What does the empirical evidence suggest about the effectiveness of discretionary fiscal actions?

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What is the transmission of variations in **government spending and taxes** to the economy?

Important policy question, but surprisingly little consensus (both on empirical evidence and on theory)

Will focus on effects of fiscal policy on **private consumption** and **real wage**, for two reasons:

1) Basic disagreement between neoclassical and neokeyenesian **theories** ...

2) ... and between alternative **empirical approaches**

regarding effects of fiscal shocks on these two variables.

Other potential variables of interest, like GDP, private investment, employment, unemployment, and the interest rate: either much less disagreement theoretically or emprically (GDP, employment), or less clear cut results (private investment, interest rate).

Two basic alternative mechanisms: neoclassical and neokeynesian

Neoclassical-RBC Model.

Key mechanism: **wealth effect**

Government spending (G) $\Uparrow \Longrightarrow$ from intertemporal government budget constraint, PDV of taxes $\Uparrow \Longrightarrow$ representative agents buys less leisure and less consumption $\Longrightarrow C \Downarrow$, L^S shifts out $\Longrightarrow w \Downarrow$.

Neo-keynesian model.

Useful to distinguish between models with complete asset marckets and incomplete asset markets.

If perfect asset markets (forward - looking agents who can borrow and lend freely): wealth effect still operative. For C to $\Uparrow$, need some intra- or inter- temporal substitution effect.

Intra - temporal substitution: need a rise in $w \implies$ the higher w induces substitution from leisure into consumption $\implies$ if w increases enough, C could increase overall.

For w to increase, **need L^d to shift out**: if shift is strong enough, can more than offset the outshift in L^s and w can increase.

For outshift in L^d, **need price rigidity**: when $G \Uparrow$, aggregate demand $\Uparrow$ $\rightarrow$ given price rigidity, firms satisfy extra demand by selling more output at given prices and hiring more labor $\rightarrow$ L^d shifts out and markup falls (real wage $\Uparrow$)

One mechanism to obtain large outshift in L^d: deep habits (Ravn - Schmitt-Grohe - Uribe 2006).

Alternative mechanism: low wealth effect on labor supply $\Longrightarrow$ high complementarity between C and L (Monacelli and Perotti 2008).

$\Longrightarrow$ when $G \Uparrow$, firms produce more at given price $=> L \Uparrow =>$ by complementarity, $C \Uparrow =>$ firms need to increase output and therefore L further $=>$a multiplier process that stops when $\Delta Y - \Delta C = \Delta G$

Smaller negative wealth effect on $L^s \Longrightarrow$ higher complementarity between C and $L \Longrightarrow$ larger multiplier.

Highlights role of wealth effects on L^s: key in neoclassical mechanism, but not clear large wealth effect on labor supply in reality.

Inter - temporal substitution: need a decline in the real interest rate $\Longrightarrow$ individuals anticipate consumption $\Longrightarrow C \Uparrow$

Davig and Leeper (2009): the decline in the real interest rate is brought about by passive monetary policy (nominal interest rate respondes less than one to one to increase in inflation when demand $\Uparrow$)

If **asset market imperfections**, alternative method to obtain increase in C: Gali - Lopez-Salido - Valles (2008).

Suppose some forward looking, unconstrained agents, and some agents who cannot lend or borrow $\Longrightarrow$ consume all their labor inome each period. When $w \Uparrow$ because of price rigidity, their $C \Uparrow$: if enough of them, aggregate C can $\Uparrow$.

Empirical evidence: will consider two alternative approaches

Narrative approach (Ramey and Shapiro)

SVAR approach (Blanchard and Perotti)

Key issue: how to identify fiscal shocks (= exogenous and unforecastable) to feed into estimated dynamic model

Narrative approach (DV approach)

(i) Define **dummy variable** capturing main episodes of **military buildups** (arguably exogenous and unforecastable).

(ii) Ramey and Shapiro (1988): measure expectations of Korean,Vietnam and Carter-Reagan military buildups $\rightarrow$ "War dummy variables" $= 1$ on 1950:3, 1965:1, 1980:1 Add We add 2003:1: expectation of the post September-11 military buildup.

