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News Shocks

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Abstract

News shocks are shocks that are useful for predicting future fundamentals but do not affect current fundamentals. While the idea of "news shocks" as a driver of economic fluctuations has been present since the early work on business cycles it had been formalized and assessed in the last decade. This entry discusses both the theoretical impact of news shocks on the economy and their empirical relevance for business cycles.

Keywords

Business cycles; Shocks; Information

JEL Classification

E13; E20; E32

Introduction

What are the forces that lead the economy to experience booms and busts in aggregate economic activity? This question has been central within (i) the economic profession, (ii) policy makers and (iii) the general public.

The modern approach to business cycle analysis relies on the methodological breakthroughs in the 1980s of the real business cycle (hereafter RBC) framework in particular, and the dynamic stochastic general equilibrium approach (hereafter DSGE). Central to this framework is that it studies the effect of various shocks to the economy (such as monetary, fiscal, trade, oil and "animal-spirits" shocks).

Throughout many iterations of the DSGE framework, it has been argued that a key shock in generating business cycle is a "technology/total-factor-productivity (TFP) shocks" – i.e., shocks that directly affect the production function. The fact that a key "suspect" in generating business cycle is a shock that directly affects the production function has proven to be controversial for various reasons (see the discussion in Rebelo (2005)). Two key criticisms have been as follows. First, it is hard to accept the idea that recessions are driven by negative TFP shocks as this would imply that the economy simply "forgot" how to produce. Second, in the DSGE framework, assuming that the economy has some advance knowledge on new technologies yields predictions that, ex ante, seem counterintuitive. For example, "positive news" about the arrival of new technologies sends, immediately as the news arrive, the economy into a recession!

These shortcomings lead researchers to consider a new class of shocks in the last 10 years,

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"news shocks". These are shocks that are useful for predicting future fundamentals but do not affect current fundamentals. While the idea of "news shocks" has been present since the early work on business cycles (e.g., Pigou (1927)), it was dormant until the work of Beaudry and Portier (2004, 2006). Specifically, Beaudry and Portier (2004) proposed a modern DSGE framework where news shocks can yield (i) recessions without having to rely on negative TFP shocks, and where (ii) positive (negative) news about the future can lead to an expansion (recession) in the current period. In addition to this theoretical work, Beaudry-Portier (2006) studied the relevance of news shocks from an empirical point of view. They developed an empirical framework according to which "news shocks" were found to have the effects as in Beaudry-Portier (2004) and showed the quantitative importance of news shocks.

In the decade that followed these seminal contributions, there has been a burst of theoretical and empirical research studying the effects of news shocks. On the theory side, research aimed at exploring the theoretical conditions under which news shocks can be a key shock that drives the economy. On the empirical front, the key identification problem is that, naturally, news shocks are not directly observable. This has lead to different empirical specifications and approaches to study their effect. Currently, the empirical evidence on the plausibility and relevance of news shocks is still mixed.

The rest of this entry proceeds as follows. For simplicity, we consider throughout the entry only the reaction of the economy to positive news about the future. In almost all models the response to a negative shock is simply the opposite of the response to a good news. The next section sketches a simple model that analyses the impact of news shocks and describes the building blocks of more advanced and recent work in the literature. Section "Modern Approach" then moves to the more sophisticated current work and especially discusses the current empirical approaches aimed at identifying the impact of news. Section "Conclusions" concludes.

A Simple Model of News Shocks

While the basic premise that good news about the future can generate an expansion sounds intuitive, it is not present in the most basic modern macro models. Specifically, in this line of models, good news about the future leads in fact to a fall in employment and output! We begin this section by describing the basic intuition of why positive news about the future could lead to a decline in economic activity. We then formalize this example in a simple consumer choice problem. This will serve as benchmark for the discussion of how modern macroeconomic models overcame this prediction.

Specifically, consider a consumer who derives utility from consuming a product (say bananas) and leisure (say watching TV). It is common in Economics to assume that these are both normal goods; that is, holding everything else constant, the richer the consumer is, the more bananas and leisure she wants to consume.

