

To what extent do short-run nominal rigidities limit the efficacy of demand-side fiscal stimulus in stabilising an economy experiencing structural shocks?

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1. Introduction

When a structural shock shifts an economy away from equilibrium, the first response is usually to stimulate demand. Governments typically do this through fiscal measures, such as increased public spending or lower taxes. These measures increase the fiscal deficit while offsetting the fall in aggregate demand. The complexity arises because an increase in aggregate demand can raise real output only if the supply side responds accordingly. If prices and wages adjusted instantly, an increase in spending would be absorbed through higher prices, while real output would remain unchanged. Demand-side stimulus works in the short run because prices and wages are sticky. As a result, an increase in aggregate demand spills over into production and may raise real output.

Three concepts underpin this discussion. Demand-side fiscal stimulus refers to an increase in government spending or a reduction in taxation intended to raise aggregate demand. Nominal rigidities describe the stickiness of wages and prices, which gives the short-run aggregate supply (SRAS) curve an upward slope. Structural shocks alter an economy's productive capacity through changes in technology, productivity, production costs, labour allocation, or resource allocation. For example, the spike in energy prices during the COVID-19 pandemic forced several net energy importers to reduce production. Such a shock differs from a pure fall in aggregate demand.

The central argument is that the degree of nominal rigidity enables stimulus to function. The stickier the SRAS curve is, the greater the effect of an expansion in demand on real output relative to prices. Rigidities therefore support stimulus in the short run. However, this stickiness also slows the economy's self-correction and hinders its response to supply-side shocks. The effectiveness of stimulus is further constrained by crowding out, the pace of price adjustment, and, most importantly, whether the shock can be addressed through demand-side policy.

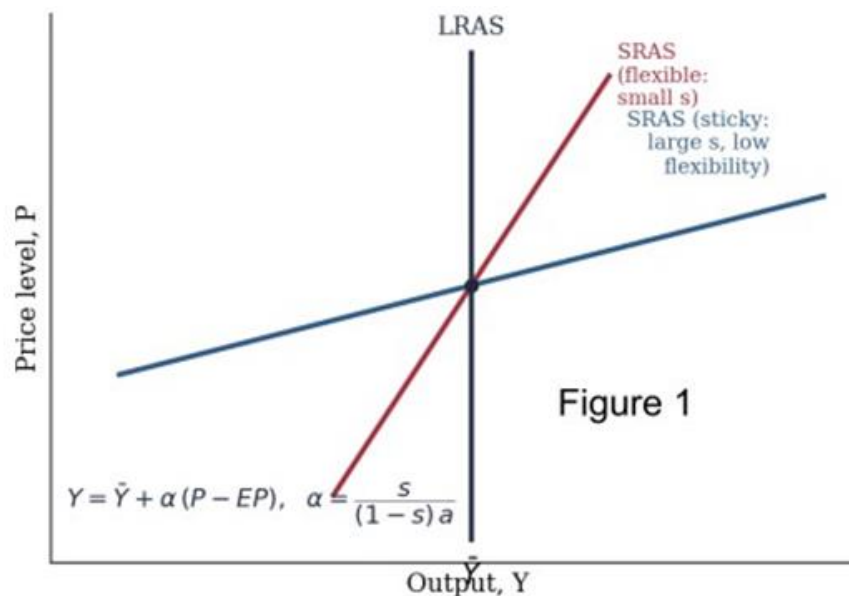
2. Analytical Frameworks

This framework is central to the research question because the slope of the LM curve shows how far nominal rigidities enable a fiscal expansion to raise real output before its effects dissipate through higher interest rates or prices.

Several tools are required to evaluate these claims. The cornerstone of this investigation is the IS-LM model, the standard framework for explaining how aggregate demand is determined in the short run (Mankiw, 2013, chs. 11-12). The IS curve plots interest rates against output, so a fiscal expansion shifts it to the right by increasing planned expenditure. The LM curve, in contrast, traces money-market equilibrium. Their intersection determines short-run output and the interest rate. Fiscal policy shifts the IS curve, after which the economy moves along the LM curve. The slope of the LM curve is important because it determines how much a rightward shift in the IS curve raises output and how much spills over into interest rates (Figure 1).