Suppose bi-variate VAR (with G and Y):

$$\begin{aligned} G_t &= \sum_{i=1}^{4} a_{11i} G_{t-i} + \sum_{i=1}^{4} a_{12i} Y_{t-i} + \sum_{i=0}^{6} B_{11i} D_{t-i} + u_t^g \\ Y_t &= \sum_{i=1}^{4} a_{21i} G_{t-i} + \sum_{i=1}^{4} a_{22i} Y_{t-i} + \sum_{i=0}^{6} B_{21i} D_{t-i} + u_t^y \end{aligned}$$

Then look at impulse response of Y_t to shock to dummy variable D_t

Typically, find that $Y \Uparrow$, but C and $w \Downarrow$ in response to fiscal shock $\Longrightarrow$ consistent with neoclassical model (see row 1 of figures 3 and 5).

(From a 7 variable VAR (sample 1947:1 to 2003:4), with log G_t, log Y_t, log C_t, log INV_t, $Marg.\ Tax\ Rate$, log $Hours$, log w_t).

Ramey (2008): constructs a longer series of military buildup episodes. Instead of a dummy variable, it is a continuous variable with the size of the change in military spending at the time it is decided. reaches same conclusions: $Y \Uparrow$, C and $w \Downarrow$.

Possible problems with this approach

- Subjective and not applicable to other countries

- Lumps together episodes with very different characteristics. The second to fifth columns of figure 4) display the responses to a shock to a dummy variable representing each military episode separately (the first column displays the responses of G, Y and C to a shock to the RS dummy variable: this is the same response as in the forst row of figure 3). The figure shows that there is no episode during which output increased and private consumption fell, the hallmark of the necolassical model. Thus, the response in column 1 seems to capture the large output responses during Korea and Vietnam and the negative consumption responses during Reagan and Bush.

- **Lags 0 to 6** of dummy variable in G equation: allow military episodes to explain a large part of "deviation from normal" of **policy variable** for seven periods in each episode. But if lag 0 to 6 of dummy variable **also in non-policy equation**, we are assuming also that dynamic response of **output** deviated from normal because of military buildups (recall that G is included in Y equation)

Seems contrary to logic of approach: we learn from these episodes because they are big, exogenous and unforecastable, not because they are different from "normal"

Alternative approach ("modified DV approach) (Perotti 2007):

only lag 0 in Y equation $\rightarrow$ after the impact period the dynamic response of output to military buildups follows the "normal" pattern.

$$
\begin{aligned}
G_t &= \sum_{i=1}^{4} a_{11i} G_{t-i} + \sum_{i=1}^{4} a_{12i} Y_{t-i} + \sum_{i=0}^{6} B_{11i} D_{t-i} + u_t^g \\
Y_t &= \sum_{i=1}^{4} a_{21i} G_{t-i} + \sum_{i=1}^{4} a_{22i} Y_{t-i} + B_{210} D_t + u_t^y
\end{aligned}
$$

Now typically, find that Y still $\Uparrow$, but C and w also $\Uparrow$ in response to fiscal shock (see row 2 of figures 3 and 5) $\Longrightarrow$ consistent with neokeynesian pattern.

SVAR approach (Blanchard - Perotti 2002)

Estimate reduced form

$$
\begin{aligned}
G_t &= \sum_{i=1}^{4} a_{11i} G_{t-i} + \sum_{i=1}^{4} a_{12i} Y_{t-i} + u_t^g \\
Y_t &= \sum_{i=1}^{4} a_{21i} G_{t-i} + \sum_{i=1}^{4} a_{22i} Y_{t-i} + u_t^y
\end{aligned}
$$

$U_t \equiv [u_t^g \quad u_t^y]'$ vector of reduced form residuals

$$u_t^g = \underbrace{\alpha_{gy} u_t^y}_{\text{effect (1)+(2)}} + \underbrace{e_t^g}_{\text{struct. G shock}}$$

Need to estimate e_t^g (structural shock). How to go from u_t^g to e_t^g? u_t^g captures **three effects:**

(1) *automatic response* of G to innovations in Y

(2) *systematic discretionary* response of G to Y

(3) *structural G* shock

Identification in SVAR

- Effect (1): get **outside estimates** of automatic elasticity of fiscal variables to Y (more relevant for taxes)

- Effect (2): with quarterly data, fiscal variable unlikely to respond to Y **within the quarter** (due to decision lags)

- Hence, $\alpha_{gy} = 0$, and structuural shock $=$ reduced form residual.

