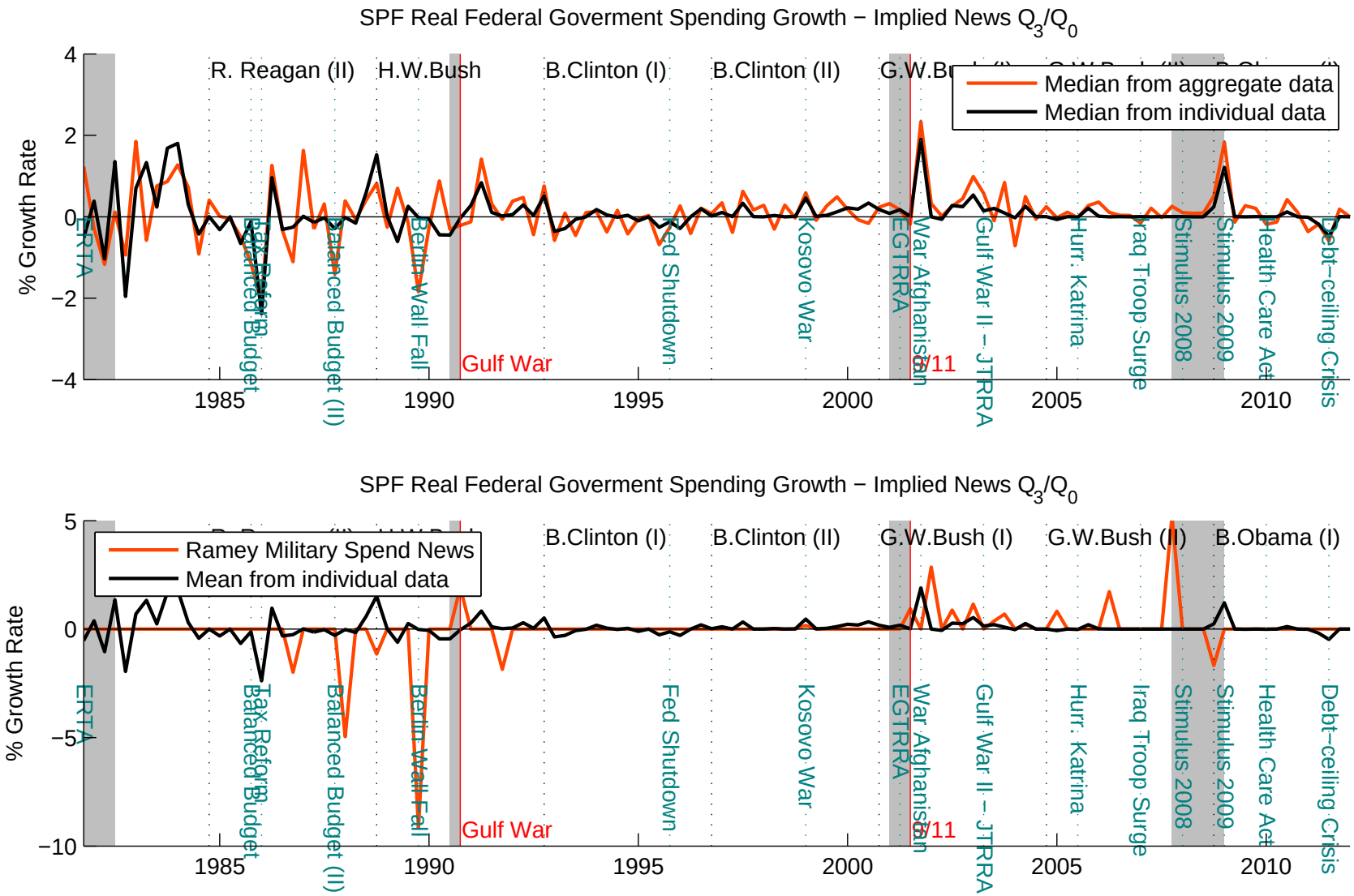
SPF Implied News and Nowcast Errors

Current Quarter

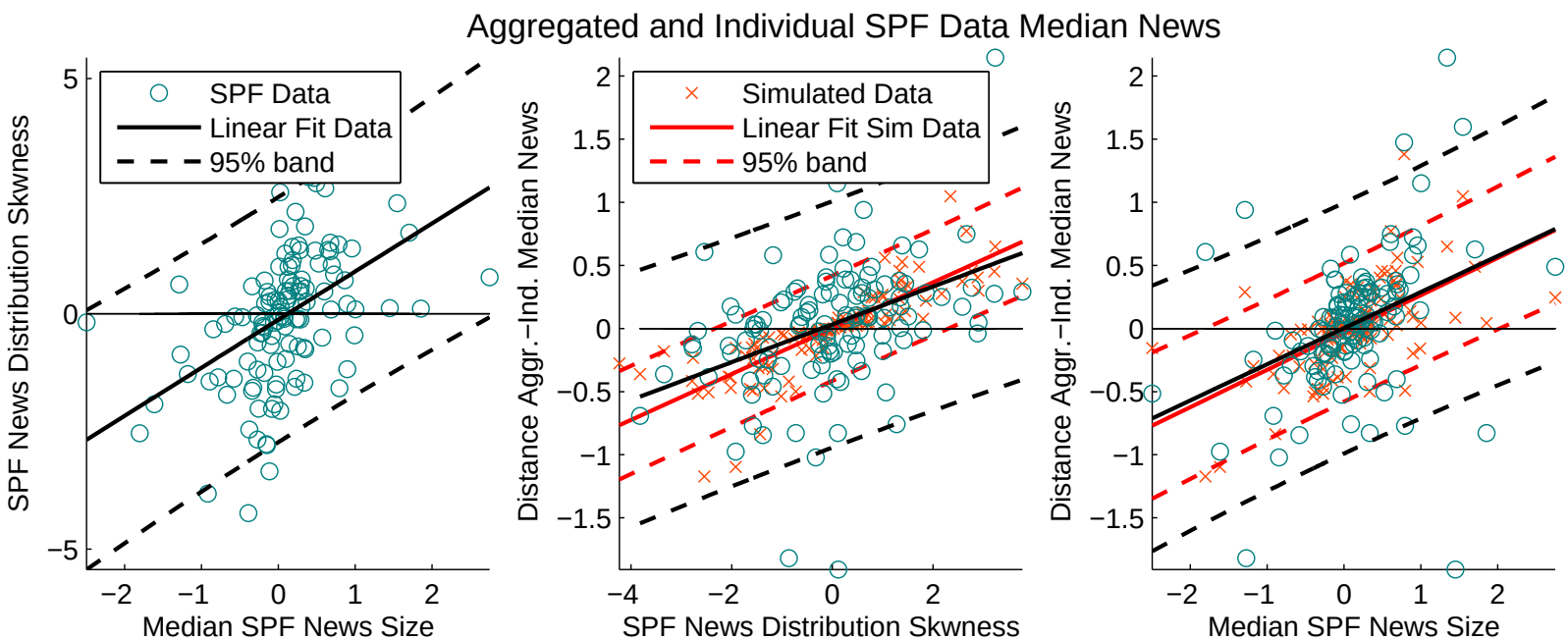


SPF Implied News

Future Quarters



SPF Implied News



SPF Implied News

Informational Content

Independent Variable	F-stat	Prob $>$ F	reg. coeff.	t-stat
$\widehat{news}(0)$	7.54	0.007	0.620	2.75
$\widehat{news}(0)$ (aggr. data)	3.50	0.064	0.448	1.87
$\widehat{news}(1,3)$	6.76	0.011	0.783	2.60
$\widehat{news}(1,3)$ (aggr. data)	3.57	0.062	0.457	1.89

Are Forecasts Forecastable?

Informational sufficiency test (Forni, Gambetti (2012))

	Factor1		Factor2		Factor3		Factor4	
	Fstat	*p-value*	*Fstat*	*p-value*	*Fstat*	*p-value*	*Fstat*	*p-value*
$\widehat{n.c.err}$	1.07	(0.35)	0.00	(1.00)	6.21***	(0.00)	1.24	(0.29)
$\widehat{news}(0)$	2.85**	(0.06)	1.04	(0.36)	1.77*	(0.17)	0.02	(0.98)
$\widehat{news}(1,3)$	0.01	(0.99)	0.04	(0.96)	0.08	(0.92)	2.55**	(0.08)

- Factors are extracted from a large dataset of 128 macroeconomic variables
- Granger causation test to assess informational content of the forecasts
- News and Nowcast Errors are forecastable using large information (Le Bihan, Andrade (2010))

The Emprical Model: Large Bayesian EVAR

Large EVAR

- Large Cross-Section for structural identification (Giannone & Reichlin 2006)
- Large VAR (Banbura et al. (2010))
- Litterman priors, Sum-of-coefficients priors
- Hyperpriors (Giannone, Lenza, Primiceri (2012))

- ☐ *Expectational Variables 1:* Nowcast Errors and News
- ☐ *Expectational Variables 2:* Forecasts for the variables entering the Gov't response function: GDP and Unemployment
- ☐ *Expectational Variables 3:* Forward looking variables: prices, inventories, CEO confidence, consumer confidence, ...
- ☐ *Macroeconomic variables:* Federal spending, S&L spending, Barro-Redlick tax rate, GPD, wages, durables, nondurables and services consumption, investment, real rates, 10-y rates, real exchange rates, ...

