

ARTICLES

The Falsity of Positive Technology Shocks

Paul F. Cwik, PhD¹

¹ Tillman School of Business, University of Mount Olive

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In mainstream macroeconomic models, random shocks drive economic outcomes. Macroeconomic shocks are typically categorized as positive or negative. However, all shocks are exogenous. Although many types of shocks exist, this article argues that there can be no such thing as a positive technological shock. Research and development are not exogenous. R&D requires savings, entrepreneurial insight, and risk-taking. Even an accidental discovery assumes that someone was using resources while looking for something. Because technological “shocks” require the application of research and development resources, they are not shocks. Thus, there is a flaw in how mainstream models represent growth. This article proposes that a proper theory of economic growth is founded on endogenous microeconomic theory.

The scientific purpose of economics is to understand how the world functions so that better public policies can be implemented. Much of what economists do is create models, abstract representations of a single market, multiple markets, or an entire economy at an initial equilibrium. Then we say, “Suppose.” For example, imagine the market for apples is in equilibrium, and suppose there is an increase in the demand for apples. What happens? Economists follow the model’s logic and attempt to measure the extent of these changes in the real world. Based on the various outcomes, economists make recommendations to the public.

Adjustments to the microeconomic model, “the supposed,” can originate within the model as an endogenous change or from external factors, classified as exogenous influences. The alteration of people’s preferences for apples is an endogenous change, while a reduction in the tax on apples is an exogenous influence. Macroeconomists follow the same pattern. Macroeconomists begin with a model in equilibrium and then suppose endogenous changes and exogenous influences. Macroeconomists give exogenous influences a fancier name—“shocks”—but they operate in the same way. All economists make these suppositions, even Austrians. It is the model’s logic that makes all the difference.

^a Paul F. Cwik (pcwik@umo.edu) is professor of economics and finance at the University of Mount Olive.

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Modern Macroeconomics

Since the decline of the traditional Keynesian macroeconomic model in the late 1970s, macroeconomics has splintered into many camps. Each has its own assumptions about how the economy adjusts to economic shocks. However, the basic pattern is the same: A model is set in equilibrium, a shock is introduced into the system, and then the consequences are analyzed through the model—“the propagation mechanism.” The most popular macroeconomic models are the aggregate supply / aggregate demand (AS/AD) model and the dynamic stochastic general equilibrium (DSGE) model. The common feature between them is their incorporation of stochastic shocks.

Macroeconomic shocks are divided along two dimensions: whether they affect the demand or supply side and whether they are positive or negative. Thus, the taxonomy of macroeconomic shocks identifies four types: positive AD, negative AD, negative AS, and positive AS shocks.

Standard textbook analysis lists several shocks affecting aggregate demand, such as changes in monetary growth, consumer confidence (fear), tax rates, government spending, exports, and imports (Cowen and Tabarrok 2024, chap. 32). Shocks to aggregate supply affect the economy’s potential growth rate. Some typical examples include changes in weather, input prices, tax rates, regulatory burdens, and productivity due to technological advances (Cowen and Tabarrok 2024, chap. 32).

Austrians also engage in this type of thought experiment. For example, Austrian business cycle theory begins with the supposition (an exogenous shock) of an expansion of artificial credit. The effects of this expansion are traced from the banking and financial markets through the entire structure of production and consumer markets.

Since Austrians do not use the AS/AD model, the impacts of exogenous shocks are analyzed through microeconomic markets. To illustrate, suppose North Korea opens itself to buying US goods. The mainstream economist would shift the aggregate demand curve to the right, while the Austrian economist would examine the implications through the various markets from which North Koreans buy goods. To an Austrian, it matters whether consumer or producer goods are being purchased. The different purchases would be illustrated by changes in the structure of production and the associated micromarkets. If, instead, China cuts trade with the United States, mainstream economists would shift aggregate demand to the left, while Austrians would again study the consequences through the pertinent micromarkets.

Similarly, mainstream and Austrian economists treat supply-side shocks at different levels of aggregation. A drought would shift the mainstream economist’s long-run aggregate supply curve to the left. Meanwhile, the Austrian economist would trace the effects through agricultural and other directly affected markets. War, another negative supply shock, would be

examined by Austrian economists through several micromarkets. Some markets, such as the armaments industry, would expand, while many other markets would contract due to a lack of available labor and resources or the destruction of capital goods. Positive shocks are also treated quite differently. If two warring parties declare a peace treaty and resume commercial relations, mainstream economists would shift the long-run aggregate supply curve to the right. Austrians, by contrast, would begin their analysis at the microeconomic level.