NB: if effect (1) is not 0, ordering of variables with fiscal variables first is not right! neither is ordering with fiscal variables after GDP!

NB: because of effect (2), quarterly data is crucial!

Now typically find that Y still $\Uparrow$, but C and w also $\Uparrow$ in response to fiscal shock (see row 2 of figures 3 and 5) $\Longrightarrow$ consistent with neokeynesian pattern.

Possible problems:

Anticipation. While decision / implementation lags help identification, they also imply that structural shock identified by econometrician can be in reality anticipated by private sector.

Ramey: this by itself can explain why SVAR approach finds a positive response of C when in reality the world is neoclassical (see column 1 of figure 1). However, with habit persistence the problem is greatly attenuated: while the impulse response is still biased, the *sign* of the response might well be correct (column 2 of figure 1)

More generally: if estimated shocks anticipated by private sector, wrong inference: estimated innovations are linear combinations of whole history of unanticipated and anticipated government spending shocks.

Solutions to problems of anticipations:

Mertens and Ravn (2009): with assumption on discount rate (fairly uncontroversial), grid search on anticipation horizon and on relative variance of anticipated and unanticipated shokcs, can still estimate impulse response to permanent shocks. For a large range of parameters find that C and w $\Uparrow$, consistent with the neokeynesian pattern.

Fisher and peters (2009): use excess returns on stocks of major militarycontractors to infer news of increases in military spending at the time they are decided. Again find that C and w $\Uparrow$, consistent with the neokeynesian pattern.

So far, we have ignored the intertemporal government budget constraint, i.e. in estiating the VARs we habv enot imposed that the PDV of teh response of government spending must be equal to the PDV of the response of taxation. Favero and Giavazzi (2008) do precisely this: the effects on the estimated responses of private consumpotion and the other variables is minor.

Notes to figures.

Figure 3:

First row: responses of G, Y and C to shock to Ramey-Shapito dummy variable

Second row: responses of G, Y and C to shock to Ramey-Shapito dummy variable, modified approach (with only contenporaneous value of dummy variable in non-policy equation)

Third row: responses of G, Y and C to shock to G in SVAR approach, with shock equal to 1 percentag epoint og GDP.

All responses are expressed as shares of GDP.

Figure 4:

The first column reports the responses of G, Y and C to a shock to the RS dummy variable: this is the same response as in the first row of the previous figure. The next four columns display responses to a shock to a dummy variable representing each military episode separately.

