

# What Can News Shocks Tell Us About the Effects of AI?

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## Economic Brief

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### Key Takeaways

- The emergence of artificial intelligence (AI) can be seen as a shock containing information about the future path of total factor productivity (TFP), that is, a TFP news shock.
- Using a standard empirical model of the macroeconomy, we identify news shocks from observed data of TFP and show their effects on the main aggregates.
- News about AI has at first a negligible effect on TFP. The impact then gradually increases as the new technology diffuses throughout the economy. The qualitative impact of AI news on the macroeconomic aggregates is more immediate due to a wealth effect.

Ever since ChatGPT's release in December 2023, the idea of artificial intelligence (AI) and its promises or dangers for the future of humanity have captured the attention of both the public and policymakers. For instance, AI-based tools are now being introduced in business processes, such as Microsoft incorporating Copilot into Word or customer service increasingly moved to AI chatbots.

This immediately raises the question of what the economic impact of AI will be. Will it be on the scale of the steam engine powering the Industrial Revolution? Or will it be more along the lines of the computer, about which [economist Robert Solow famously quipped](#), "You can see the computer age everywhere but in the productivity statistics"?<sup>1</sup>

Economists are studying various aspects of the current and future integration of AI into the economy and the likely effects on GDP, employment, inequality and other economic variables. In this article, we study a different aspect of the AI revolution: news about the

arrival of AI. In a nutshell, AI has already had significant effects on economic outcomes even before it is already fully in place.

## **What Are News Shocks?**

The emergence of AI and the subsequent hype surrounding it constitutes "news" both as it is commonly used and in a specific economic context. The idea of news as a shock and as a determinant of economic fluctuations has been introduced into the recent macroeconomic literature by economists Paul Beaudry and Franck Portier in a series of papers in the 2000s.<sup>2</sup> This has generated a large body of work that substantiated the early research, addressed various aspects of news in macroeconomic data, developed new empirical techniques to capture news shocks and branched out into other areas.<sup>3</sup>

Most of this literature studies news shocks that are related to movements in total factor productivity (TFP), which measures the productivity of an economy net of all possible inputs such as labor, capital, energy or intensity of effort. A TFP news shock is thus the arrival today of information showing what future TFP will be.<sup>4</sup>

Although the actual change does not take place for a while, a TFP news shock will likely have an instantaneous effect since economic agents expect to be better off in the future and respond accordingly. A key example of this mechanism is consumption behavior: When households believe that they are wealthier because of anticipated higher TFP (and GDP) in the future, they start increasing their spending today, which raises aggregate consumption.

The idea of a news shock addresses the criticism often levelled against real business cycle theory that random reductions in technology are to blame for recessions. In contrast, anticipation of future slowdowns or rising growth drives current outcomes. More specifically, booms can emerge when expectations reflect new information about future TFP growth, while busts can result if economic agents eventually realize their expectations about the impact of the technology on TFP were too optimistic (even if eventual TFP growth is positive).

News shocks are also related to the idea of "animal spirits" or sentiment. This label captures shocks that are not fundamental like technology, monetary policy or exchange rate shocks in the sense that they can easily be attributed to real occurrences. Instead, they are shocks that capture how agents interpret or feel about economic data. While these are not real in a measurable sense, they affect behavior nevertheless. What makes news shocks different from these concepts is that they carry information tied to something material and fundamental.

## **AI as a TFP News Shock**

The seemingly sudden emergence of AI can be seen as a news shock about future productivity improvements. The tools and methodologies underpinning AI — such as neural networks and large language models — have been available to researchers and software developers for a good while. But it took the introduction of a simple chat feature underpinned by a powerful AI feature (namely ChatGPT) to become news that was widely recognized by households and firms as a potential game changer for economic processes. Moreover, evidence is accumulating that ChatGPT and related programs are diffusing through the economy.

Economists tend to think about the effects of news shocks in terms of the diffusion of innovation through an economy. When a new technology — for instance, the light bulb, the personal computer, the smartphone and now AI — is invented, it takes some time until it moves (or diffuses) from a proof of concept to technological viability and, finally, ready for use by consumers and businesses. This involves trial and error, early adopters, and considerable investment along the way.

While the news of the new technology may be present for a while, its economic relevance may take some time to become apparent. In addition, news may not turn into a viable product, so a feature of news shocks is that they may not materialize. Nevertheless, economic actors are likely to respond to the news nevertheless. It is therefore opportune to ask what the quantitative effect of an AI news shock on the macroeconomy might be.

