

Covid-II

Refer to important disclosures at the end of this report

Opportunity cost of sub-optimal vaccine strategy

- **A successful vaccine strategy is the cheapest policy path to economic normalization. The welfare cost of universal jabbing at 0.6-0.7% of GDP much lower than 0.9-1.0% loss of monthly economic output amid soft lockdowns. FY22 GDP forecast marked lower to 9.9% from 11%**
- **Our measure of optimal vaccine distribution state-wide suggests like UP, DL and TN have a much lower current share than required, whereas RJ, GJ and MH are receiving more.**
- **While 70% of universal population may be covered by Mar'22 nationally, the maximum fiscal cost of vaccination would likely be borne by UP and MP.**
- **Policy response should expand beyond health to target income support and labor dislocations**

Monthly output loss due to Covid-II widens to Rs1.25tn vs. Rs750bn seen in Mid-April

India's macro narrative has changed swiftly from being a linear V-shaped recovery in FY22 to being a story of a lost quarter. Amid states' evolving mobility guidelines and increasing geographical spread of virus, our bottom-up projections now suggest that **for every month of current localized lockdowns, the output loss would now be ~Rs1.25tn vs. Rs750bn as per the restrictions seen in mid-Apr'21**. The fall in secondary and tertiary sector capacity utilization varies between 10% and 40% among states. **This implies a monthly loss of GVA growth by ~90bps** and compares with: (1) **our mid-Apr'21 estimated loss of 50bps** and (2) **estimated loss of more than 5%pts in output growth per month during Covid-I lockdown**. Clearly, factors such as better adapted firms and policy response, stable financial conditions, vaccine drive, pent-up demand release and robust global growth spillovers create growth buffers. Assuming Covid-II peaks in May'21 and restrictions ease by Q2FY22, **we mark down our FY22 GDP forecast to 9.9% from 11% earlier**. We admit the situation is still in a flux, but as per current dynamics, we expect **Q1FY22 annualized growth to be ~16.5% vs. 22%+ estimated before the second wave**.

Average monthly supply gap of ~170mn jabs to cover universal population by CY21-end

Given the strong positive externalities, stepping up the vaccination drive remains the most viable and cheapest policy path to economic normalization. Our calculations suggest that **the cost of vaccinating all population would be 0.6-0.7% of GDP**, assuming no wastage and optimal distribution. This compares with 0.9-1.0% loss of monthly output amid soft lockdowns. However, vaccine decentralization and tiered-pricing come with its own challenges. The vaccination drive is skewed state-wise and has overall slowed substantially, with current 7dma rate of ~1.9mn shots, <50% below the peak ~3.7mn in Mar'21. **The supply gap is significant** and can only be resolved by production ramp-up. Even after assuming enhanced supply from Jul'21 and Nov'21, averaging 5.7mn and 6.6 mn jabs per day respectively, there will still be a supply gap of ~170mn jabs per month on an average, if India intends to cover universal population by Dec'21. **Our base case suggests that by Mar'22 and Jul'22, 70% and 100% of the universal population will likely be vaccinated**. The bull and bear case scenarios suggest a 5-11M early/delay in the trajectory, respectively.

Is there an optimal vaccination strategy to minimize socio-economic cost?

It is debatable whether decentralization, privatization or tiered-pricing of the vaccine is indeed the fastest or the best strategy to cover wider population, given state-wide socio-economic and bargaining disparities amid current vaccine production monopoly. The US, a free-market nation, also followed centralized negotiation and allocation of vaccines. However, health is a state subject in India.

Ideally, the vaccine distribution should be done as per the states' population share—implying each state's vaccination drive gets aligned to the national average timeline. Preferring economically important states/districts may not be socially cost-optimal as human life has to be treated equal. However, targeting low-hanging fruits could still give optimal results, say focusing on urban areas with higher cases and population density (implying higher risk of contagion), which also incidentally have better infra for vaccination administration. **We tried estimating the optimal state share by creating a weighted distribution measure based on parameters such as population and its density, urban-rural ratio, current R-factor, and active cases and death load**. Our measure suggests that states like UP, Delhi and TN have a much lower current share than they need, whereas Rajasthan, Gujarat and Maharashtra are receiving relatively more.

