

# Policy Responses and Impact Assessment during COVID-19 Pandemic - The Case of India

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## Abstract

*COVID-19 had an unprecedented deleterious impact on economic growth all over the world. Countries around the world have responded with large fiscal stimulus packages and both conventional and unconventional monetary policy to moderate the adverse effect of the public health emergency. This paper takes stock of the various policies undertaken in India to combat the economic crisis in the wake of COVID-19. The paper establishes that the effect of fiscal and monetary policy are non-linear with respect to uncertainty regimes. Fiscal multipliers are larger but transitory under increasing uncertainty. Accommodative monetary policy has a significant positive impact on output but a moderate effect on inflation under increasing uncertainty in India. Under decreasing uncertainty, while the impact of negative interest rate shock on output is shortlived, the effect on inflation is persistent with some price puzzle.*

**JEL**.E30,E44,E50.

**Keywords.** *Uncertainty Cycles, Baker-Bloom Davis Policy Uncertainty Index, Fiscal Multiplier, Economic crisis, Fiscal Stimulus*

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# 1 Introduction

The latest episode of global economic recession triggered by lockdowns on account of COVID-19 once again brings to the brim questions about effectiveness of policy stimulus packages. To arrest the crisis spillovers forefront into financial and real sectors, governments and central banks around the world have leaned against the wind and responded with some extraordinary economic measures reminiscent of the global financial crisis (GFC) period. This included massive fiscal stimulus packages, sizeable policy rate cuts, forward guidance, quantitative easing with expansion of the range of acceptable collateral and loosening of capital buffers for depository institutions. India, which has been braving the onslaught of the public health crises, responded with a comprehensive Aatma Nirbhar Bharat package (fiscal stimulus package) along with conventional and unconventional monetary policy measures to combat the economic fallout of COVID-19 epidemic. Policy stimulus measures boost aggregate demand either directly or indirectly through the confidence channel. But periods of economic turmoil generally witness rise in economic uncertainty. Analysis of the effectiveness of large policy commitments under extreme uncertainty may be necessary in view of the long-term consequences of largesse in terms of higher public debt burden and lack of monetary policy space to respond to future recessionary periods. This paper examines the effectiveness of fiscal and monetary policy under different regimes of economic uncertainty for India and other SAARC countries.

In an empirical framework, the effectiveness of fiscal and monetary stimulus is evaluated for India and other SAARC countries under increasing and decreasing economic uncertainty. The paper finds that fiscal multipliers are higher under increasing uncertainty phases in India but is not persistent beyond a year. Under decreasing uncertainty, output rises on impact but the impact diminishes thereafter. For other SAARC countries, under increasing uncertainty, output response with respect to the fiscal shock

is muted in the short run but rises significantly in the medium term. With respect to accommodative monetary policy shock for India, GDP drops on impact and then moves into positive territory on average by the quarter 3 and rises thereafter. The response of inflation is muted until the second quarter exhibiting some price puzzle, but rises thereafter and peaks by quarter 3 before petering out. Under decreasing uncertainty, impact on output is shortlived but inflation rises significantly post quarter 3. For other SAARC countries, GDP response is muted under decreasing uncertainty but immediate, high and persistent under increasing uncertainty. Price puzzle and uncertainty induced volatility in inflation response is observed in SAARC economies under increasing uncertainty.

The paper is organised in the following manner. Section 2 recounts the impact of COVID-19 on broad macro-aggregates. Section 3 takes stock of the fiscal and monetary policy measures undertaken during the crisis by different countries. Section 4 presents the impact of policies in India. Section 5 looks at the literature on uncertainty. Section 6 and 7 present the methodology and data sources, respectively. Section 8 produces the results and Section 9 concludes.

## **2 Impact of COVID-19 on India - Broad Aggregates**

India was hit by COVID-19 in March 2020 when it was recovering from a phase of cyclical slowdown. India's immediate policy response was to impose a complete lockdown to minimise transmission through contact. In fact, India imposed a total national lockdown when total number of infections was only 500 (Economic Survey, 2020). On a scale of 0 to 100 of the stringency index, India's index rose to the peak between end of March 2020 and middle of April 2020 and moderated thereafter as different unlock phases were implemented. The index with respect to other SAARC nations also rose to very high levels at different points in time as each country braved different waves of

the infections (Figure 1 and 2).

As per provisional estimates, during 2020-21, India's real GDP contracted by 7.3 per cent on the back of 9.1 per cent contraction in private consumption and 10.1 per cent decline in gross capital formation (Figure 3).

Ambiguity in the economic environment had a profound impact on fresh investments. Investments that were announced and stalled registered a growth of 650 per cent and investments that were abandoned/stalled/shelved recorded a growth of over 200 per cent during March 2020. Investments that were dropped due to lack of information increased by 37 per cent during March 2020 and recorded a growth of close to 55 per cent during the first quarter of 2020-21 (Table 1).

On the supply side, except for agriculture which was largely outside the ambit of lockdown, all other sectors recorded a contraction. The contact intensive sectors like trade, hotels and transport and construction registered the largest decline. Manufacturing sector contracted by 35.9 per cent (Figure 4).

Net sales in major industry segments with the exception of communication and information technology registered significant contraction. The average contraction in net sales during Q1:2020-21 was 46 per cent (Table 2). The contraction moderated in subsequent quarters as the economy unlocked.

### **3 Fiscal and Monetary Stimulus during the Crisis**

Data shows that governments around the world have always responded with extraordinary measures to manage extraordinary times. In advanced economies, government expenditure as a proportion of GDP which averaged to a little over 38 per cent during 2004-2008 (the period until the GFC), increased to well over 43 per cent in 2009, in the aftermath of the financial crisis. Before the COVID-19 crisis, advanced economy governments used to spend close to 40 per cent on average which shot up to 49 per cent of GDP during the crisis in 2020 (Figure 5). Emerging and developing economies, also