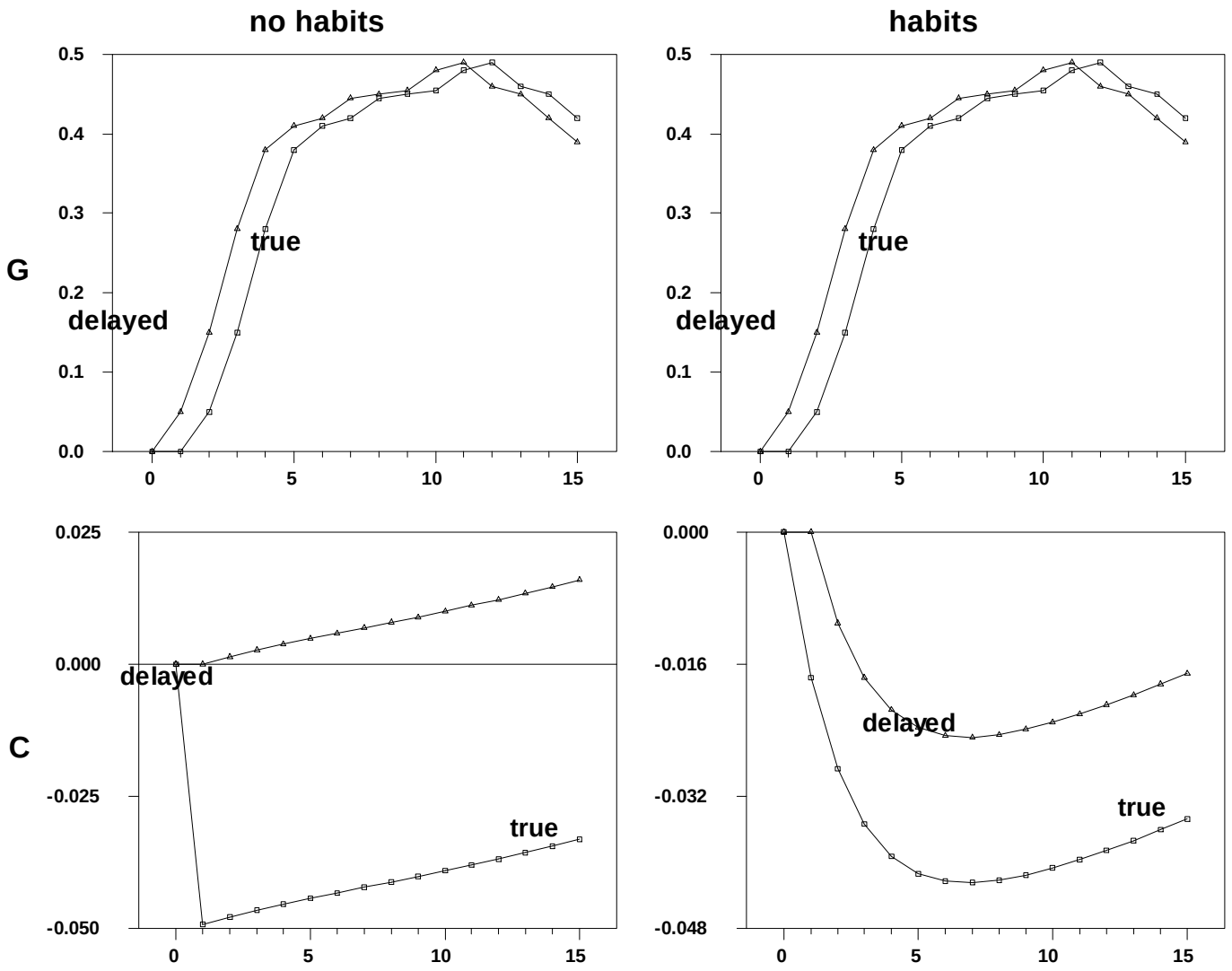

Figure 1: Effects of anticipations in neoclassical model

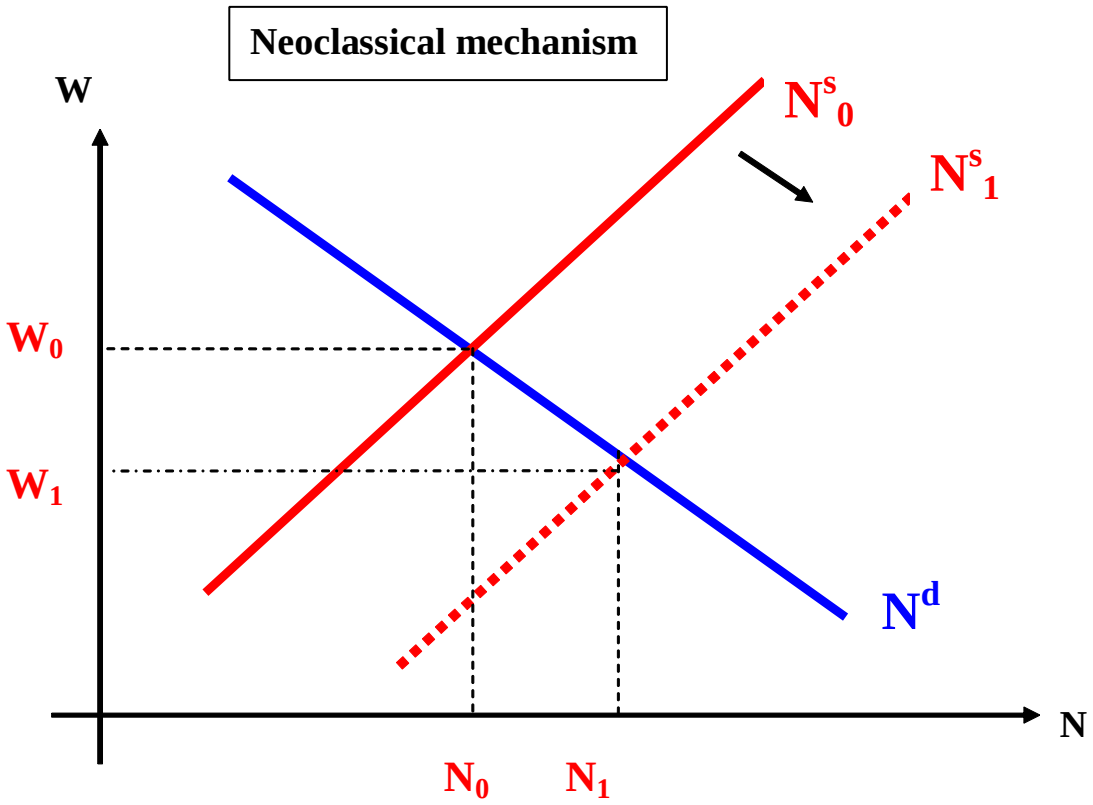