Identification

Structural Identification – Assumptions

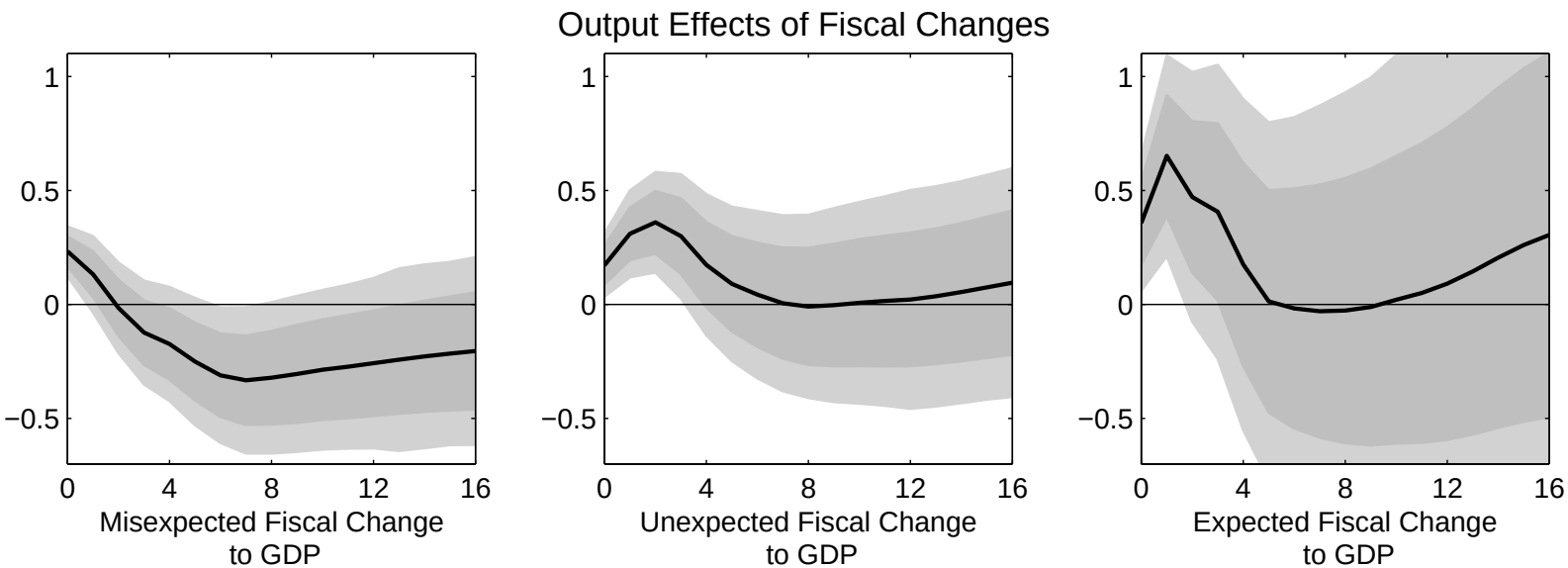
1. fiscal policy do not respond to macroeconomic shocks within a quarter
2. forecasted future government spending incorporate the discretionary policy response to the expected values for output and unemployment as well as government spending for the present quarter
3. fiscal shocks are orthogonal

Recursive identification

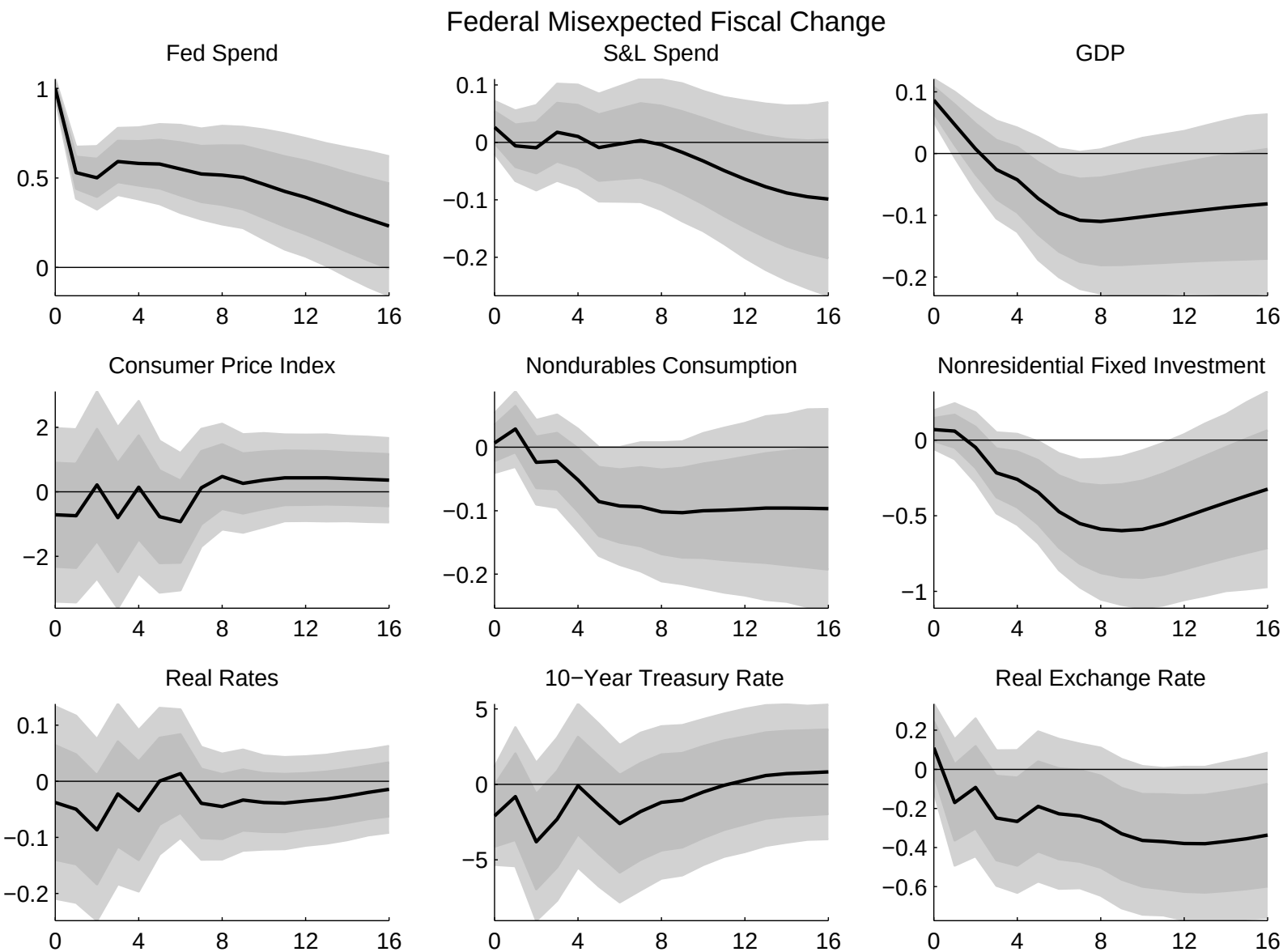
$$\left(\widehat{news}_t(0) \quad \hat{\mathbb{E}}_t^* \mathrm{GDP}_t \quad \hat{\mathbb{E}}_t^* \mathrm{U}_t \quad \widehat{news}_t(1,3) \quad \widehat{n.c.err}_t \quad Y_t'\right)'$$