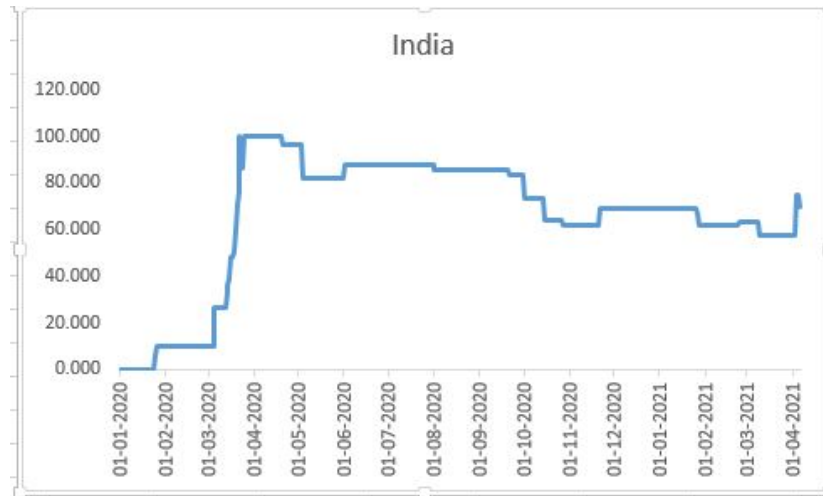


Figure 1: Stringency Index - India

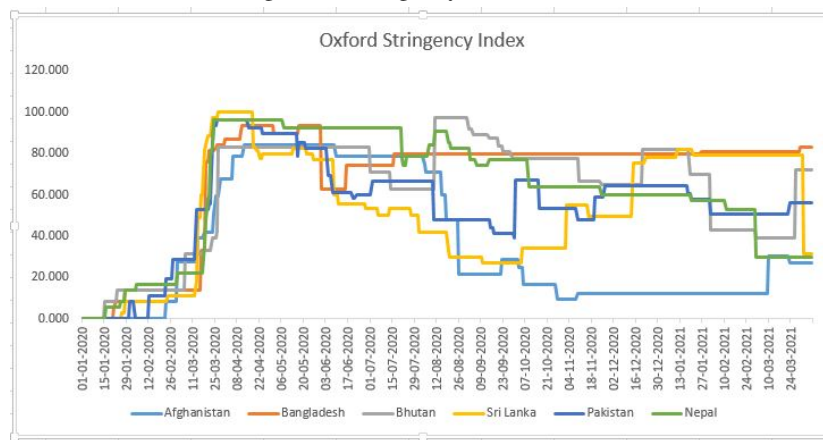


Figure 2: Stringency Index - SAARC Nations

Table 1: Investment Projects by stage of development

	Investment Projects Aban- doned/Shelved/Stalled	Investment Projects An- nounced and Completed	Investment Projects dropped due to lack of Information	New Projects Announced
Mar-19	-59.26	-44.44	31.92	-15.37
Jun-19	-31.82	-50.00	-0.17	-6.32
Sep-19	-36.84	-67.65	-6.14	1.12
Dec-19	86.36	140.00	-3.27	-5.05
Mar-20	209.09	650.00	-39.98	37.37
Jun-20	-26.67	87.50	-70.03	54.65
Sep-20	-39.58	45.45	-47.53	-0.37
Dec-20	-56.10	-66.67	-44.02	65.96
Mar-21	-78.43	-93.33	-25.61	-4.26

Source: CMIE

Table 2: Non-financial Sector : Y-o-Y percentage change in Net Sales

	Mar-20	Jun-20	Sep-20	Dec-20	Mar-21
Textiles	-22.9	-63.1	-19.8	3.4	30.5
Chemicals & chemical products	-6.9	-42.0	-19.2	-10.7	10.5
Plastic products	-17.0	-34.0	2.6	15.9	36.9
Petroleum products	-7.3	-49.9	-26.3	-16.3	8.5
Consumer goods	-10.5	-50.7	-25.3	-9.9	38.5
Construction materials	-14.9	-37.9	2.6	14.4	32.7
Metals & metal products	-18.7	-38.1	7.4	17.8	49.3
Machinery	-21.2	-47.9	-10.4	4.5	37.6
Transport equipment	-26.9	-67.3	3.2	19.6	45.8
Paper, newsprint & paper products	-12.7	-47.0	-25.6	-18.0	12.5
Glass & glassware	-10.4	-54.9	-5.9	5.7	41.9
Electricity	14.1	-5.8	-0.6	1.5	-0.7
Wholesale & retail trading	-11.1	-50.0	-21.6	-5.5	8.6
Transport services	-3.0	-63.4	-40.7	-30.7	-9.5
Communication services	10.6	13.6	16.1	23.5	25.9
Information technology	7.4	2.9	4.0	5.7	6.8

Source: Economic Outlook, CMIE (Interim Corporate Aggregates)

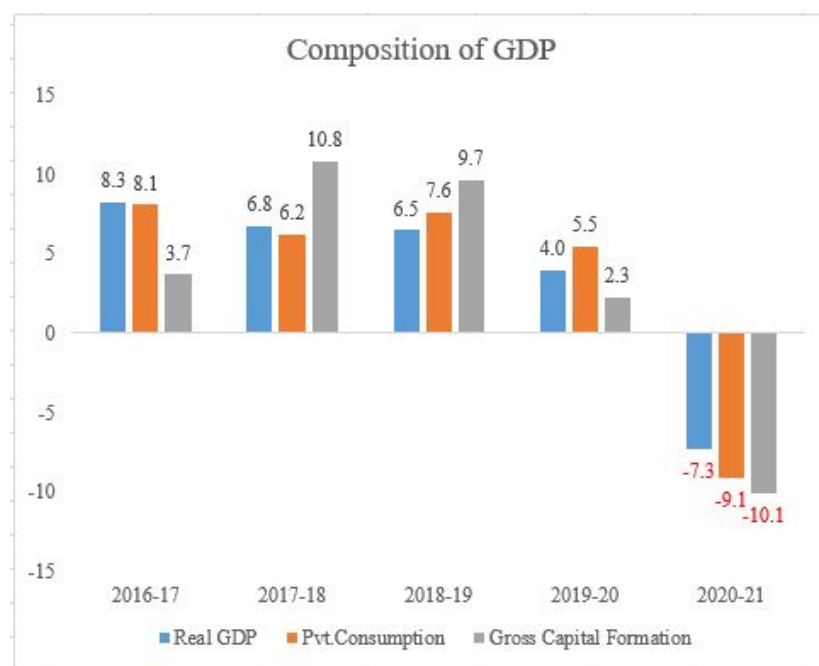


Figure 3: Aggregate Demand

responded with fiscal stimulus packages, although their incremental expenditure was much smaller (Figure 6).

In the wake of the crisis, India's immediate response was to ensure food security to the vulnerable, direct benefit transfers to aged widows, pensioners and the specially abled, insurance coverage for the healthcare sector, support to construction workers, employment to returning migrant workers and succour to small businesses. In pursuance of this objective, on May 2020, Government of India announced a relief package worth 10 per cent of GDP. Free foodgrains were distributed under PMs Garib Kalyan Yojana (Welfare Scheme for the poor) and Aatma Nirbhar Bharat. Wage rates were increased under Mahatma Gandhi National Rural Employment Guarantee Scheme which is the flagship employment creation scheme today to benefit 136 million rural families. Under PM Kisan Samman Nidhi Scheme, Rs. 2000 was distributed to each of the