Figure 2: Neoclassical mechanism

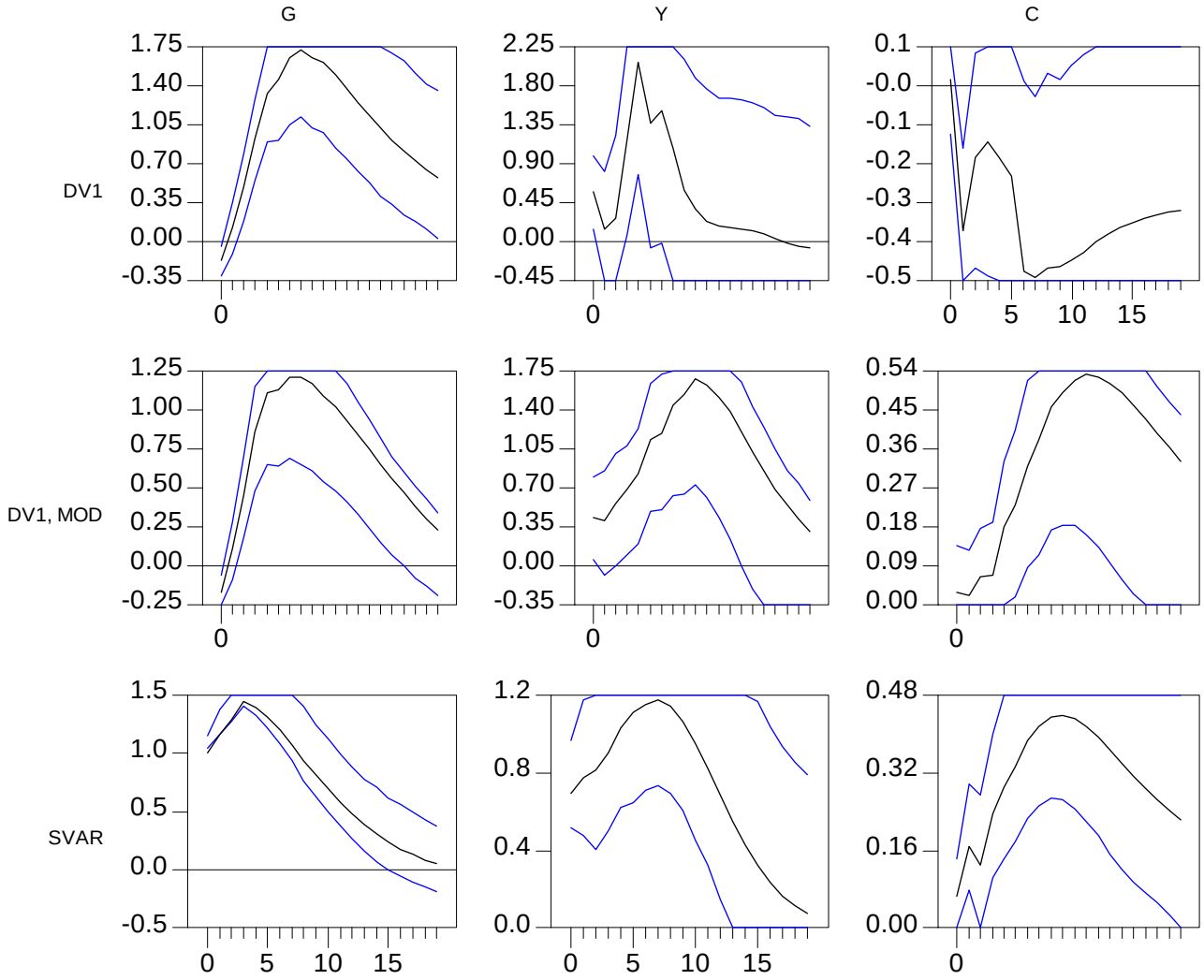

Figure 3: Responses to government