Comment

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Introduction

Barsky, Basu, and Lee have written an interesting and provocative paper. They present new empirical evidence on the effects of news shocks, and they discuss how that evidence is to be interpreted. In my comment, I discuss Barsky, Basu, and Lee’s empirical strategy and I pose some questions about it. In addition, I discuss their interpretation of the results. Finally, I close with some thoughts on why it is important to think about news shocks.

Identification

This paper seeks to identify, using a vector autoregression, the dynamic effects of a news shock on a column vector of variables, $Y_t$. Suppose that $Y_t$ has the following VAR representation:

$$Y_t = A(L)Y_{t-1} + U_t, \quad E U_t' U_t = V,$$

where $U_t$ is orthogonal to $Y_{t-s}, s \geq 1$. Let the fundamental economic shocks be denoted by $\varepsilon_t$ and suppose they have the same dimension as $U_t$. It is assumed that $U_t$ and $\varepsilon_t$ are related as follows:

$$U_t = C \varepsilon_t, \quad E \varepsilon_t' \varepsilon_t = I, \quad C C' = V,$$

where $I$ denotes the identity matrix and $C$ is a square matrix. One of the fundamental shocks is the news shock of interest, $\varepsilon_{N,t}$. An implication of these assumptions is that the news shocks lie in the space of current and past economic data. That is, $\varepsilon_{N,t}$ is “invertible.” Writing out the preceding expression, we obtain:
\[ U_t = C\varepsilon_t = C_N\varepsilon_{N,t} + \sum_{i \in N} C_i\varepsilon_{i,t}, \]

To compute the impact of \( \varepsilon_{N,t} \) on \( EY_{t+j}, j = 0, 1, 2, \ldots \), the column vector, \( C_N \), is required. Obtaining this vector requires additional assumptions.

Let the companion form for the above VAR representation be expressed as follows:

\[ y_t = Ay_{t-1} + u_t, \]

where \( y_t \) is a column vector composed of \( Y_t \) and lags thereof. Similarly, \( u_t \) is a column vector composed of \( U_t \) and zeros. Let \( \Delta TFP_t \) denote the time \( t \) growth rate of total factor productivity (TFP). This is one of the variables in the data set and let \( \tau \) denote the row vector having the property, \( \Delta TFP_t = \tau y_t \). Forecasting formulas are simple when the VAR is written in companion form. Thus, \( E_t\Delta TFP_{t+k} = \tau A^k y_t \) and \( E_{t-1}\Delta TFP_{t+k} = \tau A^{k-1} y_{t-1} \) so that

\[ E_t\Delta TFP_{t+k} - E_{t-1}\Delta TFP_{t+k} = \tau A^k[y_t - Ay_{t-1}] = \tau A^k u_t. \]

Barsky, Basu, and Lee assume (in addition to invertibility) that the revision, from \( t - 1 \) to \( t \), in the forecast of TFP growth \( k \) periods in the future is proportional to the news shock. That is, they assume

\[ E_t\Delta TFP_{t+k} - E_{t-1}\Delta TFP_{t+k} = a\varepsilon_{N,t}, \]

for some scalar, \( a \), so that

\[ \tau A^k u_t = a\varepsilon_{N,t}. \]

The covariance between the vector, \( U_t \), and the scalar, \( \tau A^k u_t \), provides the required column vector, \( C_N \), up to a scalar. To see this, note

\[ \text{cov}(U_t, \tau A^k u_t) = \text{cov}(U_t, a\varepsilon_{N,t}) = \text{cov}(C_N\varepsilon_{N,t} + \sum_{i \in N} C_i\varepsilon_{i,t}, a\varepsilon_{N,t}) \]

\[ = \text{cov}(C_N\varepsilon_{N,t}, a\varepsilon_{N,t}) \]

\[ = C_N a, \]

where \( \text{cov}(\cdot, \cdot) \) denotes the covariance operator. But,

\[ \text{std}(\tau A^k u_t) = \text{std}(a\varepsilon_{N,t}) = a, \]

where \( \text{std}(\cdot) \) denotes the standard deviation. Then,

\[ \frac{\text{cov}(u_t, \tau A^k u_t)}{\text{std}(\tau A^k u_t)} = C_N, \]

which is the object sought.
Barsky et al. also impose that the entry in $C_N$ that corresponds to TFP in $Y_t$ is identically zero. This restriction does not affect the estimates of the other elements of $C_N$, though it nevertheless is overidentifying.