Please see our model portfolio (Emkay Alpha Portfolio): [Nifty](#)

This report is solely produced by Emkay Global. The following person(s) are responsible for the production of the recommendation:

Madhavi Arora
madhavi.arora@emkayglobal.com
+91 22 6612 1341

Hitesh Suvarna
hitesh.suvarna@emkayglobal.com
+91 22 66121205

Key highlights:

- **Monthly loss of GVA growth by ~90bps as per current restrictions v/s 50bps in Mid-April. FY22 growth downgraded to 9.9%**
- **Base case- by Mar'22 and Jul'22, 70% and 100% of the universal population will likely be vaccinated**
- **Our optimal measure of vaccination share measure suggests UP, Delhi and TN should get more share of supply ahead**
- **Total cost of vaccination drive in a no wastage scenario is ~0.6-0.7% of GDP.**

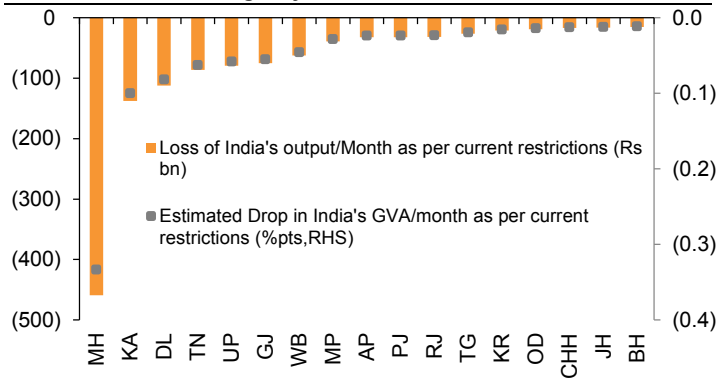
General govt. fiscal cost of vaccination ~0.3% of GDP; State-wise UP and MP to pay the most

We estimate the **total cost of vaccination drive in a no wastage scenario is ~0.6-0.7% of GDP**, of which states would bear 0.25% of GDP and private sector ~0.4% of GDP and Centre bears the least cost. This assumes (1) states and the private sector share the vaccination burden of 60% and 40% population of 18-44 and sub-18 age group respectively, and (2) the Centre covers 70% of the 45+ population in each state and the rest will be taken up by the private sector.

For states, the **fiscal burden of vaccination** would vary as per their population and its distribution skewness toward the sub-45 age group. Our cross-state assessment of vaccination cost shows that UP and MH are likely to bear the maximum absolute cost, while seen from the lens of each state's gross output, states like **UP, MP and Chhattisgarh lead the pack**. We note that **the average health spending by states is still less than 1% of SGDP** (FY22BE ~0.8% of SGDP -- ~5.4% total states' expenditure). The vaccination cost bump-up can however be borne easily as consolidated **state GFD/GDP stands at ~3.3% of GDP** (vs. the deficit cap is 4% of GDP) —giving them breather to loosen their purse strings. However, states' response should expand beyond health to giving tailor-made income support managing labor market dislocations whose reallocation to the rural sector is sub-optimal and is a deadweight loss to the economy.

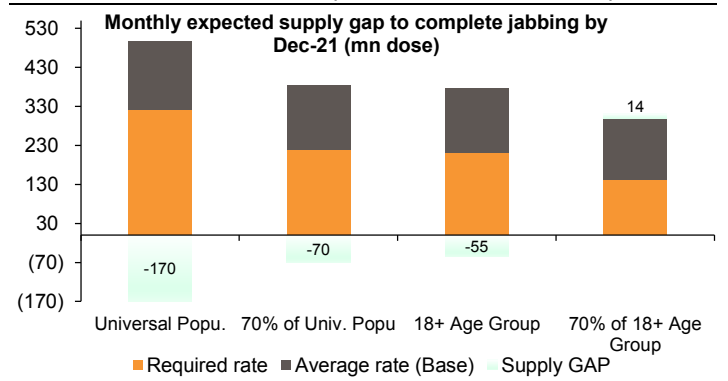
Story in key charts

Exhibit 1: Estimated loss of output per month state-wise as per current state-wise stringency