spending shock: DV approach, modi-

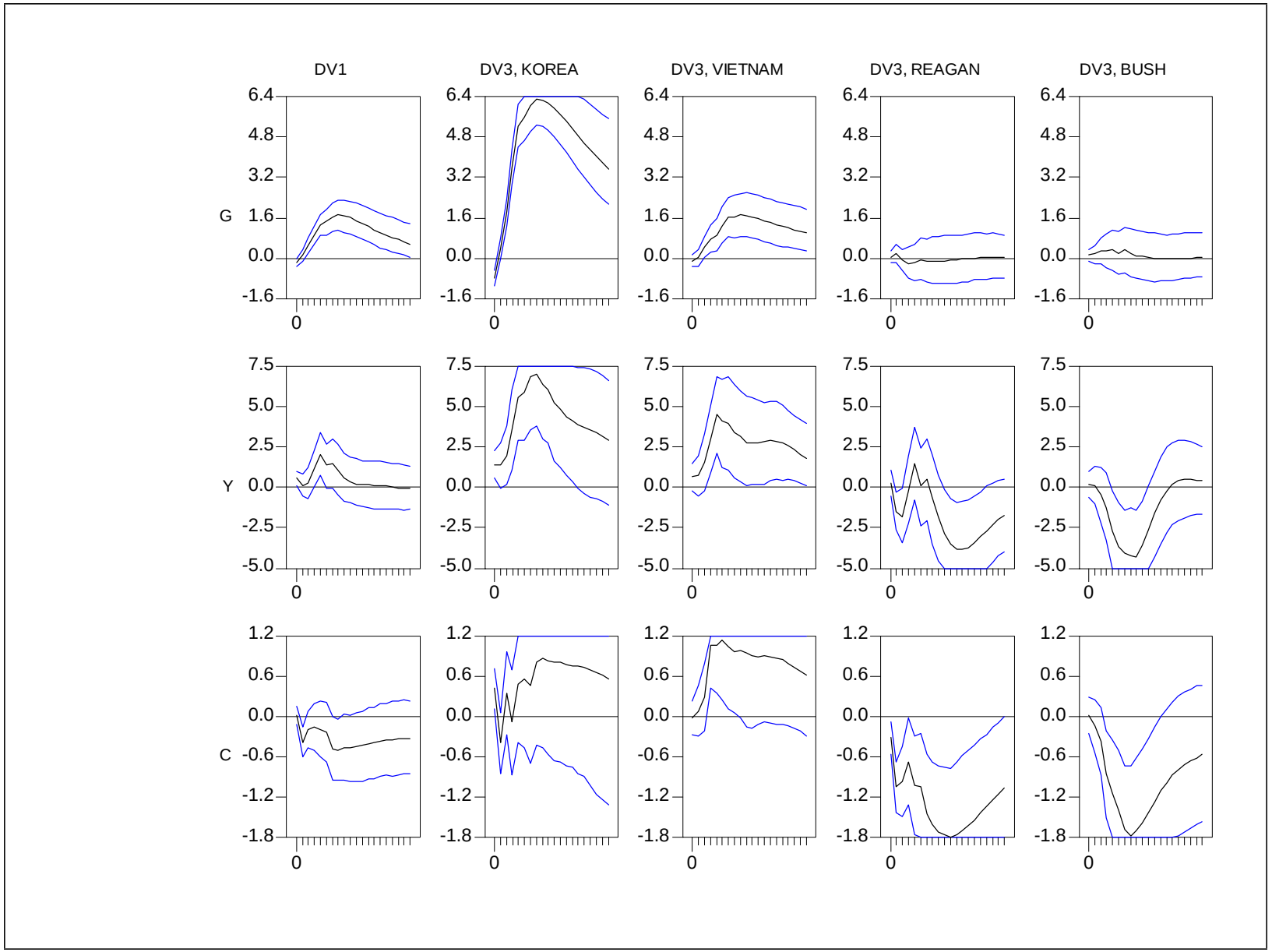

Figure 4: Responses during individual military buildup episodes