Consider the case that suddenly the consumer faces a temporary increase in her current hourly wage. How would she react to this? On the one hand, this temporary increase in her hourly wage makes taking time off for leisure more costly; for example, instead of watching 1 h of TV she could be working an extra hour and take advantage of the temporary higher wage rate. In Economics, this effect is termed as the "substitution effect" where consumers shy away from a good (in this case leisure), if its price increases (in this case the wage rate). On the other hand, since her current hourly wage is higher, and thus, holding everything else constant, she is richer, the consumer would like to consume more of the things she enjoys: i.e., more bananas and more TV. In Economics, this effect is termed as the "income effect" where consumers consume more of the goods they care about as they get richer.

Overall, in this example, whether the consumer will end up working more or less depends on different assumptions. However, practically, in almost all modern macroeconomics, the substitution effect (i.e., the "working more") tends to dominate, and hence, the consumer would end

up working more, taking advantage of the current temporary increase in the hourly rate.

Consider now the case when this consumer suddenly learns that her future, rather than the contemporaneous, hourly wage is about to increase. What will she do? The consumer understands that her lifetime resources have increased, and hence she is richer. This implies that she would like to consume more of all the normal goods she cares about. Hence she will consume immediately more bananas and more TV watching, even though she did not receive the increase in income at the current period.

Since in this example there is no immediate increase in her current salary, there is no offsetting substitution effect that makes her work more. Thus, in response to "good news" about the future, the consumer ends up eating more bananas and spending more time watching TV, implying that she will work less and employment falls. Since employment is an input in the production function, then a fall in employment leads to a fall in output and since consumption increases, then it must be that savings (and thus investment) falls. Hence, overall good news about the future will lead to an immediate contraction in output and employment!

A Two Period Example

In what follows we formalize this intuition in a simple two period model. Specifically, consider the above consumer to maximize her utility from consumption over two periods (we will later add her utility from leisure to the analysis). That is, the consumer cares about consumption today (which we denote by a utility function $U(c_t)$) and consumption tomorrow (which we denote by a utility function $U(c_{t+1})$).[1] We assume that the consumer likes to consume more (i.e., the first derivative of the utility function is positive), but at a declining rate (i.e., the second derivative of the utility function is negative).[2] Naturally, absent a budget constraint the consumer would like to consume infinite amounts. Thus, the consumer needs to be facing a budget constraint. Specifically, at the first period (i.e., period t) the consumer's budget constraint is given by

$$c_t + a_{t+1} = y_t,$$

where y_t denotes her income at that period and where a_{t+1} denotes any savings she transfers from the first per
iod to the second period (i.e., $t + 1$).[3] Then, in the second period, the consumer's budget constraint is given by

$$c_{t+1} = y_{t+1} + a_{t+1}.$$

That is, the consumer's resources are her income (y_{t+1}) and the savings she transferred from the first period.[4] We can combine these two budget constraints into one "lifetime" budget constraint:

$$c_t + c_{t+1} = y_t + y_{t+1}.$$

This last equation simply reflects the fact that over her lifetime, the consumer's total consumption must equal her total lifetime income.

What is the optimal consumption path of the consumer? Maximizing the consumer's utility with respect to consumption today and consumption tomorrow, and denoting by "prime" sign the first derivative of the utility function, it follows that she will equate the marginal utility of consumption in both periods, that is,

$$U'(c_t) = U'(c_{t+1})$$

Moreover, given the assumption that U is a strictly concave function this simply implies that

$$c_t = c_{t+1} = c^*.$$

That is, the optimal consumption path is to consume the same amounts of bananas in each

[1] For simplicity, without loss of generality, we assume no discounting, and a gross interest that equals one.

[2] That is, U is a strictly concave function.

[3] Without loss of generality we assume that the consumer begins the period with no assets.

[4] Note that since the consumer lives for only two periods, she has no incentives to save in the last period, $t + 1$.

period, which we denote by c^*. Using this result in the budget constraint, we thus get

$$c^* = \frac{y_t + y_{t+1}}{2},$$

that is, the consumer splits her lifetime income by two and consumes this amount at each period.