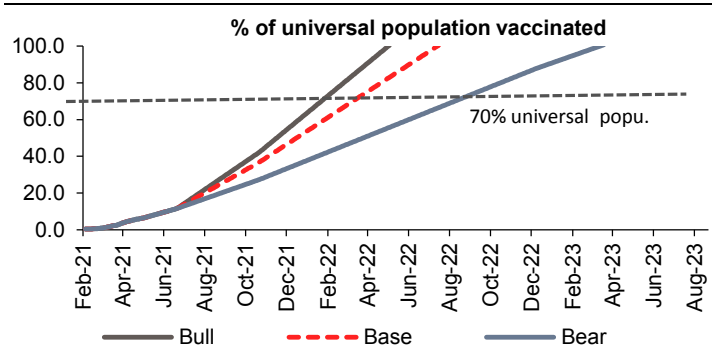
Source: CSO, Emkay Research

Exhibit 2: Supply gap for vaccinating 70% of universal population by Dec'21 is ~70 mn doses/month (cumulative ~500 mn doses)



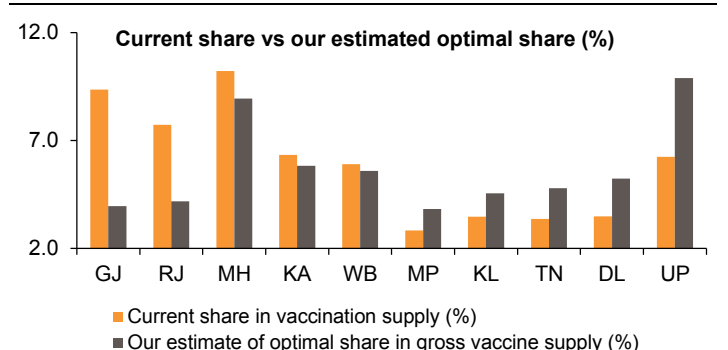
Source: Emkay Research

Exhibit 3: Realistically, 100% of universal population can only be covered by Jul'22



Source: Emkay Research Estimates

Exhibit 4: State-wise UP needs to be allotted more than the current share for optimal vaccine strategy



Source: Emkay Research Estimates

Exhibit 5: Vaccination timeline for major states

Based on	MH	UP	KA	G J	WB	DL	MP	CHH	KL	RJ	All India (our base case)
Current Vaccination share of total current supply											
Total Population	May-22	Jul-22	Apr-22	Feb-22	Jul-22	Feb-22	Jul-22	Feb-22	Jan-22	Mar-22	Jul-22
18+ Population	Feb-22	Mar-22	Jan-22	Nov-21	Mar-22	Dec-21	Mar-22	Nov-21	Nov-21	Nov-21	Mar-22
Current active cases share of current national cases											
Total Population	Jan-22	Jul-22	Oct-21	Jul-22	Jul-22	Feb-22	Jul-22	Feb-22	Sep-21	Jul-22	Jul-22
18+ Population	Nov-21	Mar-22	Sep-21	Mar-22	Mar-22	Dec-21	Mar-22	Nov-21	Aug-21	Mar-22	Mar-22

