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Seek and Ye Shall Not Find: The Absence of Hysteresis in U.S. Macroeconomic Data

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Economists are keenly interested in longer-run economic phenomena that interact with short-run shocks and business cycles. A particularly well-known example is hysteresis, which posits that disturbances typically thought of as transitory actually can have permanent effects. While this concept is well-recognized in theoretical modeling, empirical evidence has been sparse. After conducting a thorough analysis of U.S. macroeconomic data, we conclude that there has been no hysteresis in the United States for the past 60 years.

Hysteresis is the idea that economic shocks that are generally considered temporary can sometimes have permanent effects. A prime example is when the Federal Reserve increases its target interest rate to stem rising inflation. The effects of such a policy action would normally fade out over time, but if hysteresis exists, a temporary hike could lead to permanently higher unemployment.

The possible existence of hysteresis has wide-ranging implications for the conduct of monetary policy and other stabilization policies. If the effect is quantitatively important, this would mean that any policy action would have stronger effects than typically believed, a revelation that might change how the Fed approaches policy. Specifically, in a downturn, monetary policy would have to be more aggressive to prevent hysteresis in the labor market. Similarly, in better times, it would make sense to "run the economy hot" to permanently reduce the unemployment rate.

A secondary concern is that policy goals, such as a low and stable unemployment rate, would become moving targets, which would make calibrating the policy stance more difficult. For example, if a contractionary policy action affects the long-run, or "natural," rate of unemployment, then the action would have to be stronger to close the gap between the observed current rate and the unobserved natural rate since policy would move both rates in the same direction but at different speeds.

Economic Mechanisms Behind Hysteresis

Economists understand how hysteresis can arise in economic models. A key example is the labor market. Suppose an economy were affected by a long and deep recession, such as the Great Recession of 2007–09. It produced the highest rate of long-term unemployment — at its peak, almost half of the overall unemployment rate — since the Great Depression. This outcome was especially challenging because job-finding rates for the long-term unemployed decline dramatically relative to workers who have lost jobs recently. At some point, the long-term unemployed are likely to become discouraged and drop out of the labor force, which could reduce employment and GDP permanently. Thus, a disturbance that usually would be considered temporary, such as the changing risk appetites for certain financial instruments that precipitated the Great Recession, can affect output permanently.[1]

Another mechanism that generates hysteresis in economic models is the disruption of knowledge creation and business formation. Consider a model with a random but steady flow of ideas from innovators who require capital to turn their ideas into products and businesses. If a shock to the economy interrupts this process, even though the shock appears to be temporary, the shock would permanently decrease output. In other words, if Thomas Edison had not secured timely investor support (luckily, the U.S. economy was awash in liquidity when he patented his lightbulb filament), then perhaps we would be writing this *Economic Brief* in candlelight and U.S. GDP would be on a much lower path.

Searching for Hysteresis

In a recent working paper, we investigate the empirical case for the presence of hysteresis in aggregate data in the United States, the euro area and the United Kingdom.

The fundamental challenge to finding evidence of hysteresis is to separate permanent components from transitory components in macroeconomic data. For example, GDP in these three major economies has trended upward over time at fairly stable rates, but there have been persistent movements around the respective trends, even to the point where the trends on occasion appeared to be shifting. It has become standard in the statistical analysis of GDP and its components — such as consumption, investment and employment — to model the behavior of GDP as a so-called "unit root process with drift." The characteristic feature of such a process is that once the trend is disturbed, it never returns to the path it would have followed without the disturbance; that is, shocks to the process have permanent effects.

Qualitatively similar reasoning can be applied to the natural unemployment rate: After every business cycle, it does not seem to return to its previous level, so the natural rate of unemployment appears to be shifting.[2] This evidence suggests that hysteresis effects are

affecting labor market outcomes.

Another challenge in the search for hysteresis is to separate shocks that are commonly understood to have permanent effects from those that are commonly believed to produce transitory outcomes. Economists unambiguously place changes in total factor productivity — the ultimate engine of economic growth — in the permanent category. The development of the steam engine, for example, led to a surge of economic activity in the 18th century that has persisted until now and will continue in the future. In the latter category of transitory shocks — defined as shocks that affect movements around a long-term growth path — economists typically include monetary policy shocks, stimulus checks and alternating attitudes toward work versus leisure. Such shocks do not change long-term economic growth potential.

For simplicity, we label permanent shocks as supply shocks and temporary shocks — that is, those commonly considered to be temporary — as demand shocks. In the latter category, however, we recognize the possibility of a hysteresis shock, namely an aggregate demand shock that has permanent effects. This is what makes the notion of hysteresis important: the idea that economic-stabilization policies can have unintended consequences when the potential presence of hysteresis is ignored.

But accounting for the potential presence of hysteresis is difficult. In a way, it is very much a knife-edge proposition between shocks that are highly persistent but transitory and those that are truly permanent. In fact, it might simply be impossible to distinguish highly persistent behavior from permanent behavior in the timeframes of data that economists typically have available. Similarly, disentangling demand shocks and supply shocks, while relatively straightforward in theory, is often fraught with statistical uncertainty in practice. Against these caveats, we deploy various statistical techniques and identification assumptions that are designed to sharpen the inference of our findings and allow us to extract meaningful hysteresis shocks.

A Statistical Model of the U.S. Economy

In our search for hysteresis, we start by specifying a structural vector autoregressive (SVAR) model to describe the evolution of the U.S. economy over the past 60 years. This SVAR captures the interconnectedness of the main macroeconomic aggregates, selected labor market variables and short-term and long-term interest rates. The behavior of these variables over time is governed by their past values and driven by shocks.