Consider now the case, as in the above discussion, where the consumer learns a period in advance that her next period income, i.e., y_{t+1}, will increase with certainty. Then, as the equation above suggests, contemporaneous consumption, i.e., c_t, will increase immediately (as the consumer wants to spreads her lifetime income over the two periods). However, since her current income (i.e., y_t) did not increase, then it must be that her current savings (i.e., a_{t+1}, which also equal to investment in this example) will fall. Thus, this simple example captures the above intuition; in the presence of goods news about future income, contemporaneous consumption and investment must move in opposite ways.

Now, in order to investigate the impact of news on the labour market, we add to the above problem an endogenous decision on employment. Specifically, as is common in the literature, we add a disutility from working; denoting the number of hours worked in a period by h_t, the utility function then becomes

$$U(c_t) - V(h_t) + U(c_{t+1}) - V(h_{t+1})$$

where V is a convex function. That is, given the negative sign in front of the V function we assume that both the first and second derivatives of V are positive; i.e., the consumer derives a disutility from working at an increasing rate. In this case, the budget constraint of the consumer is given by

$$c_t + c_{t+1} = w_t h_t + w_{t+1} h_{t+1},$$

where w_t and w_{t+1} denote the wage rate at period t and $t + 1$, respectively. Then, with some algebra, one can show that the optimal allocation is such the following equation holds in each period

$$\frac{U'(c_t)}{V'(h_t)} = w_t$$

Then, consistent with the discussion above, assume that the contemporaneous wage rate, w_t, does not change. Rather, the consumer learns that tomorrow wage rate, w_{t+1}, will increase. With the same logic as above, her optimal consumption reaction is to increase consumption immediately, implying that the numerator in the above equation falls (recall that U is a strictly concave function so if c_t increases then $U'(c_t)$ falls). Then, since we assume there is no change in current wage, it must be that the denominator falls. Given the assumptions made above regarding V, then it must be that the amount of hours worked falls in order to make the equation hold.

To summarize, the simple model discussed above predicts that in response to good news about the future, consumption increases, while investment, hours worked, and thus output fall. While the above discussion was based on simplified "toy model", these insights and predictions are present in more advanced modern sophisticated macroeconomic models. That is good (bad) news about the future leads to a recession (expansion). Prima facie, these results suggest that news shocks cannot be a basic driving force of the business cycle.

Modern Approach

In the last decade, many different channels and "modifications" to the benchmark model have been proposed in the literature where good (bad) news shocks about the future lead to an expansion (recession). Given the abundance of theoretical models where news shocks can indeed be a driver of the business cycle, it is beyond the scope of this entry to review all models and the interested reader is encouraged to read a thorough and more technical review of the existing work in Beaudry and Portier (2014).

However, a common theme is that the different channels proposed in the literature need to "overcome" the three basic forces that make the

economy react negatively to good news. These are (i) the income effect that makes consumers want to consume more leisure when they receive good news about the future, which leads to a fall in employment and output, (ii) the lack of a reaction from the current labour demand from firms in response to good news about the future that allows the economy expand, and (iii) the lack of incentives to invest and build the capital stock in response to good news, before they actually materialize.

The Empirical Evidence

While the last 10 years have seen the advance of theoretical analysis where news shocks can be a driver of the business cycle, their empirical relevance is still an open question. The ambiguity is due to the fact that news shocks are essentially consumers' and firms' expectations and perceptions about the future. As such, they are inherently hard to measure. This identification challenge implies that there is no one unified way to measure the impact and effects of news shocks. Broadly speaking, during the last decade, three distinct methods have been used to tackle this challenge. In what follows we discuss these methods and their findings.

Reduced Form Vector-Auto-Regression Evidence

The key idea in this literature is to control for news by having a variable that is forward looking in its behaviour and thus is likely to react to news. This is the central idea in the seminal contribution of Beaudry and Portier (2006) who argue that stock prices are likely to contain news and expectations about the future. Under different scenarios, this assumption allows the researchers to identify news as innovations to stocks prices that are not driven by contemporaneous shocks to the economy. Beaudry and Portier (2006, 2014) show how under this identification, positive news shocks lead to an expansion in the economy where consumption, investment, GDP and hours worked all increase on impact.

