Estimating Hysteresis Effects

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Abstract

Standard Blanchard-Quah decompositions disentangle shocks with a permanent effect on output from shocks with only a temporary effect in VAR models. Shocks with permanent effect are normally interpreted as supply shocks (driving potential output) whereas shocks with temporary are interpreted as demand shocks. This interpretation of shocks rule out the possibility that demand shocks may have permanent effect on output through hysteresis effects.

Our paper extends the standard Blanchard-Quah decomposition, using a combination of sign and long-run restrictions, to disentangle supply and demand shocks with permanent effects from supply and demand shocks with temporary effects, in a VAR model estimated on US data.

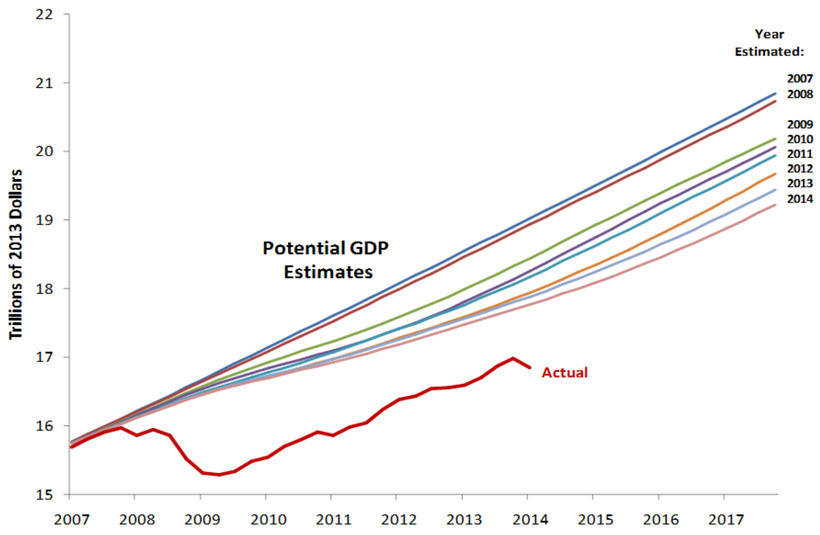
We identify a demand shock that has permanent effects on the long-run levels of output and employment. The shock explains a large fraction of the variance of these variables, indicating that hysteresis effects are important and that demand shocks may have permanent effects on output and employment.

Introduction

In the aftermath of the great recession, estimates of potential output in the US has been revised down several times (see Figure 1). Summers (2014) argues that this pattern confirms the doctrine of hysteresis, which refers to theories that demand factors may have permanent effects on the productive capacity of the economy, and thus affect potential output. Others have argued that productivity growth slowed down already before the crisis, and that previous estimates of potential output were too optimistic (Fernald, 2014).

While there has been several theoretical contributions on the topic, the empirical relevance of hysteresis effects have not been established yet. Recent event studies present cross-country evidence indicating that recessions have had long-term effects on the level of output, even for downturns that appear to have resulted from a shock to aggregate demand (see e.g. Blanchard, 2017). The objective of our paper is to study the empirical relevance of hysteresis effects through evidence from structural VAR models.

Fig. 1. Actual GDP and Estimates of Potential GDP in the US



Sources: Congressional Budget Office, Bureau of Economic Analysis

The baseline SVAR model

We estimate a VAR model in first differences with 3 lags over the period 1983Q1-2019Q2.
We include 4 variables (GDP per capita, PCE deflator, employment to population ratio and investment per capita) and 4 shocks in our baseline model. There are two demand shocks (one with a temporary effect on output and employment, and one with potentially permanent effects on these variables) and two supply shocks (one with temporary effects and one with permanent effects). We distinguish between the permanent and temporary shocks by imposing zero long run restrictions on the temporary shocks, but not on the temporary ones. We use sign restrictions on impact to distinguish between demand and supply shocks. The restrictions are summarized in in Table 1.

Table 1. Restrictions for identification of shocks in the baseline model

	Demand, permanent		Supply, permanent		Demand, temporary		Supply, temporary	
	Short-term	Long-term	Short-term	Long-term	Short-term	Long-term	Short-term	Long-term
GDP	-		-		-	0	-	0
Prices	-		+		-		+	
Employment	-				-	0		0
Investment								

Note: Blanks indicate no restrictions imposed

Results

The demand shock with potentially permanent effects, has effects on output and employment in the long run (see Figure 2). This shock is the main driver of employment, and explains a substantial share of the variation in the long-run level of output (see Figure 3). There does not seem to be a clear effect on output per worker, indicating that hysteresis effects affect output mainly through the labor market.