When I replicated Barsky, Basu, and Lee’s empirical work, I did not impose their zero restriction. I did not find that the results were significantly affected by this. Moreover, I found that the element in $C_N$ corresponding to TFP is not significantly different from zero. This appears to confirm Barsky et al.’s overidentifying restriction.

To investigate whether the Barsky et al. identification strategy works for at least one interesting model of news, I considered the familiar linearized New Keynesian model with sticky prices and a flexible labor market:

$$\pi_t = 0.086s_t + \beta\pi_{t+1}, s_t = 2x_t$$
$$x_t = x_{t+1} - [r_t - \pi_{t+1} - r^*_t]$$
$$r_t = 0.8 \times r_{t-1} + (1 - 0.8)1.5 \times \pi_t$$
$$r^*_t = E_t\Delta a_{t+1}$$
$$\Delta a_t = \varepsilon_{1,t} + g_{t-1}, g_t = 0.2 \times g_{t-1} + \varepsilon_{2,t}.$$  \hspace{1cm} (1)

The first equation is the Phillips curve, where $\pi_t$ denotes net inflation, $s_t$ denotes marginal cost, and $x_t$ denotes the output gap. The second equation is the IS curve, where $r_t$ denotes the net nominal rate of interest, and $r^*_t$ denotes the natural rate of interest. The third equation is the Taylor rule with a smoothing parameter of 0.8 and a weight on inflation of 1.5. The fourth equation represents the expression for the natural rate of interest. The last equation in equation (1) represents the law of motion for technology, which corresponds to the representation favored by Barsky and colleagues when they interpret their results. In this expression, $\varepsilon_{2,t}$ represents the news shock, denoted $e_{N,t}$ above.

I defined the vector of observables, $Y_t$, as TFP growth and the output gap, $(\Delta a_t, x_t)$. I then computed the population VAR implied by the model using the strategy in Fernández-Villaverde et al. (2007). I verified the invertibility assumption, and also that the strategy for computing $C_N$ delivers the correct answer, in population. The numerical results and code are available on request. It would be interesting to investigate the robustness of the Barsky et al. identification strategy to other representations of news shocks (e.g., the one used in Christiano, Motto, and Rostagno [2014]).
Results

There are several notable features of the results. First, a period $t$ news shock has an impact on TFP in period $t + 2$. Such a small delay may seem disappointing to some. News shocks have been used to think about stock market bubbles, and this seems to require that the news be about something that is not expected to happen for many quarters or even years (see, e.g., Christiano et al. 2008, 2010).

Second, Barsky and colleagues find that news triggers an immediate and statistically significant jump in a measure of confidence, which is included in their data vector, $Y_t$. This provides encouraging support for the notion that Barsky et al. do identify a shock that carries positive information about the future. Third, investment, hours, and durable consumption rise in a hump-shape way in response to the news shock. The point estimate of the initial response in hours is negative, but it is not significantly different from zero. So a positive, hump-shaped response for these variables seems consistent with the results. Fourth, stock prices rise according to the point estimates (although this is just barely statistically significant). Fifth, inflation drops significantly with the news about future technology.

At a qualitative level, these five results are consistent with the news shock simulations reported in Christiano et al (2008). As explained in Christiano et al., an essential requirement for the result is that news have a stationary impact on the future level of technology, not its growth rate. The Calvo sticky-price structure of their model implies that inflation is a function of the future real marginal costs. So, a decline in inflation in the wake of a news shock requires that future real marginal cost be expected to fall for at least a while. This translates into the requirement that the real wage be expected to grow less than the anticipated rise in technology. When the news shock is about a future stationary shock to technology the wealth effect on consumption demand is relatively modest, so that the induced effects on labor demand are relatively small. The latter is in turn consistent with the smaller rise in the real wage relative to technology that is required. Apart from the news shock itself, the Christiano et al. model is a fairly standard New Keynesian model. This is a model that has born intense econometric scrutiny in many research papers, using macro and other data.