Overall, we see that mainstream economists and Austrians generally agree that these assumed changes will affect the economy. They differ in *how* the economy is affected by these changes but not in whether the economy is affected. However, there is one major exception: positive technology shocks. (Although the preceding analysis focused on the AS/AD model, the DSGE model also specifically incorporates stochastic positive technology shocks. Thus, it is also subject to the following criticism.)

Positive Technology Shocks

According to mainstream macroeconomic models, a positive technology shock is an exogenous enhancement of productivity. Where does this new knowledge come from? No one knows. It is an external factor. By definition, it is a surprise that comes from outside the model. This article contends that technological change must be endogenous.

Economic knowledge is an important ingredient in the production process. Production is not simply intuitive. (There is a reason why experienced employees are more valuable.) Knowledge is not an objective thing waiting to be found. Nor is it something that can be passively attained. Technological progress requires the creation or acquisition of new knowledge. The creation of new knowledge requires the application of resources to research and development. These resources require savings, entrepreneurial insight, and risk-taking. Funds are invested. Labor, capital goods, and time are employed. The decision to engage in research and development is a conscious choice. Someone must be looking, conducting experiments, or solving problems. It cannot simply happen; it is purposeful behavior. Therefore, it is illegitimate to treat positive technological shocks as exogenous.

Perhaps the gain is larger than expected, but this does not make the process of technological discovery exogenous. Even an accidental discovery assumes that someone was using resources to look for something. The development of Post-it notes is an example of such an accident. In 1968, Spencer Silver, a 3M scientist, was attempting to create a superstrong adhesive. What he created was the opposite. Nothing was done with the glue for five years until a colleague, Arthur Fry, came up with the idea of using it profitably (Bang Design 2025). The point is that without action following the idea, there is no economic improvement.

Accidents always occur, but turning them into productivity gains requires entrepreneurial insight and application. At the very least, time and labor (thinking and implementing) are required. Even if a foreign company's discovery takes the industry by surprise, competing domestic companies must divert *real investment capital* to adopt the better production technique.

Endogenous Microeconomic Growth Theory

The Austrian conception of economic growth represents a superior approach. The Austrian model presents a logical sequence of events that begins with savings leading to investment, which is turned into capital goods (Böhm-Bawerk [1889] 1959, bk. 2). Appropriately applied capital accumulation increases worker productivity and output. However, this chain of events does not occur in a vacuum or automatically. Austrian analysis includes the entrepreneur as part of the analytical core. Entrepreneurship, research, and development are not exogenously grafted onto a preexisting framework. They are neatly incorporated into Austrian macroeconomics throughout the structure of production. In other words, for Austrians, these positive productivity shocks are not shocks, and they are not exogenous. They are the necessary endogenous starting points of production.

We do not have to begin with an isolated individual on an island to demonstrate this approach. Suppose a profit-seeking firm wishes to increase its profits. It has a choice: either increase revenue or cut costs. If the firm is already in equilibrium, then it cannot raise or lower its prices, for either choice will reduce total revenue. The only option to raise revenue is to introduce something new. As illustrated above, the research and development of this new good or service must be endogenous to the model. Alternatively, the firm could choose to reduce costs. Again, if the firm is in equilibrium, then simply cutting resource use would be detrimental. Instead, it must find a new cost-saving technique. Regardless of how the new cost-saving technique is discovered, it is not acquired without effort. It, too, must be endogenous.

The complete picture of economic growth, then, is as follows. It begins with savings. In some cases, an individual saves a portion of his income. Alternatively, a company retains earnings from a successful venture and reinvests these funds in the company. Regardless of the route, the savings become investment funds, which are directed toward new projects. Entrepreneurial judgment is required to determine which projects will proceed and which will have to wait. The new projects are the conversion of abstract ideas into reality. The market will test these ideas. Profits are the rewards for ideas that add to society's wealth. Losses are the result of failure.

Policy Implications

Good business ideas are not exclusive to the rich, the smart, the upper class, or members of elite schools. Good business ideas can come from *anywhere* at any time. Since it is impossible to know where the most profitable new ideas

are, the best policy is to follow free and open markets. Open markets allow for the most experimentation. Patents, which block the spread of ideas, should be discouraged or eliminated. Austrian economists further caution against government subsidization or the provision of seed money to pick winners and losers. The profit-and-loss feedback mechanism continuously informs all market participants of constantly changing conditions. Government bureaucrats are not known for taking risks or accepting unorthodox ideas, two qualities associated with good business ideas. Furthermore, bureaucrats lack both the necessary information and the incentive structure required for proper economic calculation (Lavoie 2016). Picking winning ideas is the job of entrepreneurs and venture capitalists, not bureaucrats.

The term *positive productivity shocks* is an inaccurate shorthand used by mainstream economists. It masks the complex microeconomic relationships that generate economic growth. The Austrian approach allows economists to make better policy recommendations to the public.

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