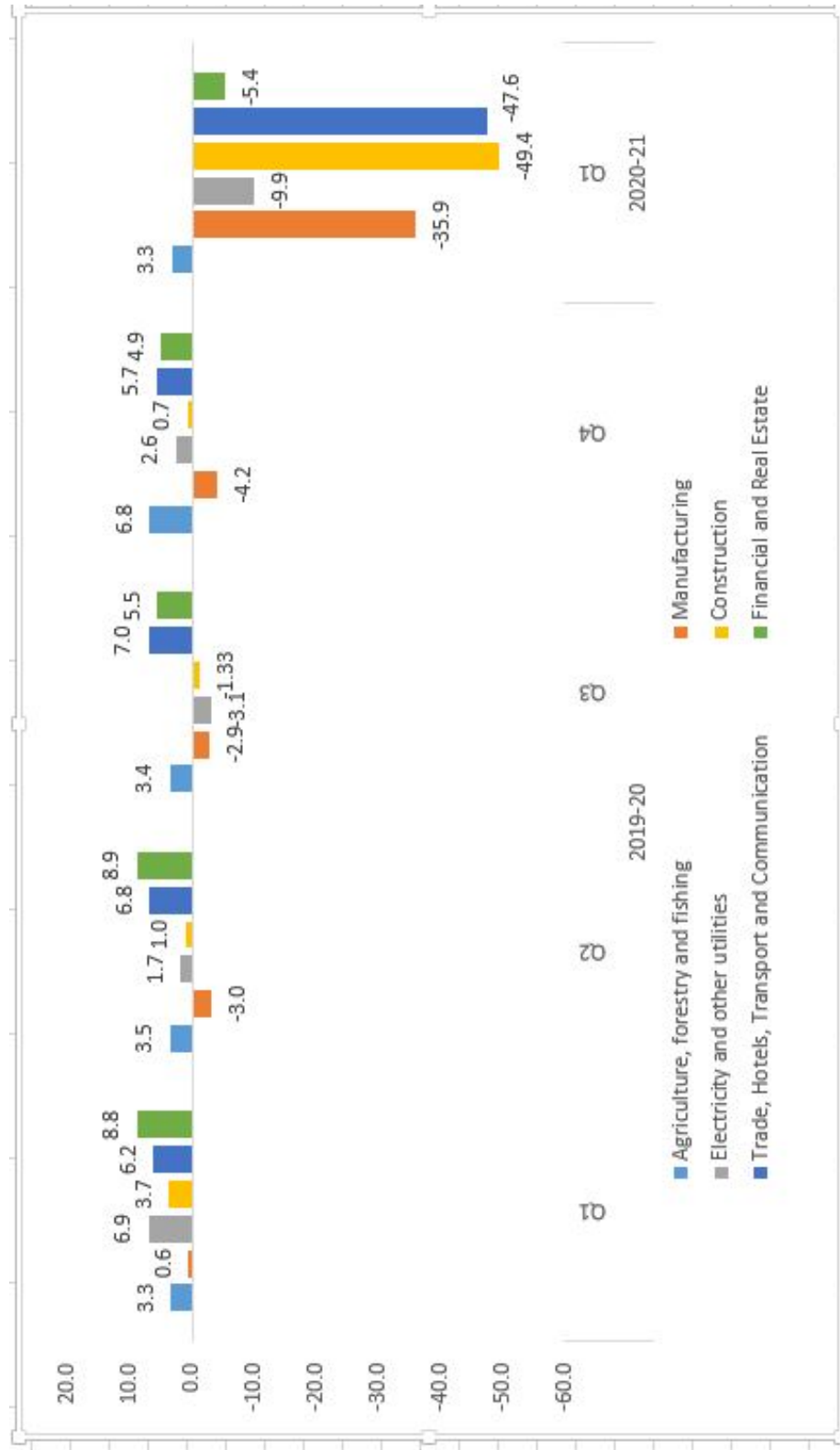


Figure 4: Aggregate Supply - Gross Value added by composition

87 million farmers. Relief Measures for MSMEs included collateral free lending programme with 100 per cent credit guarantee; partial credit guarantee to public sector banks (PSBs) on borrowings by NBFCs, HFCs and MFIs; credit facility for street vendors and others. Simultaneously, there was a welcome realisation that there was a need to expand the productive capacity of the economy to boost supply so as to meet the pent-up demand once the health emergency eases and lockdown is lifted. Structural reforms included supply chain and price realisation reforms for agriculture, contract farming reforms, relaxation in stock-holding limits, extension of FDI limits in defense sector, easing of the tax compliance norms (direct and indirect taxes), relaxation in labour laws and simplification of laws.

In the wake of the COVID-19 epidemic, several developed country central banks have taken some extraordinary monetary measures. The US Federal Reserve lowered the target range for federal funds rate to 0-0.25 per cent. The Fed provided conditional guidance to hold the rates at this range until normalcy is restored. The Bank of Canada (BoC) slashed its benchmark interest rate by a total of 100 bps (50 bps on March 4, 2020 and by another 50 bps on March 13, 2020 to reduce the overnight interest rate to 0.75 per cent). BoC has also increased the frequency of Term repo operations and is in the process of launching a USD Term repo facility against a broad range of Canadian dollar collateral eligible for standing liquidity facility. The European Central Bank (ECB) announced a sizeable stimulus by agreeing to buy USD 820 billion worth of Government and Corporate Bonds and other assets, pumping cash into financial markets. In the same vein, Bank of England (BoE) undertook a slew of measures to manage the impending crisis. The Monetary Policy Committee at the BoE reduced bank rate by 50 bps to 0.25 per cent and introduced a Term Funding scheme for small and medium enterprises financed by issuance of central bank reserves.

The emerging market central banks have also used conventional and unconven-

tional monetary policy measures to respond to the crisis. The People's Bank of China (PBOC) reduced reserve requirements, injected liquidity through reverse repo operations (RMB 1.2 trillion) apart from reducing policy rates three times during 2020. The PBOC provided special central bank lending amounting to RMB 300 billion in January 2020 to provide low-cost funds to banks, and enable them to extend credit support at preferential interest rates to major enterprises in manufacturing, transportation, medical supplies and daily necessities for epidemic containment. The PBOC announced another 1 trillion RMB of inclusive central bank lending and central bank discounts quotas, to support the banks to extend credit supply to agricultural entities, medium and small business, and private businesses. The Bank of Russia (BoR) reduced policy rate by 200 bps and launched long-term repo auctions (1 month and 1 year), which also served as a source of financing for banks offering loan restructuring options to their clients. The BoR recommended that credit institutions do not downgrade borrowers' credit scores and defer loan payments for up to six months for small sized companies and individuals. Banks were asked not to classify such loans as restructured for loan loss provisioning purposes. To support mortgage lending segment, add-ons to risk weights for mortgage loans issued before 1 April 2020 were canceled and add-ons to risk weights for mortgage loans issued after 1 April 2020 were lowered. The Central Bank of Brazil (BCB) cut the benchmark policy rate by 225 bps in quick succession to 2 percent and announced extensive liquidity and capital relief measures. The Congress passed legislation allowing the BCB to purchase public and private assets for financial stability purposes while a state of public calamity is in force. Some central banks like the Bank of Thailand (BoT) have decided to support some specific sectors. BoT, for example, has established a special facility to provide liquidity through commercial banks to mutual funds facing redemption pressures and corporate bond stabilization fund to enable corporates tide over rollover issues. Some central banks like Monetary Authority of Singapore, Bank of Korea, Central Bank of Brazil and Bank of Mexico

obtained swap facilities from the US Federal Reserve.