Large EVAR Empirical Results

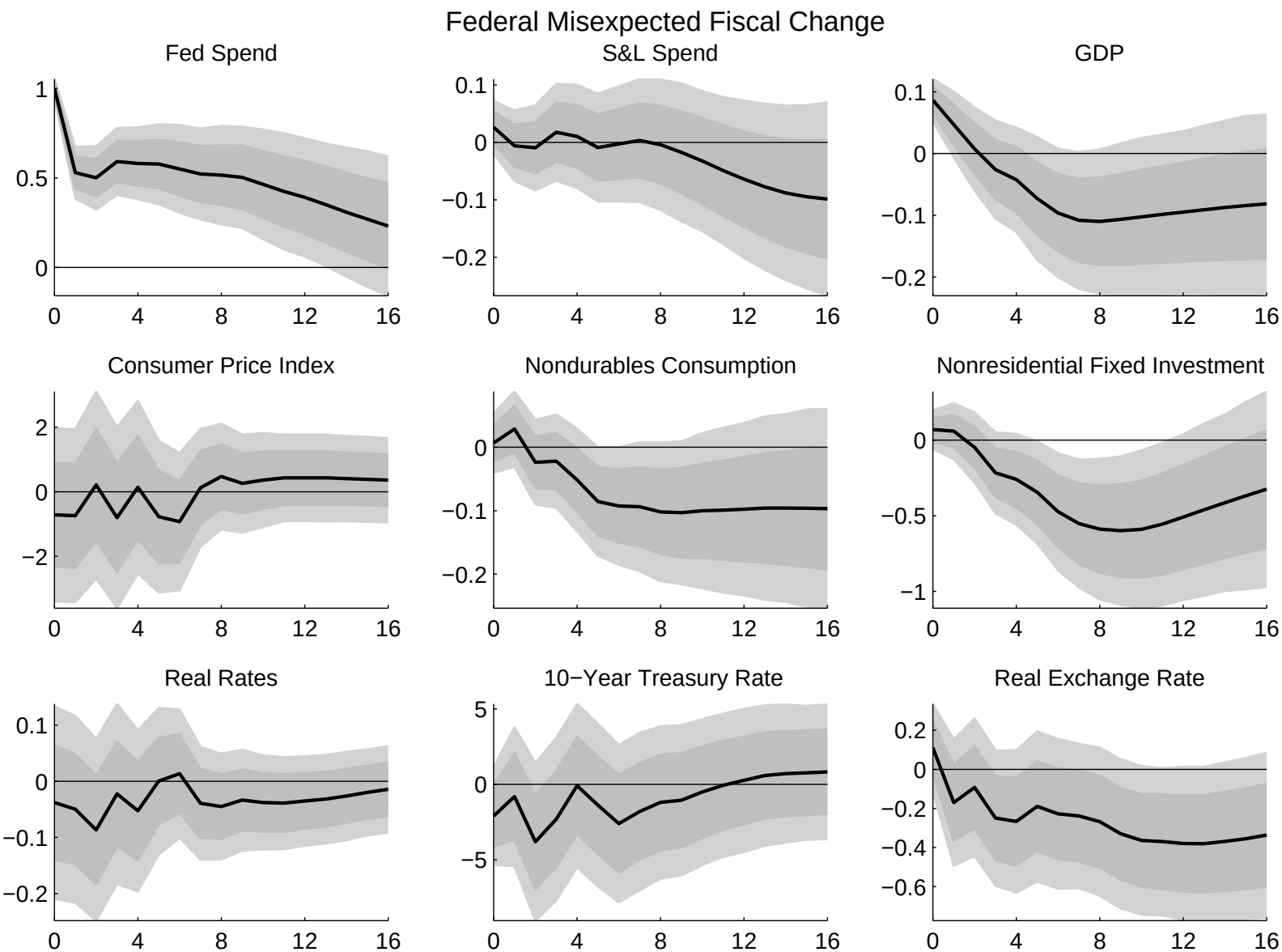
The Output Effect of Fiscal Changes



Misexpected Fiscal Changes