The short-run aggregate supply curve is the second key tool. Nominal rigidity gives this curve its slope. Firms with some control over prices can set a desired price according to $p = P + a(Y - Y_{\bar{}})$. Firms operating under conditions close to perfect competition, however, have little control over prices. They may therefore set prices in advance, before actual market conditions are known. Aggregating sticky-price and flexible-price firms produces the short-run supply equation. This approach follows Mankiw's sticky-price model (Figure 1).

$$Y = \bar{Y} + \alpha (P - EP), \quad \alpha = s / [(1 - s) a],$$



A closer examination of the equation shows that output can deviate from its natural level, Y_{bar} , only when the actual price level, P , differs from the expected price level, EP . The variable s represents the fraction of firms with sticky prices. As s increases, α rises and the SRAS curve becomes flatter. Consequently, more of the change appears as an increase in output rather than an increase in prices. Other studies derive the upward-sloping SRAS curve through different mechanisms. In sticky-wage models (Fischer, 1977; Taylor, 1980; Calvo, 1983), nominal wages are fixed by contracts, making labour costs rigid. Demand can therefore rise before wages adjust. An imperfect-information model (Lucas, 1972) derives a similar relationship by assuming that firms confuse changes in the general price level with changes in relative prices. Although these models follow different routes, each explains why the SRAS curve slopes upward.

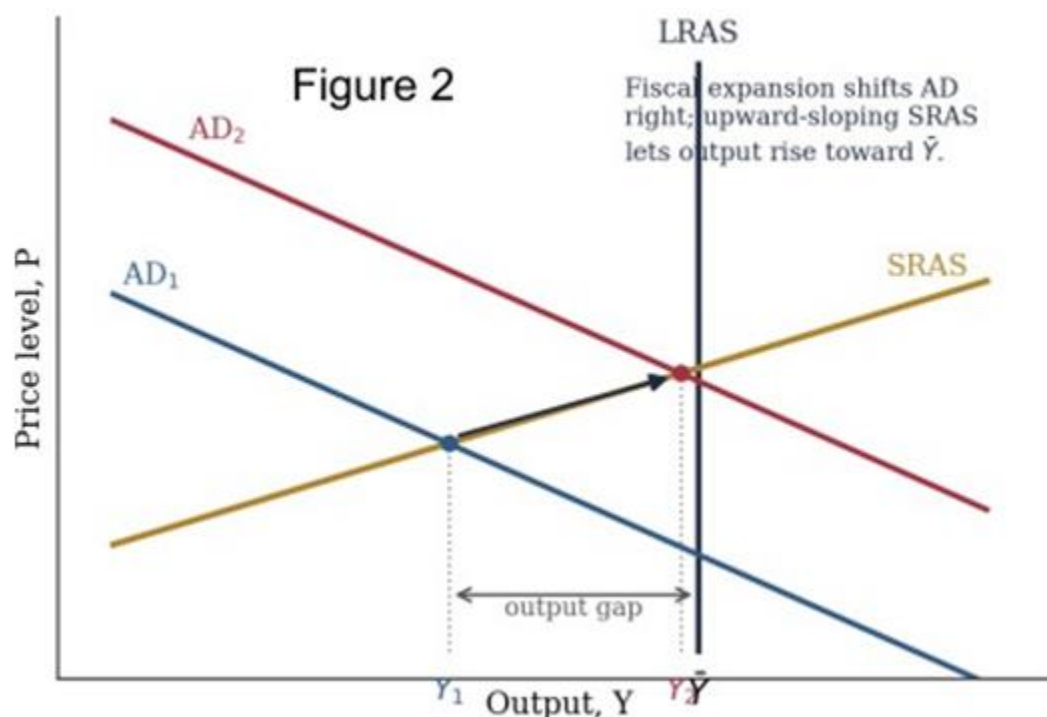
Demand and supply shocks affect the economy differently. A demand shock moves aggregate demand along a given SRAS curve, whereas a supply shock shifts the SRAS curve itself. This distinction determines the policy response available to policymakers. The Phillips curve offers another formulation of the short-run aggregate supply relationship. It relates inflation to unemployment through the equation $\pi_t = E\pi_t - b(u_t - u_n) + v_t$. The supply-shock term, v_t , captures the disturbances examined in this paper. Together, the IS-LM model, the upward-sloping SRAS curve, and the distinction between demand and supply shocks provide a framework for answering the research question.