The Reserve Bank of India also deployed a gamut of conventional and unconventional policies to tide over the crisis. On March 27, 2020, the Reserve Bank of India reduced the policy repo rate under the liquidity adjustment facility by 75 bps to 4.4 per cent from 5.15 per cent and the reverse repo rate to 4.0 per cent in March 2020. The policy repo rate was further reduced by 40 bps to 4.0 per cent in May 2020. The Monetary Policy Committee of the RBI provided a conditional guidance to continue an accommodative stance until growth revives, while ensuring inflation remains within target. The RBI introduced long term repo operations (LTROs) in February 2020 under which RBI provided long term liquidity to banks at lower than prevailing market interest rates to lower their cost of funding. The RBI conducted five LTRO auctions each of Rs.250,000 million between February-March 2020 which augmented system liquidity by Rs.12,51,170 million. During March-April 2020, the RBI conducted targeted LTROs (TLTROs) to provide relief to certain stressed sectors. Under this, banks were provided Rs.10,00,500 million for deployment in investment grade corporate bonds, commercial papers (CPs) and non-convertible debentures. RBI expanded the scope of eligible instruments used for this including from the mutual funds and NBFCs. TLTRO 2.0 was introduced to de-stress small and mid-sized corporates and NBFCs and micro-finance institutions. Subsequently, in October 2020, on tap TLTRO was introduced for Rs.10,00,000 million for deployment in corporate bonds, CPs and non-convertible debentures in five sectors. Later following the recommendations of the Kamath committee, the number of sectors were expanded to 26. The Reserve Bank undertook two six month USD-INR swaps of total USD 7 billion in March 2020 to infuse dollar liquidity.

During 2020-21 (upto February 26, 2021), RBI's Net OMO purchases amounted to

Rs. '3,04,7540 million consisting of both central and state government securities (Talwar et al, 2020). In order to reduce the steepness of the yield curve and compress the term premium, the RBI conducted simultaneous buying of long-term securities and sale of short-term securities. During 2020-21, the Reserve Bank of India conducted 19 such auctions of operations twists. This combination of OMOs and operation twists (OTs) softened yields and reduced cost of borrowing for Government of India.

The RBI acted as the lender of last resort for the all India financial institutions which were unable to raise resources during the weak financial conditions. The RBI started special refinance facility worth Rs.75,000 crore for financial institutions. During April 2020, the RBI also started a special liquidity facility worth Rs. 50,000 crores for mutual funds facing redemption pressures.

With respect to regulatory policies, substantial adjustments were made to take the stress off the small and mid-sized companies while keeping in mind the financial stability implications of the policies. All regulated lending institutions were permitted to grant a moratorium of six months on payment of all instalments falling due between March 1, 2020 and August 31, 2020. Existing loans to small and medium industries not exceeding Rs. 250 million were permitted to be restructured without a downgrade in asset classification. The LTV ratio for loans against gold and jewellery was increased from 75 per cent to 90 per cent. The date of implementation of the last tranche of capital conservation buffer was deferred until October 2021. The implementation of net stable funding ratio was also deferred till October 2021. Since the lock-down had limited on-site supervision, the off-site surveillance mechanism was enhanced. The Reserve Bank of India has taken proactive measures immediately after the outbreak of the pandemic to avoid any disruption to the payment system in the country. Regulatory forbearances were given towards easing the situation with the required caveats so that

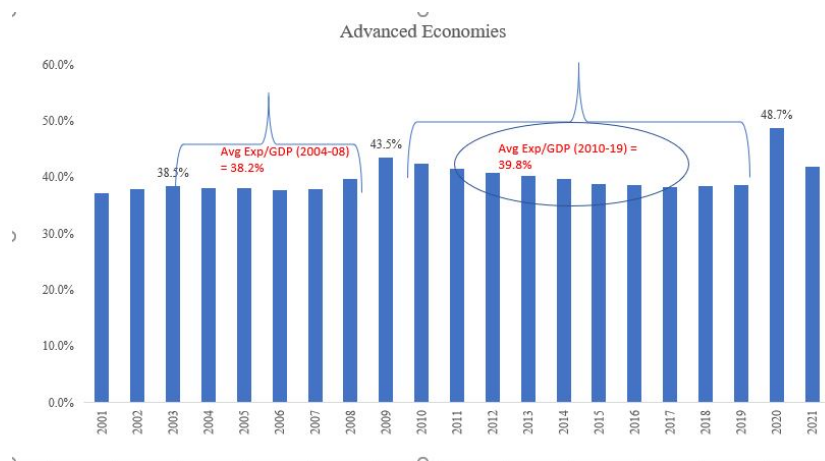


Figure 5: Fiscal Stimulus

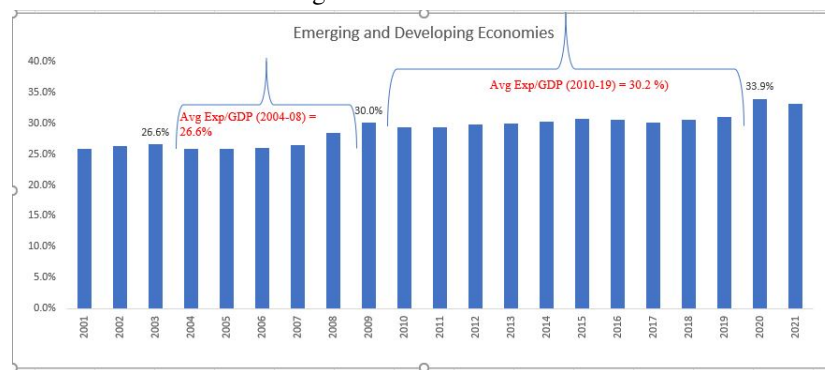


Figure 6: Fiscal Stimulus

only the genuinely distressed cases are placed under restructuring while the banking sector is ring-fenced from potential losses (BRICS Bulletin, 2020). Overall, the total policy stimulus package, including the liquidity and other measures undertaken by the Reserve Bank of India amounted to 15.7 per cent of GDP during 2020-21.

Amongst the recent measures, in order to provide liquidity support to the market, the RBI launched government securities acquisition programme called as G-SAP 1.0 and G-SAP 2.0. Under G-SAP 1.0, the RBI is committed to purchase Rs.1 lakh crore of bonds in the first quarter ending June 2021 in the secondary market. In the June 2021 bi-monthly statement, the RBI announced that it will conduct secondary market purchase operations worth Rs. 1.2 lakh crore. Further, the RBI announced a term liquidity-facility of Rs. 50,000 crore with tenure of up to 3 years, at repo rate, for ramping up COVID-related health infrastructure services. To mitigate the adverse impact of the second wave of the pandemic on certain contact-intensive sectors, the RBI, in June 2021, announced an on-tap liquidity window aggregating Rs. 15,000 crore, which will be open till March 31, 2022.