## How Are News Shocks Measured?

The literature on news shocks has developed several methodologies of identifying and measuring such disturbances. They can be directly measured by actually looking at news (that is, reports in newspapers or other media about novel technological developments).<sup>5</sup> In a similar vein, more recent research has looked at patent filings as indicators for technological news.

The most commonly used methodology, however, uses standard time-series techniques to back out news shocks from macroeconomic data. It directly applies the idea that news disperses slowly through the economy and that it gradually increases, say, TFP until it fully realizes at some date in the future. A news shock is therefore that component of observed TFP that contributes most to its movements over a specific time horizon. Economists have developed an empirical method called max-share identification, which does precisely that.<sup>6</sup> It constructs a shock — that is, an independent disturbance to an economic variable — from a vector autoregression (VAR) that includes TFP and other relevant variables. The news shock is chosen to maximize its contribution to TFP over the time horizon.

One potential concern about this identification strategy is whether one can actually identify a news shock in the data if the technology has not yet diffused and TFP is not yet affected. In particular, booms associated with news shocks can look like those generated by demand shocks until they are eventually tethered to some future TFP growth. Methods such as

max-share require some observable realizations on TFP. Since AI is just establishing a footprint, any TFP growth seen in the data over the last few years may therefore be related to past or existing technologies and not current AI.

We thus regard our empirical analysis more like a thought experiment in the sense that we provide an answer to the question: What are the effects of AI as it slowly diffuses through the economy and are perceived a priori as news about future technological advances based on estimated historical patterns? Consequently, our empirical exercise is similar to a conditional forecast where the dynamic responses of key variables are conditional on a shock, but the size and the incidence of the shock remain unspecified.

## **What Do News Shocks Have to Say About the Qualitative Effects of AI?**

We estimate a VAR for the following variables: TFP, GDP, consumption, investment, inventories, employment, real wages, the S&P 500 Index, inflation and the federal funds rate. The data are quarterly, and the period is 1984-2019. The assumed target horizon for the full effects of the news is 10 years. The dynamic responses of these variables to a news shock are shown in Figure 1.

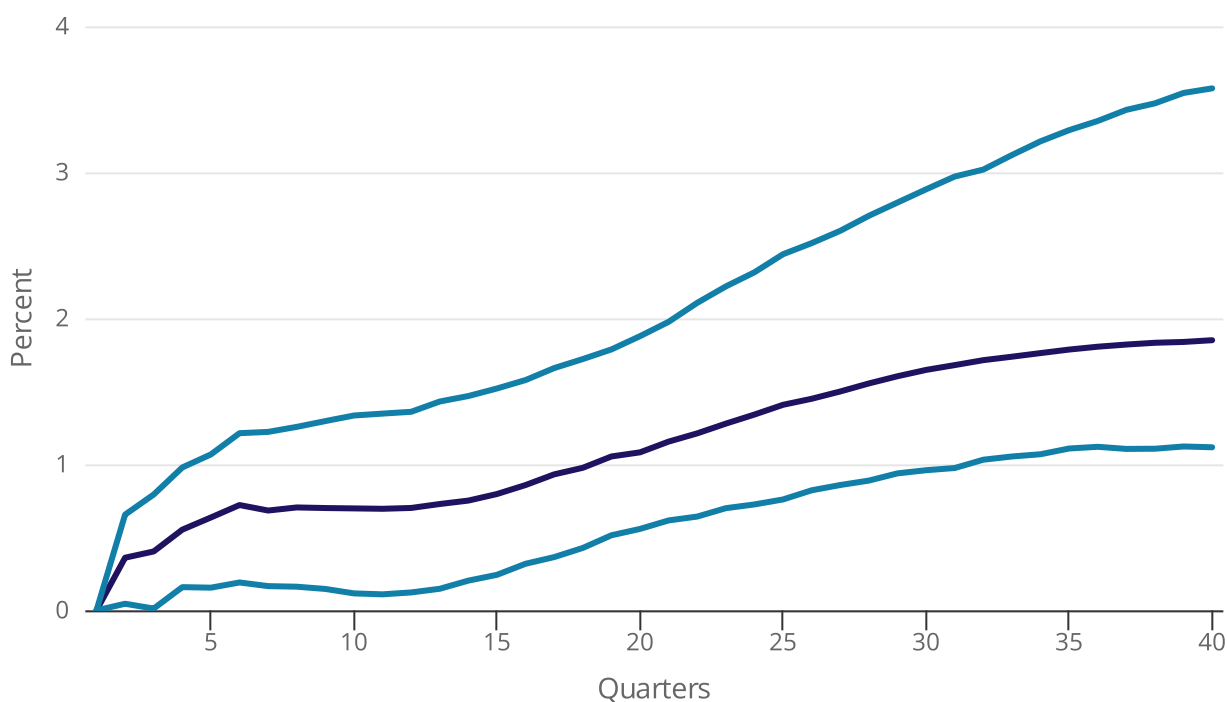
### **Figure 1: Impulse Responses to a News Shock**

< TFP >

## Total Factor Productivity



TFP TFP High TFP Low



Author's calculations

Note: High and low lines represent 90 percent confidence intervals.