3. How Fiscal Stimulus Works Under Nominal Rigidities

Rigidities initially increase the effectiveness of fiscal policy, yet they also limit how long and how far a fiscal expansion can raise output. The strongest claim is that nominal rigidities do not obstruct demand-side stimulus. Instead, they determine its effectiveness. Considering the absence of nominal rigidities clarifies this point. If prices were fully flexible, the SRAS curve would be vertical at Y_{bar} . A fiscal expansion that shifted aggregate demand along this curve would raise prices while leaving real output unchanged. Demand-side policies would then generate inflation without increasing production. The failure of prices to adjust immediately is precisely what makes fiscal policy effective in the short run.

Sticky prices produce an upward-sloping SRAS curve. When aggregate demand shifts, real output and the general price level therefore rise together (Figure 2). Assume that an economy begins below its potential output, where $Y_1 < Y_{bar}$. It has cyclical unemployment and idle capacity, conditions that may warrant stimulus. An increase in government spending shifts aggregate demand to the right. Because firms cannot continually adjust prices, they increase production and hire more workers. Output consequently rises and the output gap narrows. Sticky prices also sustain the multiplier process. Initial spending raises income, which increases

consumption and raises income again, instead of being neutralised by an immediate jump in prices.



The slope of the SRAS curve is $1/\alpha$, while α increases with the proportion of sticky-price firms. The stickier the economy, the flatter the SRAS curve. A flatter SRAS curve means that more of an increase in aggregate demand is absorbed through higher real output rather than inflation. Mankiw's model therefore indicates that rigidities amplify the effects of stimulus rather than diminish them. This result makes empirical evidence about the duration of price rigidity important. Two studies using US Consumer Price Index microdata examined how long regular prices persist. Bils and Klenow (2004) found that regular prices persisted for four to five months. Nakamura and Steinsson (2008), after excluding temporary sales, found that regular prices could persist for eight to eleven months and concluded that prices were significantly sticky. The estimates differ because the studies use different treatments of temporary price changes, which affects the implied slope of the SRAS curve and the amount of output that stimulus can generate. The durations estimated by either study provide enough time for an expansion in demand to increase quantities before prices fully adjust.

The state dependence of the fiscal multiplier supports this argument. Stimulus operates through idle capacity and sticky prices, so it should have its greatest effect when an economy has substantial spare capacity. Auerbach and Gorodnichenko (2012) estimated multipliers that vary

across the business cycle. They found multipliers above one during recessions and close to zero during booms or expansions. This evidence is consistent with the claim that a flatter SRAS curve gives demand-side policies more room to raise output. If significant rigidity persists during a recession, fiscal policy can help close the output gap while imposing moderate inflationary costs.

4. How Rigidities Limit Stimulus

Although rigidities amplify the effects of demand-side stimulus, the extent of this amplification remains limited. Four factors set its bounds. These are the actual flexibility of prices, implementation delays, crowding out, and the type of structural shock. The research question assumes that rigidities limit the effect of stimulus. More precisely, weak or rapidly diminishing rigidities reduce its efficacy.

Crowding Out

Crowding out through the interest-rate channel is the first limitation, as shown in Figure 3a. A fiscal expansion shifts the IS curve to the right. Unless the central bank increases the money supply, higher output raises the demand for money and pushes up interest rates. Higher rates crowd out private investment, so output rises by less than the horizontal shift of the IS curve would suggest. The gap between Y^* and Y_2 represents the investment that has been crowded out. Evidence supports this leakage. The DRI macroeconomic model reported in Mankiw (2013, ch. 12; Eckstein, 1983) produces a multiplier of 1.93 when the central bank holds interest rates constant, compared with only 0.60 when it holds the money supply constant (Figure 3b). The same fiscal stimulus therefore produces an effect approximately three times larger when supported by the central bank's monetary stance. This suggests that the effect of fiscal stimulus also depends heavily on monetary policy. When the nominal interest rate is close to zero and cannot rise, crowding out may disappear, and multipliers can exceed two (Christiano, Eichenbaum, & Rebelo, 2011).