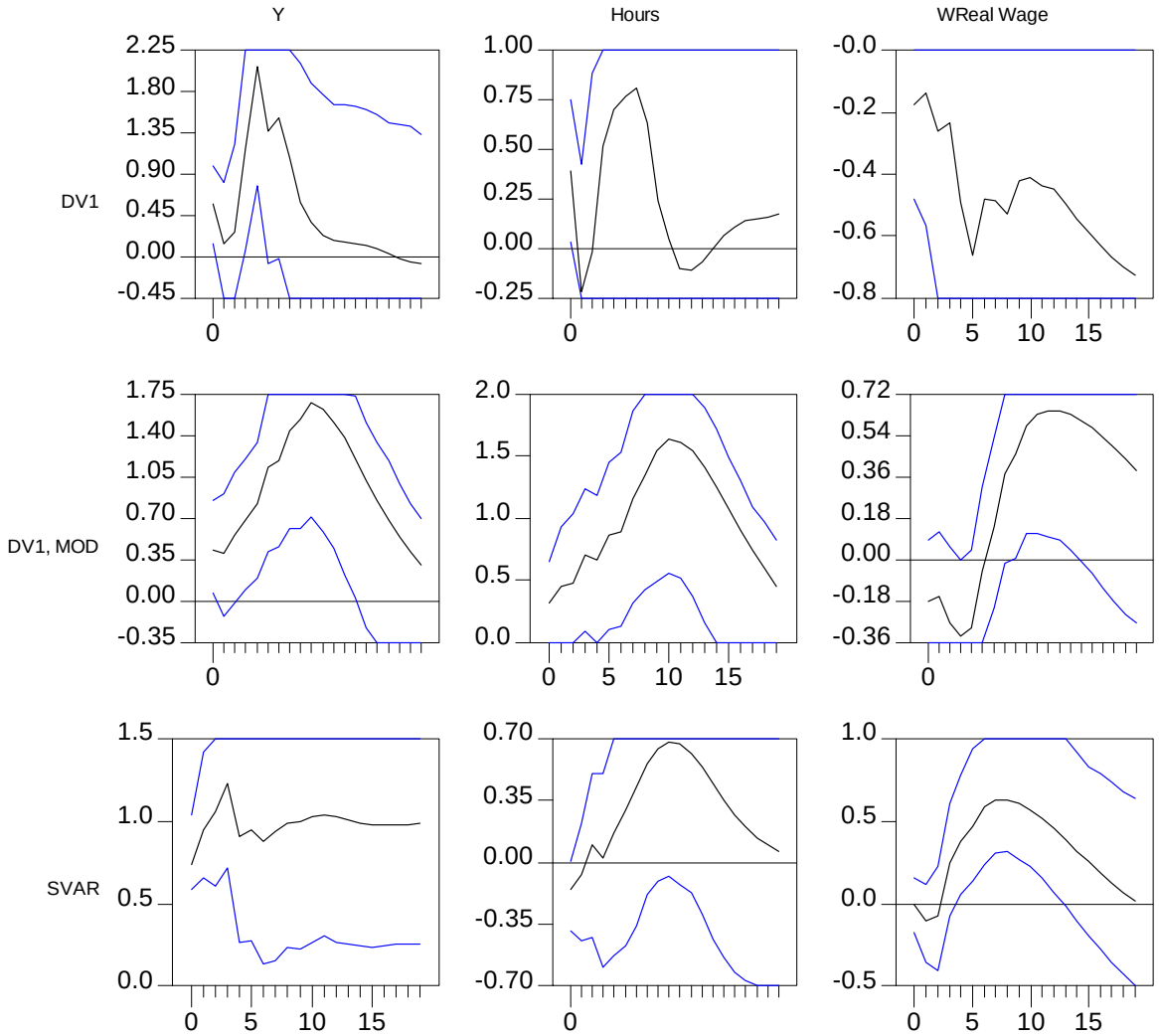

Figure 5: Responses of hours and real wage, non-financial business sector