Source: Emkay Research estimates

Table of Content

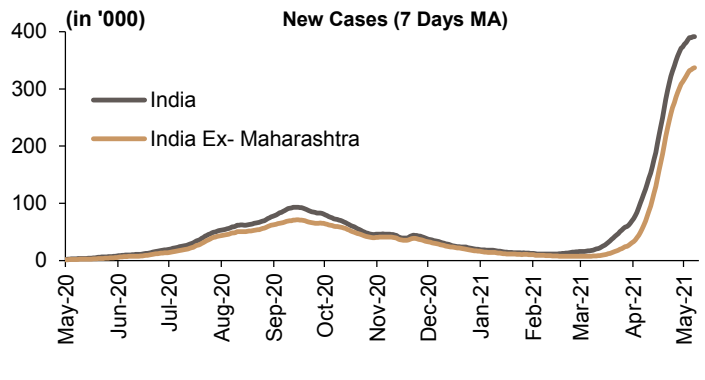
The second wave putting spoke in the economy's wheel.....	4
Gauging the economic cost of Covid-II	6
■ <i>Economic cost of Covid-II less enduring and less painful?</i>	
■ <i>Marking down growth by ~110bps</i>	
Vaccination progress remains key, still long way to go	10
■ <i>The skewness of State-wide vaccination drive</i>	
Is there an optimal vaccination strategy?	14
■ <i>Centralisation of vaccine negotiations and/or ideal (if any) state-wide distribution?</i>	
■ <i>Case study: The curious case of Maharashtra</i>	
The Cost of vaccination: Who bears what?	18
■ <i>Inter-state vaccine maths suggests UP and MP to bear the highest cost</i>	
■ <i>What should be the ideal economic response beyond the vaccine mandate?</i>	
Appendix	23
■ <i>State- and district-wide vaccination snapshot</i>	
■ <i>Sector/industry assessment post the Covid wave</i>	

The second wave putting spoke in the economy's wheel

The new Covid cases seem to have peaked if seen by last couple of days' data, but the wave has indeed spread geographically from being more concentrated in early April. India's changed macro narrative amid Covid-11 suggests every month of current localized lockdown/restrictions, the output loss would now be ~Rs1.25tn vs. Rs750bn, as per the restrictions seen in mid-April. We mark down our FY22 GDP forecast to 9.9% from 11% earlier. That said we expect the Economic cost of the second wave less enduring and less painful than Covid-1

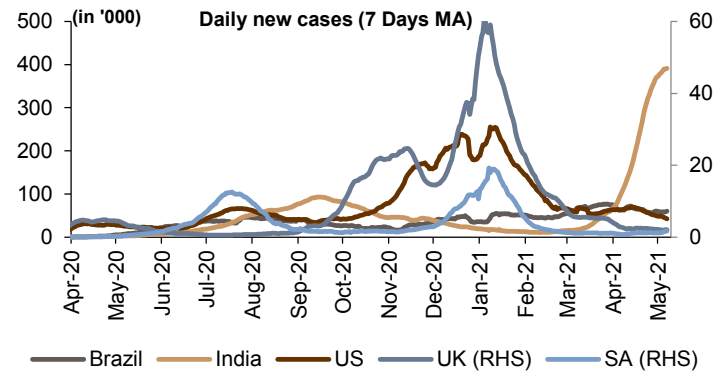
The dramatic resurgence of Covid-19 in India risks disrupting prevailing macroeconomic trends. It didn't take too long for the macro narrative to change from a linear V-shaped economic super growth to talks of a lost quarter and a supposed W-shaped recovery. The number of active cases have multifold to above 3.7mn from sub 200,000 in early Mar'21, with faster proliferation and sharp pick-up in the positivity rate. Worryingly, the second waves in several countries (UK, US, Brazil, South Africa) have also been far more acute, with higher chain of transmissions as well. In India, the current doubling rate is nearly 36 days and the reproduction factor (R) is close to 1.2, implying that an infected person is infecting 1.2x more persons. However this has improved from the highs of 1.5 in Mid-Apr'21. Around 13 states currently have the R factor greater than the national average, with Assam and AP topping with the R factor at 1.5+ as on May 6. The positivity rate (new cases per 100 tests) has jumped, and at 22% it is the highest since the beginning of the pandemic, with the first wave peaking at 12.7%.

Exhibit 6: India's second wave 3X of the first one in Sep'20...



Source: CEIC, Emkay Research

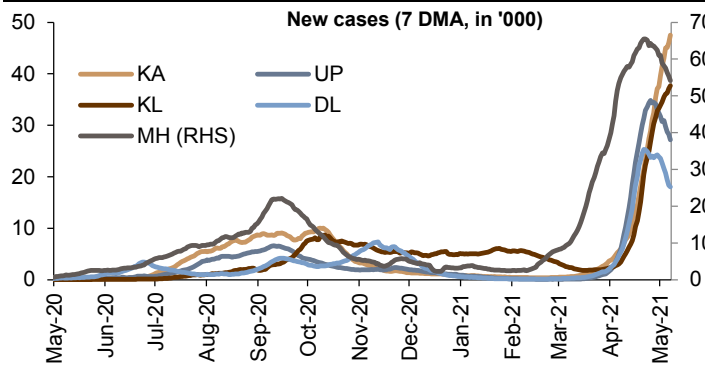
Exhibit 7: The second wave acute globally; India being no different