Misexpected Fiscal Changes vs Large SVAR & Ramey



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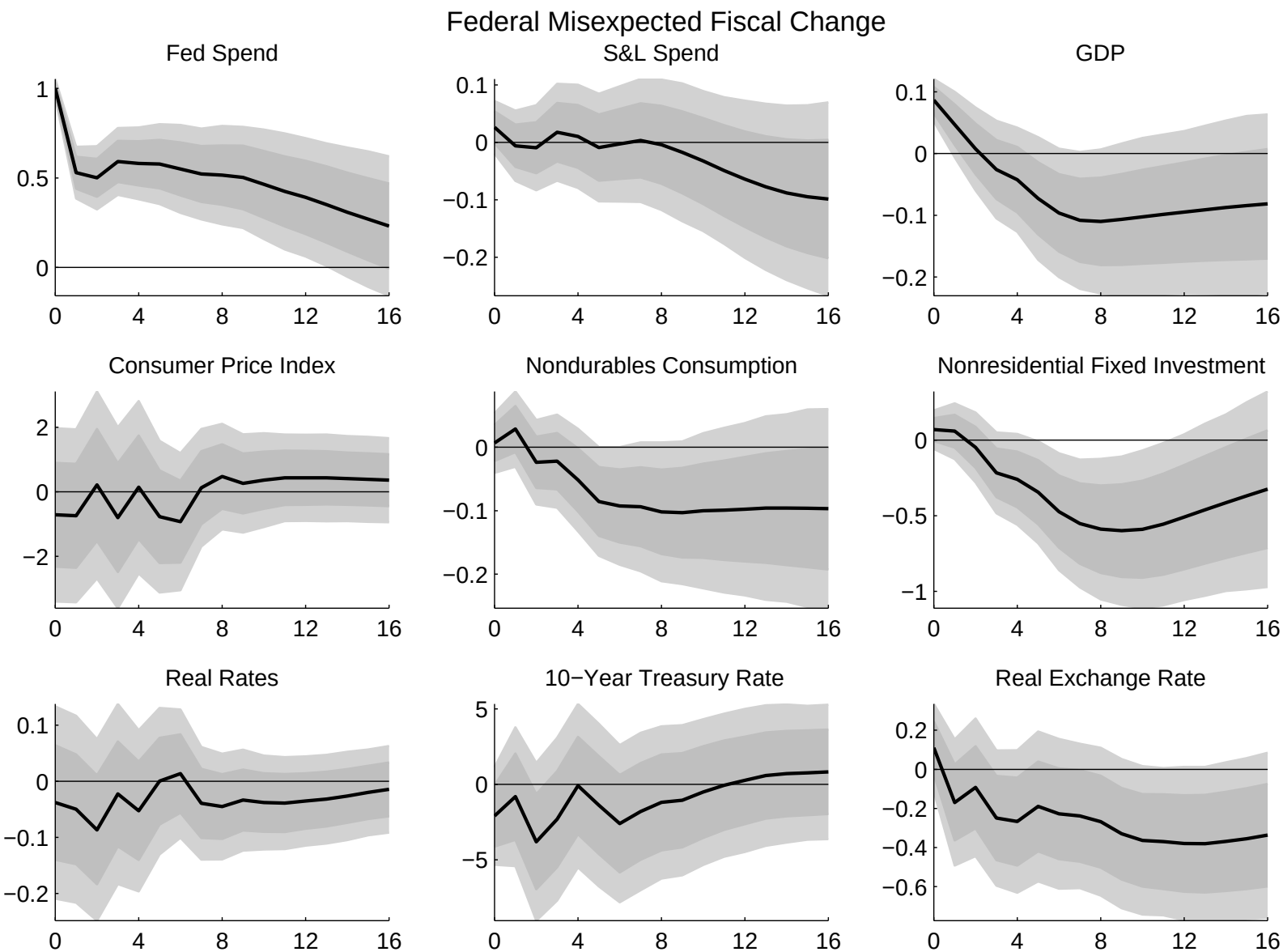