Price Flexibility

Price flexibility presents the opposite case. The more flexible prices are, the larger the share of stimulus that spills over into inflation. Flexible prices produce a steeper SRAS curve. A high average inflation rate may have a similar effect by weakening the mechanisms that sustain price stickiness. When the SRAS curve is steep, a shift in aggregate demand changes the price level more than real output. Rigidity therefore determines the effect of stimulus. Strong rigidity amplifies its effect, whereas weak rigidity contributes to its failure. Its efficacy is consequently not fixed. Instead, it depends on a parameter that policymakers cannot directly control.

Time Lags

The third factor is timing. Prices may remain sticky for up to eleven months, yet they will not remain unchanged for three years. This creates a problem because fiscal stimulus can face severe delays. These include the recognition lag involved in identifying a shock, the decision lag involved in agreeing on a policy response, the implementation lag involved in authorising and disbursing expenditure, and the impact lag before that expenditure affects output. Rigidities may therefore begin to unwind before public spending enters the economy. Stimulus may arrive after the SRAS curve has already steepened and the economy has begun to correct itself. Under these conditions, stimulus would add to inflation instead of increasing output. Rigidities create a pathway for stimulus only in the short run. As they weaken, that pathway closes, potentially worsening economic conditions.

Nature of Structural Shocks

The most important limitation is the nature of the shock. A structural shock shifts the supply side of the economy, so attempting to correct it through demand stimulus has consequences.

Demand-side policies can move aggregate demand along the SRAS curve, though they cannot shift the SRAS curve itself. If a shock reduces productive capacity, additional demand cannot restore that lost capacity. Ramey and Zubairy (2018) found that US fiscal multipliers were generally below one in periods of economic slack and expansion. Their findings counter the claim that downturns necessarily increase the effect of stimulus (Table 1).

Broader post-crisis studies report a wide range of multiplier estimates rather than a single consistent value. The evidence therefore neither fully supports nor entirely rejects the argument.