In order to investigate the channels further, we estimate alternative models where we replace investment, which is unrestricted in our baseline model, with other variables. A reduction in the level of investment, as seen in our baseline model, could reduce the level of capital per worker and thus have a negative effect on labor productivity. Productivity could also be adversely affected by a fall in R&D investment, which we find in our alternative model. However, these effects could be counteracted by an increase in the average productivity in the workforce, if the least productive workers are laid off. We find a fall in the share of employees working in routine jobs, which could support this hypothesis (see upper panel of Figure 4).

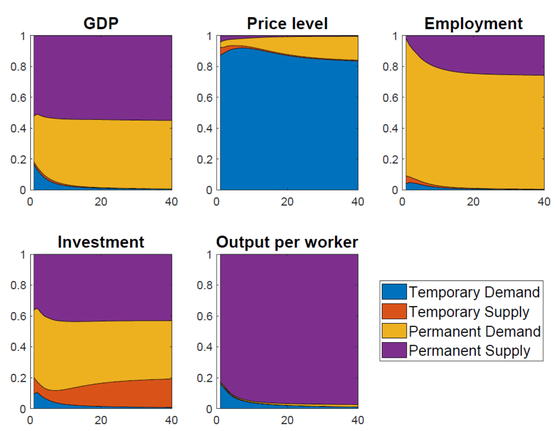
The fall in employment seems to come both from an increase in the unemployment rate, much of which comes through an increase in long-term unemployment, and a reduction in the participation rate (see lower panel of Figure 4).

We extend our model to include the Fed funds rate, participation rate and real wages, and three more shocks, in order to distinguish between different types of demand and supply shocks with potentially permanent effects. The Financial shock, which is defined as a shock where output, inflation, employment, interest rates and the investment to GDP ratio falls, explains much of the long-term variation in GDP, while less is driven by monetary policy and other demand shocks.

Fig. 2. Demand shock with permanent effects in baseline model

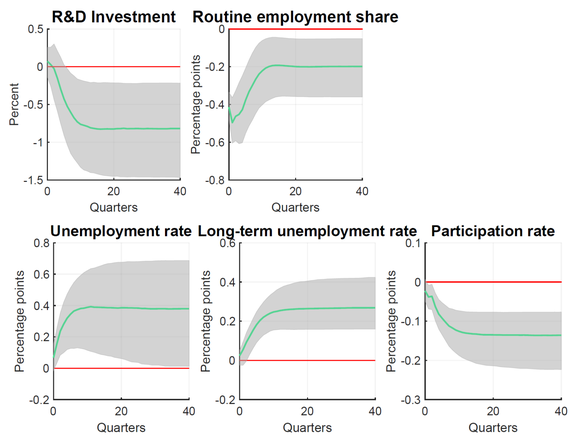
Note: Impulse responses to a one-standard-deviation **demand shock with permanent effects**. The green line represents the posterior median at each horizon and the shaded area indicates the 68th posterior probability region of the estimated impulse responses

Fig. 3. Variance decomposition in the baseline model



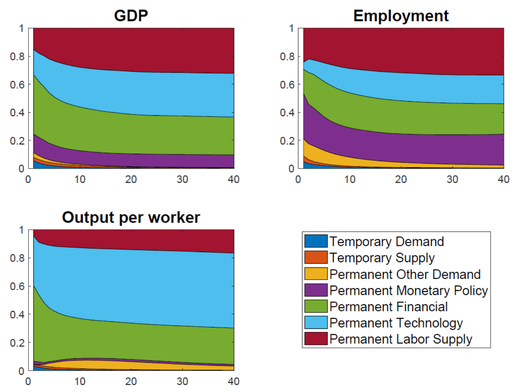
Note: Median forecast error variance decomposition at each horizon in the baseline model

Fig. 4. Demand shock with permanent effects in alternative models



Note: Impulse responses to a one-standard-deviation **demand shock with permanent effects**. The green line represents the posterior median at each horizon and the shaded area indicates the 68th posterior probability region of the estimated impulse responses

Fig. 5. Variance decomposition in the extended model with 7 shocks



Note: Median forecast error variance decomposition at each Horizon in the extended model with 7 shocks

Conclusions

Demand shocks explain a large share of long run fluctuations in output and employment, indicating that hysteresis effects are important. Output seems to be affected mainly through employment. We do not find evidence that demand shocks have significant effects on labor productivity.

References and contact

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