Our first key modeling assumption is allowing for the possibility of cointegration, a statistical relationship in which variables trend together tightly in the long run but only loosely in the short run. Notable examples are GDP, consumption and investment, which should share the same long-run growth trend. A similar cointegrated relationship might exist among interest rates of different maturities and also among labor market variables.

Wherever we find cointegration, we subsequently impose it on the estimation of the SVAR. This procedure helps sharpen the inference — that is, reduce the uncertainty surrounding the presence of hysteresis effects — but more importantly, it allows us to disentangle permanent components from transitory components in the variables. This separation becomes the key element behind our second assumption.

In the next step, we use the estimated cointegrated SVAR to disentangle temporary and permanent supply and demand shocks. The identification assumptions to achieve this are broadly consistent with a variety of economic theories and have been used previously in the literature. Specifically, we assume that a permanent and positive aggregate supply shock is identified by its effect on GDP and the price level in the long run. (It raises GDP and lowers prices.) In the short run, temporary demand shocks impact GDP and prices in the same direction, while temporary supply shocks impact GDP and prices in opposite directions. Finally, the long-run impact of demand shocks on GDP and prices crucially hinges on whether there is hysteresis. Without hysteresis, GDP would remain unchanged in the long run, and the only impact would be on the price level. If there is hysteresis, demand shocks would permanently shift GDP in the same direction, while their impact on prices would be ambiguous.

The search for hysteresis therefore boils down to a very simple test: Do identified permanent demand shocks in a cointegrated SVAR move output in the long run? This question assumes that the estimation method can identify hysteresis shocks at all, which is not necessarily a given. If the answer is yes, if these shocks exist and are substantially different from zero, then we have found what we were seeking.

No Hysteresis — Except by Statistical Decree

The evidence from U.S. macroeconomic data based on the approach described above shows clearly that there is no hysteresis. Specifically, the algorithm we use to extract the various types of shocks from the estimated cointegrated SVAR cannot find any aggregate demand shocks that have permanent effects on GDP. Consequently, we conclude that macroeconomic dynamics in the United States are determined by transitory supply and demand shocks around a permanent trend component that is buffeted by long-run supply disturbances.

Naturally, this finding is subject to many caveats, and it could be just a fluke of the data. In order to address the latter possibility, we implement an alternative statistical methodology to try to establish if it is at all possible to find hysteresis shocks given the empirical specification (which is widely used in the literature) and the identification assumption (which is also standard and fairly basic).

Our alternative statistical methodology is the Bayesian approach to estimation and inference. It allows us to incorporate additional information, such as additional data sources or various ranges in which estimation results are likely to be found. Repeating the previous exercise under the same identification assumptions, we find the same result. The possibility that there are hysteresis shocks that move output permanently is nearly zero in this analysis, and the quantitative importance of such a shock in explaining the long-run behavior of GDP would be very small.

We then consider a specification that *imposes* the presence of hysteresis on the shock identification. In this case, hysteresis arises by definition. The point of this exercise is to make sure that if there were a permanent effect from a demand shock on GDP, our methodology would have found it. Applying this same analysis to data from the euro area and the United Kingdom, we find essentially the same result. In neither case could we identify hysteresis shocks unless we imposed their existence ex ante.

Conclusion

Economists have increasingly turned their attention to longer-run economic phenomena that interact with short-run shocks and business cycles.[3] A particularly well-known application and example is hysteresis, which posits that disturbances typically thought of as transitory actually can have permanent effects. While this is a recognized idea in theoretical modeling, empirical evidence has been difficult to come by, perhaps largely because the object of interest, namely outcomes in the long run, are still far away. In a recent working paper, we apply sophisticated empirical techniques to dig into this question. Our answer is perhaps surprisingly unequivocal: There is no hysteresis in aggregate U.S. data. GDP is driven in the long run by aggregate supply movements, while demand disturbances only matter for movements around this trend.

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[1] *This issue, with special reference to the Great Recession, is discussed in Andreas Hornstein and Thomas A. Lubik, "The Rise in Long-Term Unemployment: Potential Causes and Implications," Federal Reserve Bank of Richmond Economic Quarterly, Second Quarter 2015, vol. 101, no. 2, pp. 125–149. The precise economic mechanism that makes it difficult for the long-term unemployed to find jobs could be an insider-outsider theory of the labor market (which prevents wages from adjusting downward), as advanced by Olivier J. Blanchard and Lawrence H. Summers, "Hysteresis and the European Unemployment Problem," NBER Macroeconomics Annual, 1986, vol. 1, pp. 15–78. An alternative hypothesis is high reservation wages by the unemployed, as suggested by Lars Ljungqvist and Thomas J. Sargent, "The European Unemployment Dilemma," Journal of Political Economy, June 1998, vol. 106, no. 3, pp. 514–550.*

[2] *This pattern is documented by Luca Benati and Thomas A. Lubik, "The Time-Varying Beveridge Curve," in Advances in Non-Linear Economic Modeling: Theory and Applications, edited by Frauke Schleer-van Gellecom, Berlin: Springer-Verlag, 2014, pp. 167–204. They show that the U.S. unemployment rate achieves a new long-run (or natural) level only after deep and prolonged recessions.*

[3] *These efforts are discussed in Renee Haltom, Thomas A. Lubik, Christian Matthes and Fabio Verona, "Moving Macroeconomic Analysis Beyond Business Cycles," Federal Reserve Bank of Richmond Economic Brief No. 19-04, April 2019.*

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