## **4 Impact of Policies**

India started showing signs of recovery from the Q2:2020-21. By Q3:2020-21, all sectors except trade, hotels, transport and communication exhibited positive growth rates. However, the contraction in trade, hotels, transport and communication sector had moderated significantly (Figure 7).

Signs of nascent recovery was also visible on the demand side. Real GDP increased by 0.5 per cent during Q3: 2020-21 and 1.6 per cent during Q4:2020-21 on the back of 2.7 per cent growth in private consumption (Figure 8).

High frequency indicators like growth in monthly automobile sales and domestic and international cargo are exhibiting traces of strengthening demand (Table 3).

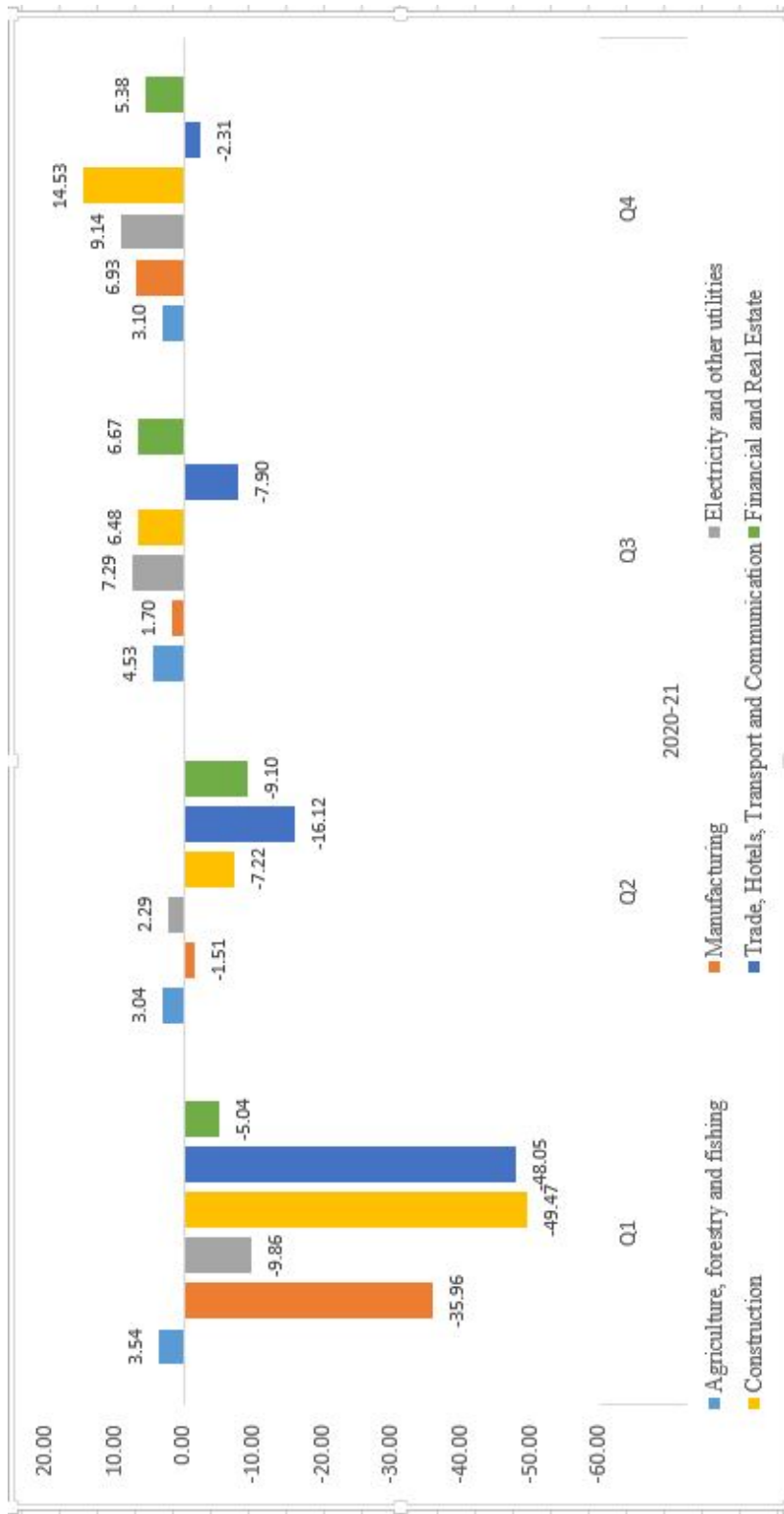


Figure 7: Aggregate Supply - Gross Value added by composition



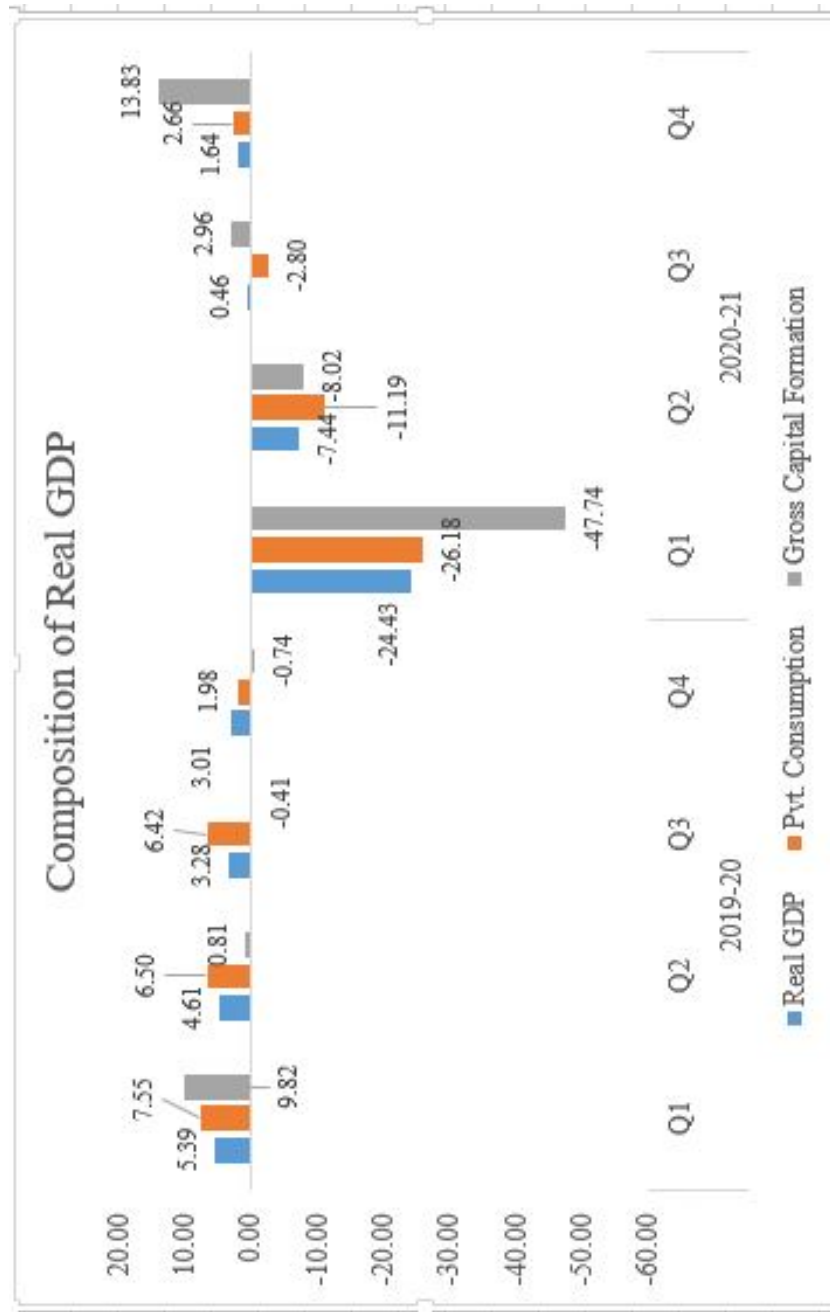


Table 3: High Frequency Indicators

	<b>Automobile Sales: SIAM: Passenger Vehicle</b>	<b>Registered Motor Vehi- cles</b>	<b>Passenger Traffic: Domestic</b>	<b>Passenger Traffic: In- ternational: All Airports</b>	<b>Cargo Traf- fic: Domes- tic</b>	<b>Cargo Traffic: International</b>
Mar-19	-4.02	-2.48	3.88	3.97	10.76	-0.94
Jun-19	-17.66	-9.75	-0.72	-0.34	-2.20	-6.51
Sep-19	-25.42	-8.45	1.59	0.25	2.48	-8.74
Dec-19	-2.88	-1.54	4.91	3.19	-1.01	-7.24
Mar-20	-26.35	7.44	-6.95	-19.41	-10.30	-13.54
Jun-20	-78.65	-69.98	-93.39	-96.69	-74.41	-57.29
Sep-20	-0.46	-23.75	-74.63	-89.36	-32.40	-23.00
Dec-20	4.57	-10.62	-49.83	-82.34	-9.87	-13.37
Mar-21	29.25	-17.39	-28.00	-68.65	5.21	0.73

Source: CEIC

Net sales in consumer goods segment is also recording robust growth (Table 4). Google mobility trends are showing signs of people returning to transit stations, work-places, parks and recreation facilities at least until end of March 2021 before the second wave intensified.

Table 4: Y-o-Y percentage change in Net Sales of Consumer Goods

	Mar-20	Jun-20	Sep-20	Dec-20	Mar-21
Cosmetics, toiletries, soaps & detergents	-11.0	-0.6	14.8	18.1	31.7
Leather & related products	-9.1	-51.6	-12.4	4.3	39.7
Footwear	-8.1	-50.0	-11.7	7.0	38.3
Other leather & related products	-12.2	-57.3	-14.0	-4.7	49.5
Gems & jewellery	-10.0	-85.9	-67.6	-45.6	49.6
Domestic appliances	-9.7	-57.3	3.4	27.4	40.8
Air-conditioners & refrigerators	-7.8	-59.5	-4.6	8.6	23.1
Consumer electronics	-4.9	-57.6	18.5	92.6	99.1
Other domestic appliances	-18.6	-49.5	8.8	29.8	57.0
Other consumer goods	-11.6	-46.4	-11.1	10.6	33.5

Source: Economic Outlook, CMIE

Evidence from data is substantiated by several empirical studies that have measured the effectiveness of policies during COVID-19. Talwar, Kuswaha and Bhattacharya

(2020) have found that LTROs and TLTROs had a more prolific impact on the money market than the bond market. They estimate that these auctions enabled commercial paper rates to ease by 259 basis points and softened yields on ten year government paper by 32 basis points and yields on 10 year corporate bond paper by 46 basis points. They also found that asset purchases programmes reduced term spreads by 29 basis points. Above all, both conventional and unconventional monetary policy measures have instilled confidence amongst market participants. These results have been seconded by several other international studies based on panel data of emerging and developing economies. Fratto et al (2021) have found that asset purchase announcements were more effective in reducing bond yields than conventional policy rate cuts. Rebucci, Hartley and Jimenez (2020) found that the impact of asset purchase programmes was larger for EMDEs than advanced economies. Chudik, Mohades and Raissi (2021) have found that had it not been for the fiscal stimulus packages, global growth would have been lower by 2 percentage points (IMF 2021). IMF (2020) found that without various social protection schemes, extreme poverty would have risen by 10 million people by the end of 2020.