This approach has been challenged by Barsky and Sims (2011) who propose an alternative statistical way to measure news. In their approach, news shocks lead to a persistent fall in hours worked. Hence, in fact, this pattern is consistent with the discussion in section "A Simple Model of News Shocks" where news shocks lead to a fall in employment and output. According to these results, there is no "puzzle" to be resolved and no need for a new theoretical paradigm since the existing one predicts the correct response of the economy to news.

Overall, this literature has been exploring the role of the different identifying assumptions. Hence there are different plausible combination of variables and identification methods that yield significantly different results. The effects of news shocks on the economy in this approach remain an open question.

Natural Experiments

These challenges have lead researchers to adopt a different, more direct approach to the identification of news shocks. Specifically, the idea is that from time to time, there are identifiable "natural experiments" that generate news shocks in markets. These events can then be used as a direct measurement of news shocks. As before, in this line of work, the results with respect to the effects of news are mixed.

For example, Bruckner and Pappa (2015) study the aggregate effects of bidding for the Olympic Games using panel data for 188 countries during the period 1950–2009. They find that investment, consumption and output significantly increased years before the actual event in bidding countries. Similarly, Alexopoulos (2011) studies periods where there is new information on technological developments that are not yet implemented. Alexopoulos (2011) finds that economic activity tends to pick up after these news events.

In contrast, Arezki et al. (2017) use oil and gas discoveries as a directly observable measure of news shocks about future income and output. Since there is usually a delay of about 5 years between a discovery and production, these discoveries serve as a natural candidate for news shocks. The authors find that after the news arrives, investment rises, employment falls, while GDP does not increase. Similarly, Mertens and Ravn (2012) use tax legislation as a way to

measure news; specifically, when the difference between an announcement on a tax policy and its implementation is large enough, the authors consider that to be a news shock. In this work, they find that a pre-announced tax cut leads to different reaction than surprise tax cuts as the former leads to a decline in aggregate output, investment and hours worked, with no effect on consumption.

Overall, the "natural experiment" approach has an important advantage over the reduced form approach discussed above since the shocks are "identifiable". However, most of this literature focuses on shocks that are not cyclical in nature, making their implications for the relevance of news shocks to the business cycle an open question.

Maximum Likelihood Model Based Estimation

The third prominent approach is one where researchers use dynamic general equilibrium models to evaluate the importance of different shocks to economic fluctuations. In this line of work, researchers study modern equilibrium models where various shocks are considered. Through statistical methods the importance of news shocks can be assessed. The pioneering work in this area is Schmitt-Grohe′ and Uribe (2012) who find that news shocks account for roughly half of output fluctuations. Follow-up work in this area produced different results, and overall, the effects of news shocks on the economy within this approach remain an open question.

Overall, the maximum likelihood approach has an advantage since it formally embeds news shocks into state-of-the-art macroeconomic models which allow the researchers to conduct a "horse race" between different shocks to the economy. However, this alternative approach also has its limitations; the resulting decompositions and importance of news shocks are model-based and thus depend critically on the specific assumptions of the model. Hence the final conclusions are not "model free" and crucially depend on various modelling assumptions.

Conclusions

News shocks offer an attractive theory of expansions and recessions. In response to good news about the future, the economy "gears up" and the expansion is immediate. Similarly, in response to negative news about the future, the economy slides into a recession. While this story sounds plausible to many, it has proven surprisingly difficult to capture it in a modern theoretical business cycle model.

In the last decade, modern statistical and theoretical methods have been used to address this old question. This has sharpened our views on the contribution of news shocks to cyclical fluctuations. On the theoretical side, researchers have suggested many mechanisms via which news shocks can be a driver of the business cycle. On the empirical side, the evidence in support of the importance of news shocks is still an open question due to the inherent difficulty of identification. Future work is required to assess the qualitative and quantitative importance of news shocks.

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