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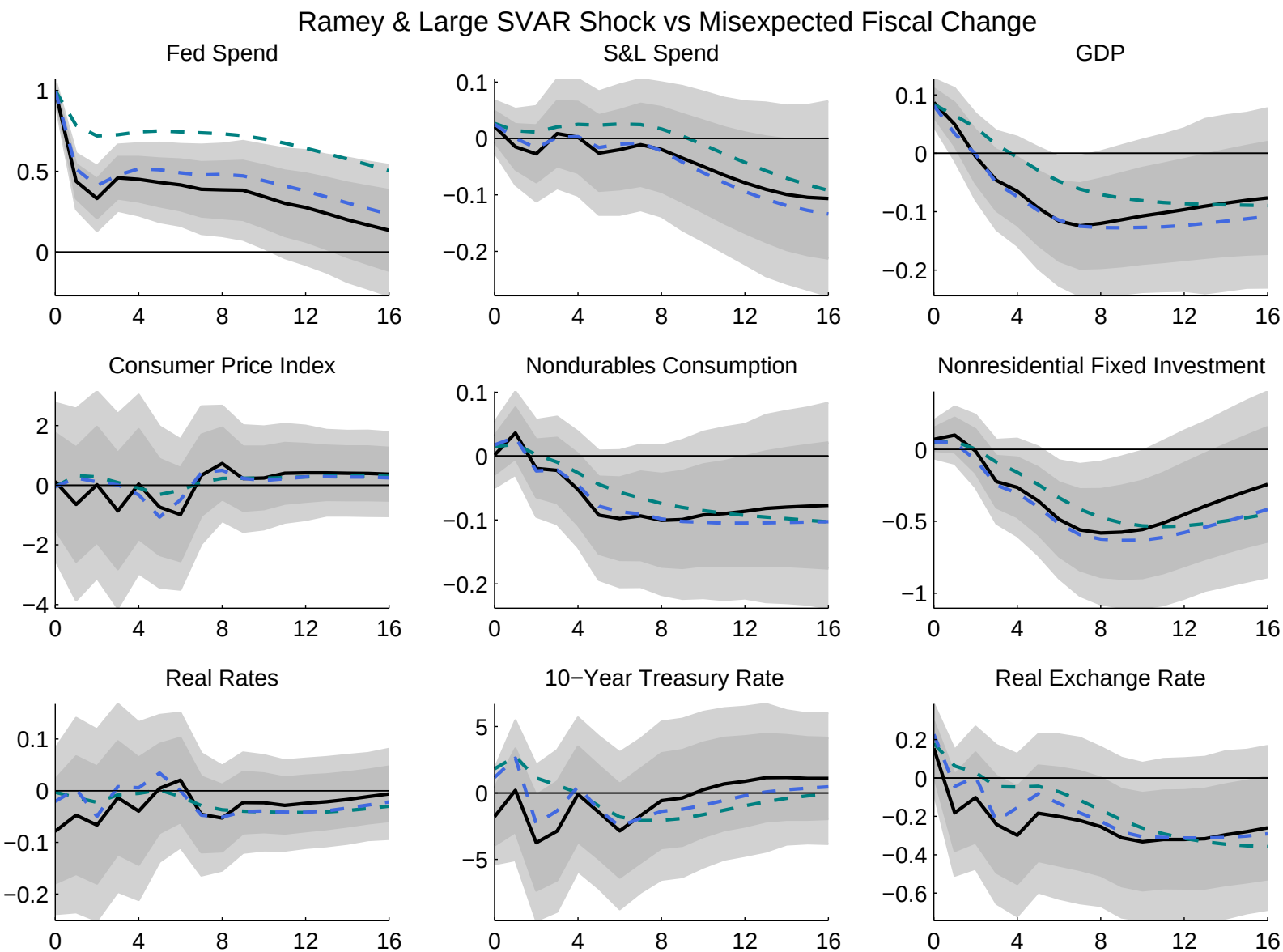
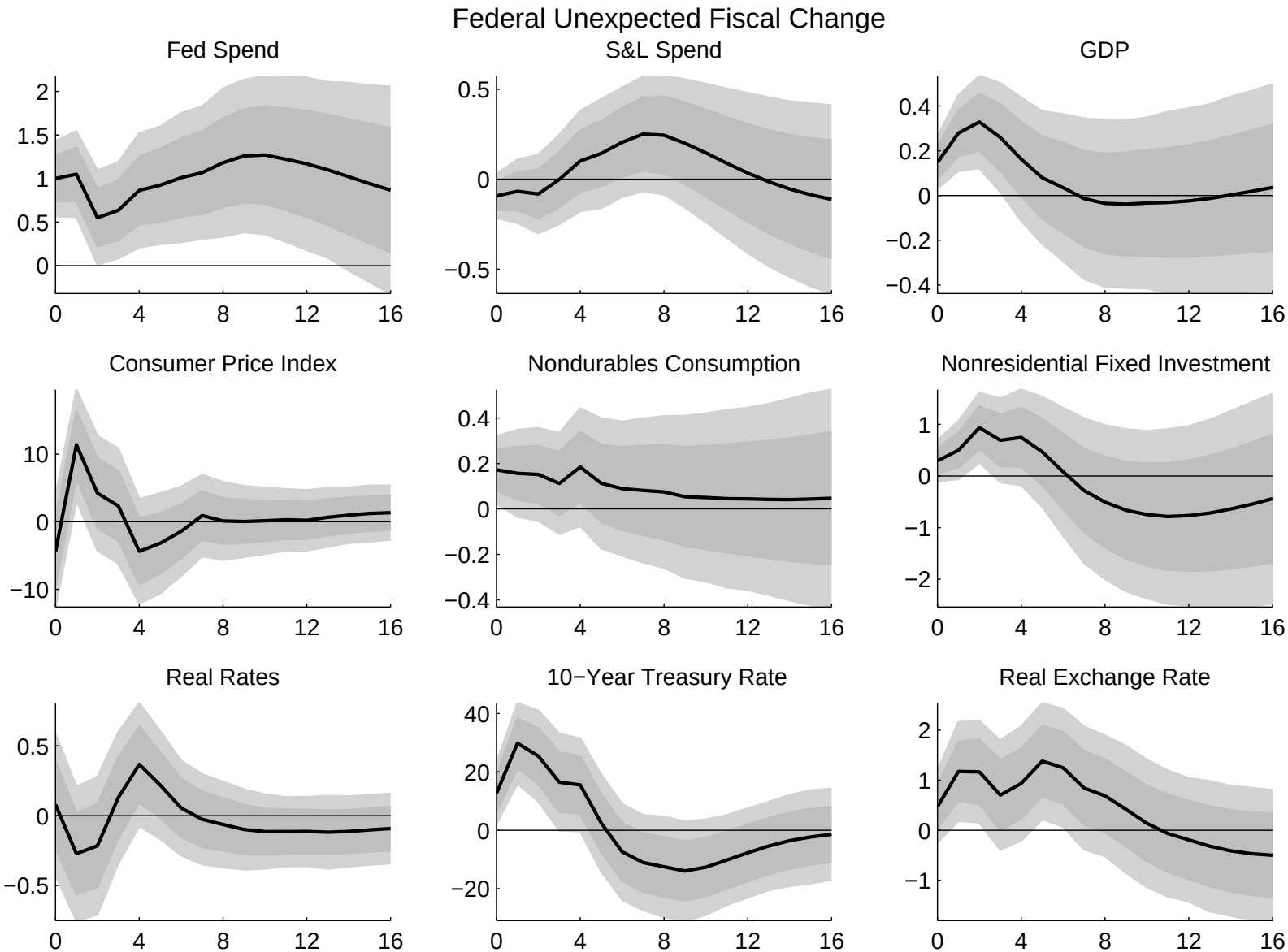