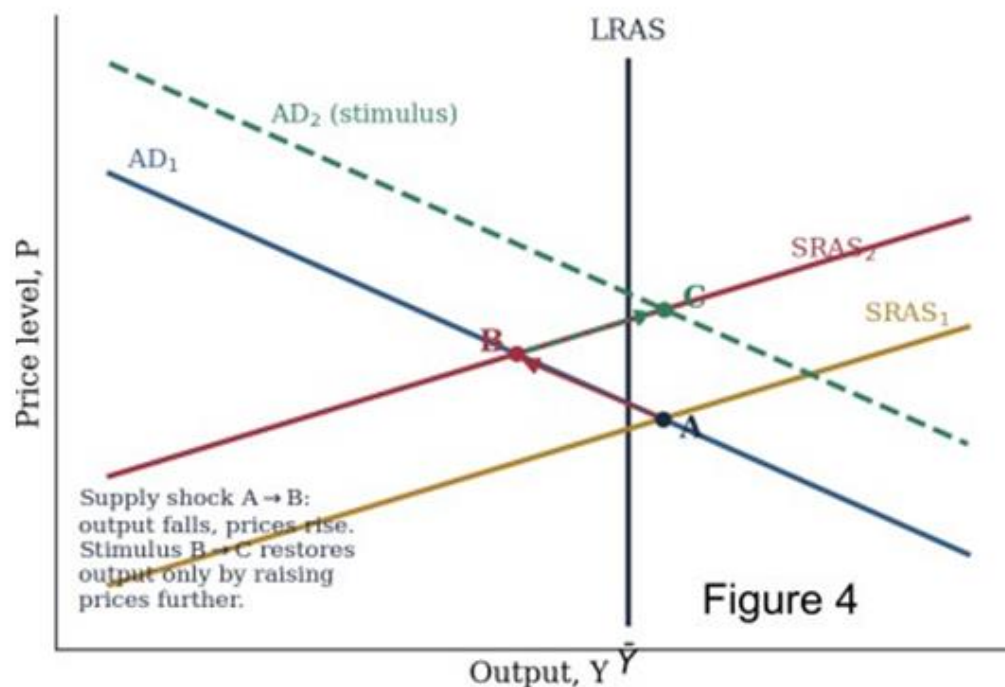
Table 1

Source / condition	$\Delta Y/\Delta G$	Note
DRI model — interest rate held constant (Eckstein, 1983; Mankiw, 2013)	1.93	Monetary policy accommodates; little crowding out
DRI model — money supply held constant	0.60	Interest rate rises; investment crowded out
Auerbach & Gorodnichenko (2012) — recession	≈ 2.0	State-dependent estimate; large slack
Auerbach & Gorodnichenko (2012) — expansion	$\approx 0.0-0.5$	Little slack in the economy
Ramey & Zubairy (2018) — any state	< 1	Longer historical sample; weak state-dependence
Christiano, Eichenbaum & Rebelo (2011) — zero lower bound	> 1	Crowding out muted when the nominal rate cannot rise
Blanchard & Leigh (2013) — early crisis (implied)	$\approx 0.9-1.7$	Versus the ≈ 0.5 assumed by forecasters

5. Structural Shocks and the Harder Case

Fiscal policy is not entirely ineffective in this context. Well-targeted infrastructure investment can raise productive capacity directly, which qualifies the claim that demand-side measures can never address supply-side constraints. Until this point, the analysis has mainly considered demand-driven contractions. These contractions usually arise when a shortfall in spending opens an output gap. A structural shock can instead shift the SRAS curve to the left, causing prices to rise at every level of output. The economy then moves from equilibrium point A to point B (Figure 4). At point B, output has fallen below $\bar{Y}$ while the price level has risen. The result is stagflation, a combination that a demand shock does not ordinarily produce.

At point B, demand-side stimulus cannot fully correct the damage caused by the supply shock. Shifting aggregate demand to the right could restore output at point C, though only at the cost of a higher price level. Policymakers therefore face a dilemma. They can support output or reduce inflation, while demand-side policy cannot accomplish these objectives simultaneously. Stagflation occurs when a supply shock raises inflation and the central bank responds by tightening monetary policy, which can deepen the downturn. A fiscal expansion may work against disinflation and raise inflation further. The inertial Phillips curve, $\pi_t = \pi_{t-1} - b(u_t - u_n) + v_t$, captures this problem because current inflation contributes to future inflation (Mankiw, 2013, ch. 14).