This paper makes a humble contribution to the broad literature by evaluating the effectiveness of fiscal and monetary policies during these times of extreme uncertainty. Uncertainty is a critical variable that influences inter-temporal decision making. Economic agents adopt a wait and watch approach towards key decisions with respect to consumption and investment under uncertainty. During COVID-19 too, uncertainty peaked to historically high levels in most countries as may be gleaned from the global uncertainty index. It is probable that extreme times draw extreme reactions from economic agents. Economic agents may become more attentive to the outcome of government and central bank policies during uncertain times. They may respond positively to government spending program announcements by increasing current consumption be-

cause they realise that such programs reduce the uncertainty of future employment and income. It is equally possible that policies may uplift sentiments only for a short while without leading to any permanent outcomes. That may in fact depend on the composition of the government spending, credibility of fiscal and monetary institutions and the past experience of the government in public debt management.

## **5 Literature Review**

There is ample evidence in the literature to show that both fiscal and monetary policy are state dependent. Hubert (2019) documented that pass through of contractionary monetary policy into inflation depends on whether published inflation projections point towards an inflationary surprise or a deflationary surprise. He found that the tightening of policy interest rates signalled rise in inflationary expectations which had a positive impact on current inflation. Alpanda et al (2019) undertook an exhaustive analysis of state dependence of monetary policy. They find that monetary policy transmission is curtailed during recessions, high household debt and contractionary monetary policy. They observed that the credit channel of monetary policy is state dependent with respect to the business cycle, credit cycle and interest rate cycle. Changes in the fixed mortgage rate had a differential effect on debt service limit depending on the wages. Lippi et al (2013) looked at the distributional effects of anticipated monetary policy in a flexible price economy. The optimal policy under these circumstances is monetary expansions during recessions. To minimise the inflationary consequences of expansions, the paper suggests monetary contractions in good times. In a recent work, Bernstein (2021) has shown that the pass through of monetary policy to consumption is maximum when firm equity holders are unconstrained and which as micro evidence suggests coincides with periods of high output. Hence, they find conclusive evidence that monetary policy is more effective during booms than recessions. A subset of the literature has found contrarian evidence. They find monetary policy is more effective

at the zero lower bound (Gambacorta, Hoffmann and Peersman, 2014).