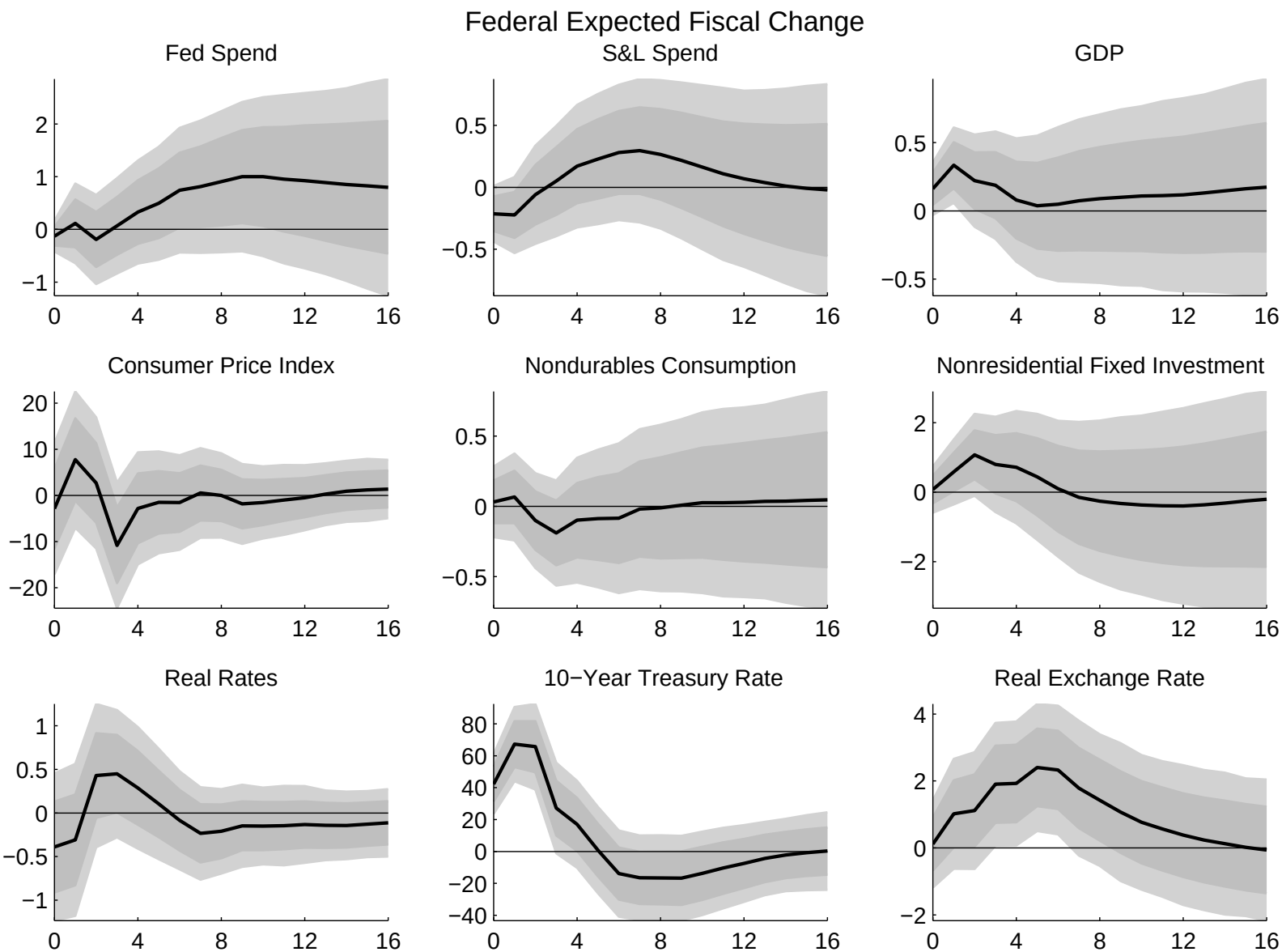
What Does Enter in Nowcast Errors?