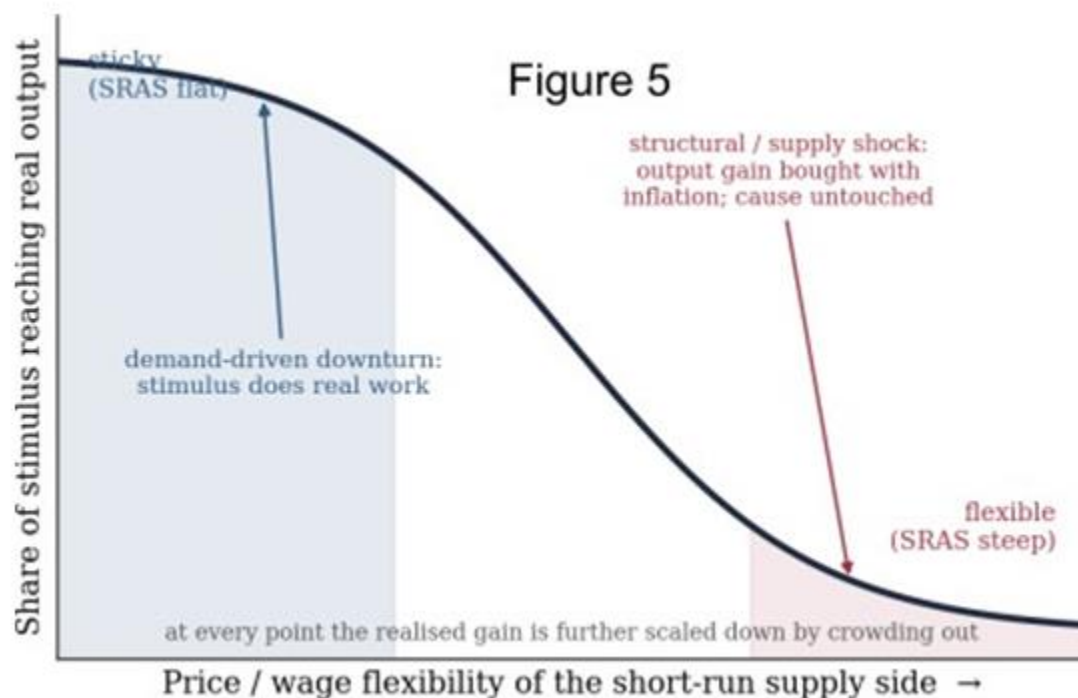


The key point is that demand stimulus does not address the source of a supply-side disruption. If a shock reduces productive capacity by destroying capital, interrupting supply chains, or raising the cost of energy and other factors of production, potential output falls. Demand stimulus cannot produce goods that firms are no longer able to supply. It can only prevent the supply shock from causing a further contraction in demand. In this sense, stimulus can protect the economy without resolving the original disruption. Supply-side measures, such as investment in productive capital and structural reform, address the source more directly.

Applying a demand-side measure to a supply-side disruption risks generating more inflation than expected. Policymakers must therefore ask whether the shock arises from a shortfall in demand or from a constraint that changes in demand cannot resolve.

6. Synthesis

The answer to the question of extent is conditional. Across the available evidence, nominal rigidities make demand stimulus more likely to raise real output in the short run. Three parameters limit this effect. These are the degree of price rigidity, the extent of crowding out, and whether the shock originates on the demand side or the supply side (Figure 5).



Efficacy rises with price stickiness because a flatter SRAS curve permits output to respond more strongly to demand-side stimulus without an equally large rise in inflation.

Evidence on price duration (Bils & Klenow, 2004; Nakamura & Steinsson, 2008) indicates that actual economies retain some short-run rigidity, giving demand-side stimulus room to affect output. The studies differ in one important respect. Nakamura and Steinsson exclude temporary sales because these represent short-lived discounting rather than persistent price adjustment.

Once such sales are removed, estimated price durations increase, which explains why their measure of stickiness exceeds that of Bils and Klenow. This distinction matters because persistent rigidity, rather than the raw frequency of price changes, determines the slope of the SRAS curve and the division of a demand expansion between output and inflation. The effect of stimulus declines as crowding out increases. Taken together, the evidence points to a moderate and state-dependent effect. The net result depends on factors that policymakers can control only partly. The slope of the SRAS curve reflects firms' pricing behaviour, while the central bank's monetary stance influences crowding out. Fiscal stimulus therefore depends on nominal rigidity and supportive monetary policy to achieve its greatest effect.

The third parameter is the nature of the structural shock. Demand stimulus is well suited to a demand-driven downturn because it closes a gap created by insufficient spending. The match is weaker when the shock originates on the supply side. Stimulus can protect output only at the cost of higher inflation, while it cannot directly repair the supply constraint. My assessment is that price rigidities reduce the fall in output during a demand-driven contraction, whereas they may worsen the trade-off created by a structural shock. Stimulus can stabilise a demand-driven downturn and partly offset a structural contraction, though the latter response carries considerable inflationary risk. Its efficacy depends on supportive monetary policy and an accurate diagnosis of the shock.

7. Conclusion

The answer to the research question is, therefore, 'to a significant yet conditional extent.' Nominal rigidities are the reason demand-side stimulus can affect real output in the first place. The benefits diminish as prices begin to adjust and as higher interest rates crowd out private investment. These processes divert part of the stimulus into inflation rather than output. Most importantly, a mismatch between a supply-side disruption and a demand-side response limits what fiscal stimulus can accomplish. Stimulus can stabilize a demand-driven contraction. In an economy affected by an adverse supply shock, it can protect output only partly and may generate substantial inflation.

The result ultimately depends on the diagnosis made by policymakers. During pandemics, energy-price surges, wars, and similar disruptions, they must determine how much of the downturn arises from a demand gap that stimulus can close and how much stems from a supply

contraction that it cannot remedy. This distinction explains why the use of demand-side policy in response to supply-side disruptions remains contested.

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