Barsky and colleagues explore an interesting alternative interpretation of their estimated impulse responses, one which assumes that news is about the future growth rate of technology. Consistent with the reasoning in the previous paragraph, their model produces a decline
inflation in the wake of a news shock by imposing exogenous rigidity in real wages. Barsky et al. assume prices are flexible. It would be interesting to investigate how well their model does based on standard econometric criteria using other data and other shocks.

Why Should We Care About News Shocks?

An obvious answer to the question in the title is that news shocks may help us to better understand empirical phenomena. One example is given by the impulse response functions in the paper. Another example, stressed by Christiano et al., is that news shocks may help us understand the phenomenon that inflation is low in most stock market booms. Christiano and colleagues argue that this phenomenon can be explained by a combination of news shocks and a standard New Keynesian macroeconomic model.²

Another reason to think carefully about news shocks is that they may have important implications for monetary policy. Conventionally, monetary policy is represented in the form of a Taylor rule such as the one in equation (1). A slightly modified version is as follows:

\[ r_t = r_t^* + \alpha r_{t-1} + (1 - \alpha)\phi \pi_t. \]

Relative to equation (1), I have included the natural rate of interest as a shifter. In practice the natural rate of interest is not included in the Taylor rule. There are at least two reasons for this. First, there is a desire for the Taylor rule to be a function of easily measured variables only. The functional form for the natural rate is model dependent and requires the measurement of shocks, as in equation (1). Second, in practice, when researchers estimate a time-series representation of shocks, they leave out news and the estimated autocorrelation coefficients turn out to be close to unity. That is, a typical time-series representation for a shock, say (the log of) technology, is

\[ a_t = \rho a_{t-1} + \varepsilon_t. \]

In this case, the natural rate of interest is

\[ r_t^* = E_t(a_{t+1} - a_t) = (\rho - 1)a_t = (\rho - 1)\rho a_{t-1} + (\rho - 1)e_t. \]

When \( \rho \) is nearly unity then \( r_t^* \) is essentially constant. In this case, the innovation to technology is multiplied by \( \rho - 1 \), which is close to zero. Given the difficulty of measuring \( r_t^* \) and the evidence that, absent news shocks, \( r_t^* \) is basically constant, it is no wonder that \( r_t^* \) has been ignored in interest rate rules used in practice.
But, note that everything changes with news shocks. By changing the outlook for the future value of shocks and leaving present shocks unchanged, news shocks directly shift the natural rate of interest. Consider, for example, \( r_t^* \) when the time-series representation for the technology shock is as it is in equation (1):

\[
 r_t^* = E_t \Delta a_{t+1} = 0.2 g_{t-1} + \varepsilon_{2,t}.
\]

Note that the news shock hits \( r_t^* \) with a coefficient of unity.

Thus, news shocks suggest a reexamination of the conventional practice of leaving the natural rate of interest out of the Taylor rule. There remains, of course, the problem that \( r_t^* \) is hard to measure. However, it is not difficult to think of variables that might be correlated with expectations about the future relative to the present. Examples are credit growth and the stock market. Christiano et al. reports experiments in which variables like these are included in the Taylor rule in their model and the results suggest that credit growth and the stock market may have a valuable role to play in proxying for the natural rate.

Endnotes

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1. As explained in Christiano et al. (2008), other features of the model that are essential to producing the sort of impulse response patterns reported in this paper are (internal) habit persistence in consumption and adjustment costs in investment.

2. As discussed above, the forward-looking nature of inflation implied by Calvo price stickiness is an important ingredient in the Christiano et al. model. Their conjecture that this may be a reduced form representation for an IO structure with the property that firms cut prices today when positive news occurs in an effort to gain market share.

References