The state dependence of fiscal multipliers is widely debated in the literature. Christiano et al (2009), Woodford (2010), Auerbach and Gorodnichenko (2010) and Albertini et al (2020) produce convincing evidence of higher multipliers during recessions than expansions in line with the traditional keynesian theory. Using regime switching SVAR models and incorporating expectations, the latter found large differences between fiscal multipliers during times of slack and booms. Albertini and others (2020) argue that multipliers are higher during downturns because higher government purchases reduces unemployment and hence unemployment risk significantly during slack periods which reduces precautionary savings and elicits a larger response of private consumption. In sharp contrast, in a series of papers for the US, Ramey and others have found that the stimulative effects of government expenditure multipliers do not vary significantly according to the state of the economy (Owyang, Ramey and Zubairy, 2013, Ramey and Zubairy, 2018, Ramey, 2019). Ramey and Zubairy (2018) found multipliers were not above unity when unemployment is high or when policy rate is at the zero lower bound. With respect to tax policy, Fotiou et al (2020) found that a capital income tax cut is more effective when government debt is low than when it is high.

However, the literature has not looked at the dependence of fiscal and monetary policy multipliers on different regimes of economic uncertainty. We fill this gap in the literature by setting up an empirical model using local projections technique with economic uncertainty as the conditioning variable.

## **6 Methodology**

Our preferred approach is to use non-linear local projections (LPs) technique to work out the regime based multipliers as proposed by Jorda (2005). Fiscal multipliers are

calculated using Blanchard and Perotti method. The shock is simply given by current government spending and the set of controls which includes lagged measures of GDP and government spending. The specification is given as under.

$$Z_t' t+h = I_t' t-1 [\alpha_{A,h} + \psi_{A,h}(L)y_{t-1} + \Omega_{A,h}(L)g_{t-1} + \beta_{A,h}ExpShock_t] + (1 - I_{t-1})[\alpha_{B,h} + \psi_{B,h}(L)y_{t-1} + \Omega_{B,h}(L)g_{t-1} + \beta_{B,h}ExpShock_t] + \epsilon_t$$

Z is a vector of real country domestic product. ExpShock is the real government spending of the state, I is an indicator variable that takes the value of 1 when the economic uncertainty is increasing and zero otherwise. The coefficient  $\beta$  corresponds to the response of output at time t+h to the shock variable at time t.

In order to calculate impulse responses to monetary policy innovations, the ExpShock is replaced with interest rate shock in the above equation and the variable Z becomes a vector consisting of GDP and inflation.

Due to data limitations with respect to SAARC economies, the sample size for these economies is constrained to annual data from 2004-2020. A non-linear panel local projections model is estimated for these countries to estimate the fiscal and monetary policy effects respectively under the two regimes.

## 7 Data

Uncertainty index is the key variable in our model as the multipliers are calculated contingent on the uncertainty regimes. The data on uncertainty is sourced from the Baker-Bloom-Davis webpage on uncertainty index. The data on general government expenditure at constant prices, GDP deflator, interest rate and real GDP are obtained from CEIC and OECD statistics. For India, the estimation is undertaken at a quarterly

frequency.

Due to data limitations, the estimation approach towards SAARC countries is a bit different. Except for India and Pakistan, the economic uncertainty index (EPU) which is the benchmark conditioning variable in the model is not available for the rest of the SAARC economies. As a result, the EPU index had to be replaced with an uncertainty index constructed from google trends (G-trends) data for these countries. G-trends is an unbiased sample of google search data. It represents the search interest on a topic as a proportion of all searches on all topics on Google at that time and location. The data is anonymized, categorized, normalized and aggregated relative measure of popularity. Thus a measure of 100 would imply that the topic is at peak popularity at that time, while a measure of 50 would be interpreted as the topic being only half as popular at that time. Since all other relevant data for SAARC countries are available only at annual frequency, an annual index of uncertainty is constructed for the SAARC countries from 2004-2020 by aggregating the search interest of phrases like 'uncertainty' and 'uncertain' in these countries. A number close to 100 would mean high uncertainty. Further, the per capita GDP data and government spending data is available for different time periods for each of the SAARC countries. These limitations of data constrain the sample size from 2004-2020 for the SAARC countries and a non-linear panel local projections model with annual data is estimated for the SAARC countries. Data on government expenditure and GDP for SAARC countries have been obtained from the SAARCFINANCE database. Interest rates and price indices have been sourced from CEIC database.

## 8 Results

We find a clear distinction of the fiscal multipliers across economic uncertainty regimes. Contrary to theoretical assertion, we find that spending multipliers are higher during increasing uncertainty phases for India. The positive fiscal shock persists for only one year under increasing uncertainty.

Accommodative monetary policy under increasing uncertainty has a significant impact on GDP. GDP dropped on impact and then moved into positive territory on average by the quarter 3 and rose permanently thereafter. The response of inflation is muted until the second quarter, peaks by quarter 3 and then peters out by quarter 4 in case of India under increasing uncertainty. Negative interest shock, however, does not seem to be much effective in uplifting sentiments during decreasing economic uncertainty. For India, GDP increases on impact and then declines at most by quarter 4. Accommodative monetary policy under decreasing uncertainty on the other hand has a permanent positive impact on inflation with some price puzzle.

With respect to other SAARC economies, the response of output to a fiscal shock is muted in the short run but rises significantly in the medium term. Under decreasing uncertainty, however, output peaks by the first year and then gradually diminishes in impact.

With respect to accommodative monetary policy shock, under decreasing uncertainty, GDP remains muted for one year and then picks up and attains a peak by the third year in SAARC economies. Under increasing uncertainty, the impact of monetary policy shock is higher than that under decreasing uncertainty. GDP increases on impact and continues to increase until the 4th year. On the other hand, we observe price puzzle with respect to the response of inflation until the first year, irrespective of



the uncertainty regime. Inflation attains a peak by the second year under decreasing uncertainty. Under increasing uncertainty inflation response is erratic and volatile.