- Model mispecifications/Higher order terms
- Data revisions
- Noisy signalling
- Forecasters' aggregate bias
- Accounting issues
- Deviations from rational expectations
- ...
- ...
- Structural fiscal shocks

Unexpected Fiscal Changes



Expected Fiscal Changes



Large EVAR Informational Sufficiency

Informational sufficiency test (Forni, Gambetti (2012))

	Factor1		Factor2		Factor3		Factor4	
	Fstat	*p-value*	*Fstat*	*p-value*	*Fstat*	*p-value*	*Fstat*	*p-value*
Nowcast Err.	1.07	(0.35)	0.00	(1.00)	6.21***	(0.00)	1.24	(0.29)
EVAR Res.	0.00	(1.00)	0.00	(1.00)	0.01	(0.99)	0.31	(0.73)
News Q0	2.85**	(0.06)	1.04	(0.36)	1.77*	(0.17)	0.02	(0.98)
EVAR Res.	0.03	(0.97)	0.03	(0.97)	0.10	(0.90)	0.02	(0.98)
News Q1-Q3	0.01	(0.99)	0.04	(0.96)	0.08	(0.92)	2.55**	(0.08)
EVAR Res.	0.17	(0.85)	0.17	(0.84)	0.09	(0.92)	0.01	(0.99)
SVAR Residuals	0.02	(0.98)	0.00	(1.00)	0.00	(1.00)	0.24	(0.79)

- EVAR Shocks are not forecastable using a larger information set
- Structural Shocks appear to be fundamental for the Large EVAR

Fiscal (Adjusted) Multipliers

Fiscal Multipliers (impact/peak)						
	Unexpected		**Misexpected**		**Expected**	
GDP	1.28	(0.63)	0.98	(0.29)	3.06	(1.24)
D Cons	0.54	(0.2)	0.17	(0.13)	0.21	(0.31)
ND Cons	0.28	(0.12)	0.07	(0.08)	0.19	(0.21)
S Cons	0.21	(0.18)	0.04	(0.09)	-0.28	(1.44)
NRes Inv	0.34	(0.19)	0.12	(0.14)	0.89	(0.49)
Res Inv	-0.15	(0.15)	0.08	(0.07)	0.90	(1.12)

Multipliers are adjusted to take into account the direct effect of Fed spending only Definition

Conclusions

- "Quantitative" assessment of fiscal foresight
- Indication of the relevance of fiscal "signalling forward guidance" - well signalled fiscal measures have stronger effects
- Some reconciliation of (or a way to look at) previous results (SVARs vs EVARs)

Adjusted Fiscal Multipliers

The impulse response function of a variable, e.g, output, to the news shock $\mathcal{N}_t$ can be expressed as follow

$$\frac{d \log Y_{t+h}}{d\mathcal{N}_t} = \frac{G^{Fed}_{t+h}}{Y_{t+h}} \left[\frac{\partial Y_{t+h}}{\partial G^{Fed}_{t+h}} + \frac{\partial Y_{t+h}}{\partial G^{S\&L}_{t+h}} \frac{\partial G^{S\&L}_{t+h}}{\partial G^{Fed}_{t+h}} \right] \frac{d \log G^{Fed}_{t+h}}{d\mathcal{N}_t}$$

Rearranging (and approximating)

$$\mathcal{M}^{peak} \equiv \frac{\frac{\bar{Y}}{\bar{G}^{Fed}} \mathrm{IRF}^{peak}(Y)}{1 + \frac{\bar{G}^{S\&L}}{\bar{G}^{Fed}} \mathrm{IRF}^{peak}(G^{S\&L})}$$

Back...