Source: CEIC, Emkay Research

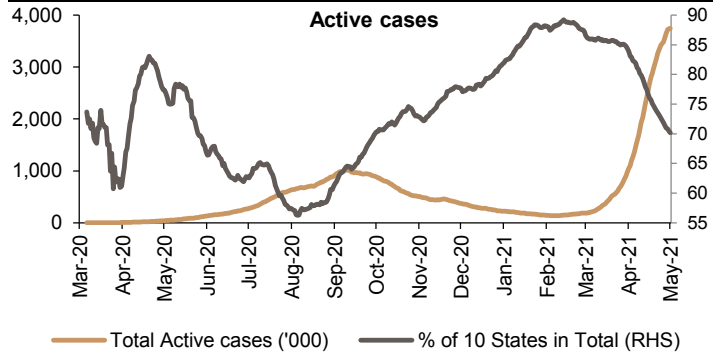
The wave is spreading geographically as well, defying the earlier notion that the second wave is more concentrated than the first wave. Maharashtra, which accounted for 60% of new cases in mid-Apr'21, now accounts for just 13% of cases. Our cross-state assessment shows the Top-5 states now account for 46% of cases vs. 70% a month ago. The Top-10 states currently constitute ~65% of new cases, and when compared to the peak of the first wave (mid-Sep'20), the Top-10 states constituted 60% of the total new cases. Comparing the peaks, we note that new cases in the second wave (7th May'21) in Kerala and Rajasthan are 8.8 times higher than the new cases seen in the first wave peak (17th Sep'20). The trend is similar in other states as well: Gujarat – 8.1 times, West Bengal 4.8 times, Karnataka - 4.8 times.