## **9 Conclusion**

COVID-19 had a deleterious impact on the world economy. SAARC nations have also come under the ambit of the outrageous virus although there is considerable heterogeneity in the country experiences. The Indian economy is showing signs of nascent recovery in terms of positive growth rate in real GDP during Q3:2020-21 and Q4:2020-21, upbeat google mobility trends and sundry other high frequency parameters like automobile sales and domestic and international cargo registering positive growth rates. The advent of the second wave during April-May 2021 might slowdown the pace of recovery but may not nip it in the bud completely given that people have learned to live with the times. The agriculture sector, which was the fulcrum of growth last year, will play a key role in advancing growth prospects this year. It is expected to perform well on the back of good monsoon predictions for this year. Strengthening global demand conditions due to the fast pace of vaccinations in advanced economies is likely to provide considerable boost to our export sector. Finally, with domestic vaccinations likely to speed up by the middle of this year, the economy may get back on track particularly the contact intensive sectors like trade, hotels and transport which provide employment to large sections of the population. Both fiscal and monetary policy have contributed significantly to the process of recovery so far under extreme uncertainty. Government's foresightedness in maintaining productive capacity to meet pent-up demand upon unlocking of the economy coupled with central banks' commitment to maintain liquidity and financial conditions in the economy in line with the accommodative stance is expected to bolster long term economic growth.

## Appendix

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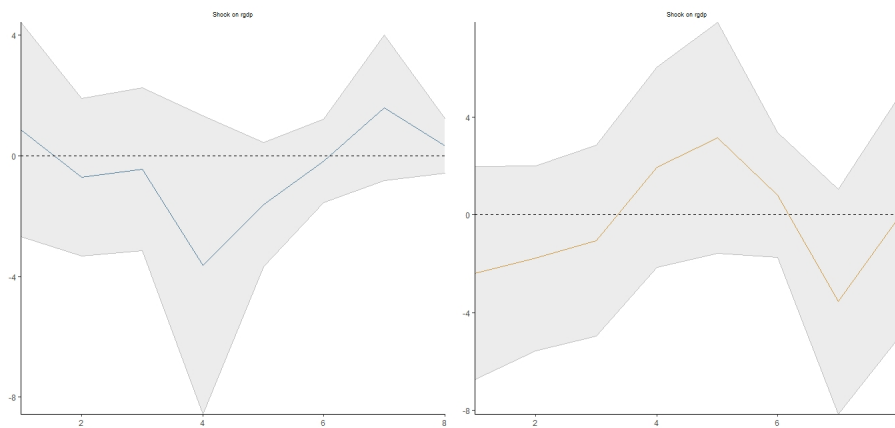


Figure 8: India - GDP Response to Expenditure Shock under (a) Decreasing Uncertainty (LHS graphs); and (b) Increasing Uncertainty (RHS graphs)

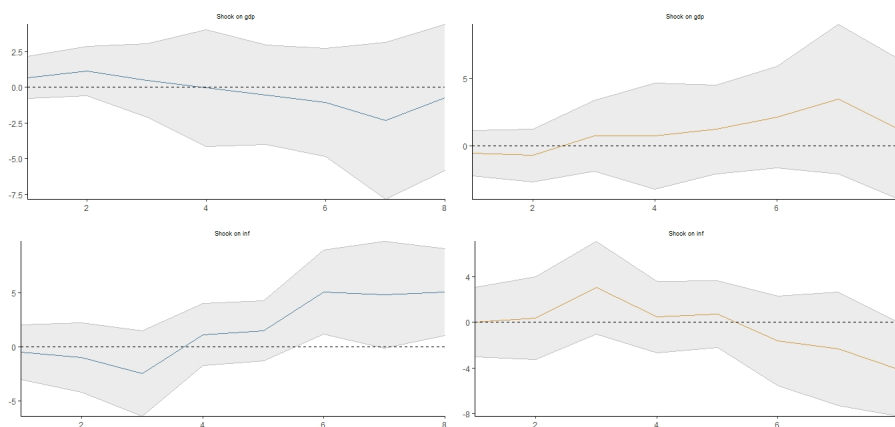


Figure 9: India - GDP And Inflation Response to Negative Interest Rate Shock under (a) Decreasing Uncertainty (LHS graphs); and (b) Increasing Uncertainty (RHS graphs)

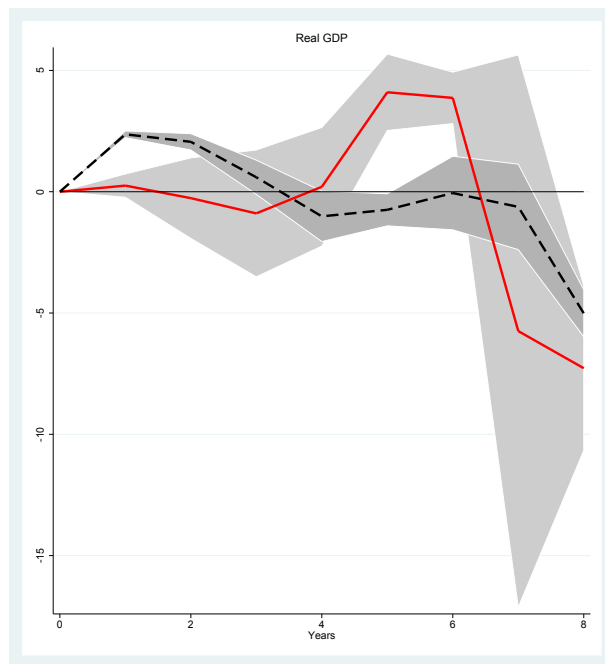


Figure 10: GDP Response to Govt. Expenditure Shock (BP shock) in SAARC countries under Increasing Uncertainty (Red solid line) and Decreasing Uncertainty (Dashed Blue line).



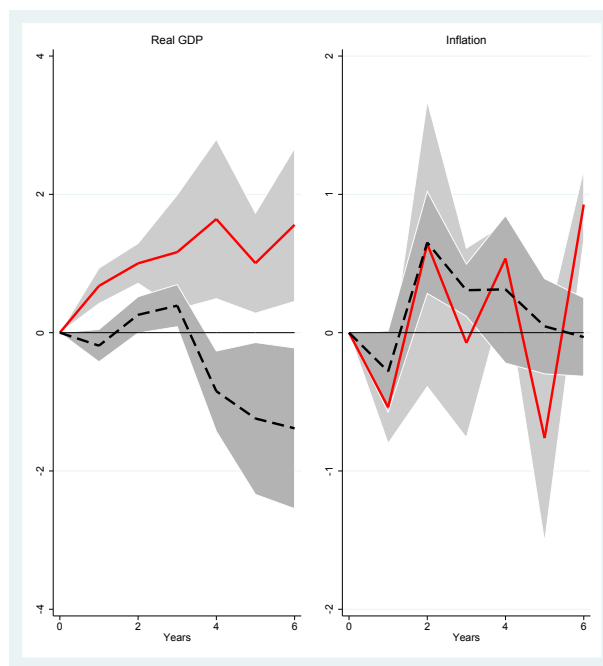


Figure 11: GDP and Inflation Response to Interest Rate Shock in SAARC countries under Increasing Uncertainty (Red solid line) and Decreasing Uncertainty (Dashed Blue line).