In response to a news shock, TFP does not react initially (by construction) and barely moves for a few quarters. It starts rising after about 2-3 years and reaches its permanently elevated peak around 10 years. This pattern is consistent with the idea of a slow diffusion of the technology through the economy, which picks up speed over time as the productivity advances are more widely implemented. Moreover, the immediate rise in stock prices points to an anticipation of higher future technology. When the technology is full available, TFP and, therefore, the productive capacity of the economy is permanently higher.

In contrast to the slow and gradual effect of the news shock on TFP, the response of key macroeconomic aggregates is more immediate and striking. GDP, consumption and investment all rise fairly substantially and in unison, as do employment and inventories. The behavior of these variables can be explained by two key economic mechanisms:

- A wealth effect
- An expected higher marginal product of capital

With respect to the first mechanism, news of the technology-improving shock makes households realize that they will be wealthier in the future. They therefore pull some of the expected gains forward, or as economists describe this mechanism, they substitute

future consumption for current consumption by means of borrowing against future income.

This increase in consumption demand has an immediate effect on production (or GDP), which rises on account of an increase in hours worked, work effort and higher capacity utilization. Typically, work effort and consumption tend to move in opposite directions as richer households desire to work less. In response to a news shock, however, hours worked rises as wages increase due to the influx of new investment to build up the capital stock.

Investment thus rises due to two effects: A higher capital stock is needed to satisfy the increase in demand, and higher capital also increases the marginal return to labor (namely the real wage). The second effect works through the expected higher marginal product of capital in the future. The eventual increase in TFP-driven GDP raises the returns to investment and therefore stimulates it.

Finally, the estimates also reveal the prolonged rise in inventories, which we highlighted in our 2022 paper "[Is There News in Inventories?](#)" as a key mechanism for news-driven economic fluctuations. Businesses build up inventory to satisfy future demand — which again is driven by higher expected TFP — so that production increases are more widely available for investment purposes.

## Summary and Conclusion

Our empirical work suggests that news about AI and its diffusion throughout the economy has widespread effects on macroeconomic aggregates. Based on historical patterns, we would expect that the current and ongoing news about AI over the course of the last 18 months will lead to a substantial and widespread increase of TFP and all macroeconomic aggregates.

As a caveat to our analysis, our statements should, however, be largely seen as qualitative since we cannot ascertain the size of the AI-driven increase in TFP. A second caveat is that if the initial positive expectations about AI-driven TFP do not materialize, then this can be seen as a negative news shock slowing down the expansion of the economy and taking back initial gains.

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<sup>1</sup> See Solow's 1987 [book review of \*The Myth of the Post-Industrial Economy\*](#).

<sup>2</sup> See their 2006 paper "[Stock Prices, News and Economic Fluctuations](#)" and their 2014 paper

*"News-Driven Business Cycles: Insights and Challenges."*

- 3 *Key articles in this literature are the 2009 paper "Can News About the Future Drive the Business Cycle?" by Nir Jaimovich and Sergio Rebelo, the 2011 paper "News Shocks and Business Cycles" by Robert Barsky and Eric Sims and the 2012 paper "What's News in Business Cycles" by Stephanie Schmitt-Grohe and Martin Uribe. The authors of this article have expanded the investigative range of news-shock-driven cycles in several articles, such as the 2017 paper "News and Financial Intermediation in Aggregate Fluctuations" and the 2022 papers "News Shocks Under Financial Frictions" and "Is There News in Inventories?"*
- 4 *A typical example of such a news shock is the invention of fracking technologies (like horizontal drilling in the 1930s), evidenced by a plethora of patents being filed at that time. However, it took a long time until the associated technology became technically feasible and economically viable. The effects of TFP news are therefore also related to the speed of technological diffusion.*
- 5 *The classic study of this type is the 2011 paper "Read All About It!! What Happens Following a Technology Shock?" by economist Michelle Alexopoulos, who links measures of technological change based on technology books and uses them to identify the impact of technology shocks on economic activity.*
- 6 *See the 2014 paper "A Flexible Finite-Horizon Alternative to Long-Run Restrictions With an Application to Technology Shocks" by Neville Francis, Michael Owyang, Jennifer Roush and Riccardo DiCecio.*

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