Exhibit 8: New cases in MH peaking; KA, KR testing new highs



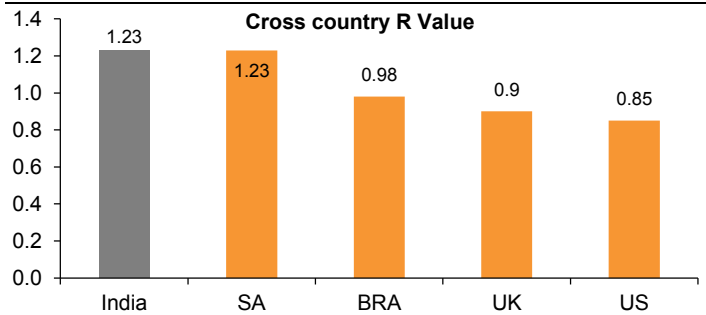
Source: CEIC, Emkay Research

Exhibit 9: Top 10 states' share falls, indicating broad-based spread



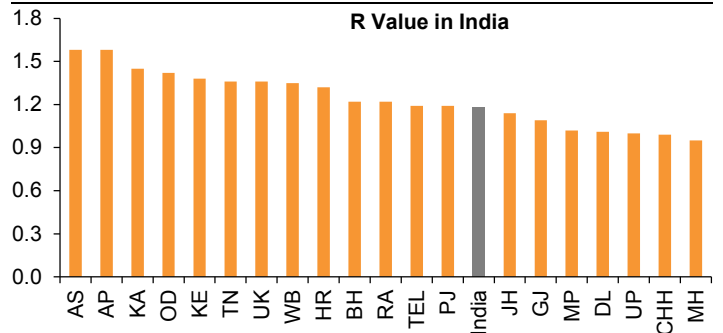
Source: CEIC, Emkay Research

Exhibit 10: India's R factor higher than most even as it falls



Source: Our world in Data, Emkay Research | As on 5th May 21

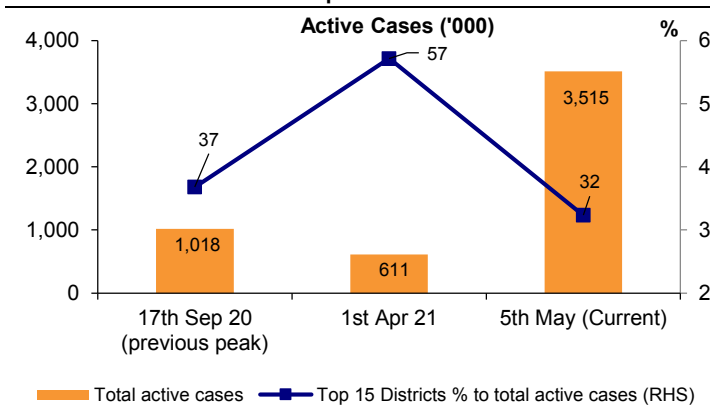
Exhibit 11: Assam and Kerala lead the R factor currently



Source: Univ of Michigan, Emkay Research | As on 6th May 21

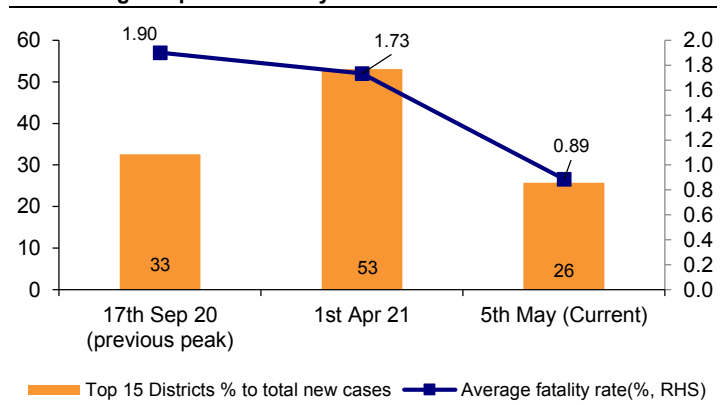
The district-wise geographic spread has widened as well since Apr'21. Cases remain urban-centric with Top-10/15 districts accounting for more than ~45%/60% of active cases now vs. 25% cases during the peak of the first wave. However, rural penetration has been steadily increasing as well. The share of rural districts in new cases stands above 42% currently vs. ~36% in Mar'21 and ~44% in peak in Sep'20.

Exhibit 12: One-third of the active cases concentrated in Top-15 districts in both the Covid peaks



Source: covid19india.org, Emkay Research

Exhibit 13: New cases also depict the similar concentration; but average "reported" fatality rate has fallen



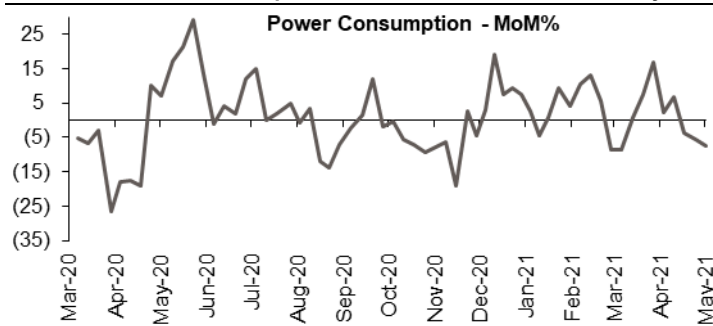
Source: covid19india.org, Emkay Research

Gauging the economic cost of second wave

The current policy approach to Covid management has resisted imposing blanket lockdowns and chosen circuit breakers in the form of partial and/or local/statewide lockdowns, given that the recovery is still nascent from the effects of the first set of lockdowns. Of course, Maharashtra leads the pack on restrictions followed by Delhi, given the intensity of active cases, but we are now seeing broad-based restrictions in most states. However, with health infrastructure being overwhelmed, it is merely a matter of time that other large states like Bengal and UP follow even tighter restrictions. Still, compared to last year, lockdowns this time are expected to be shorter, less stringent, and staggered over the quarter as the virus progressively pressures different states. But stepping up the pace of vaccination with intensity in districts where cases are surging will need to be a critical part of the response this time around.

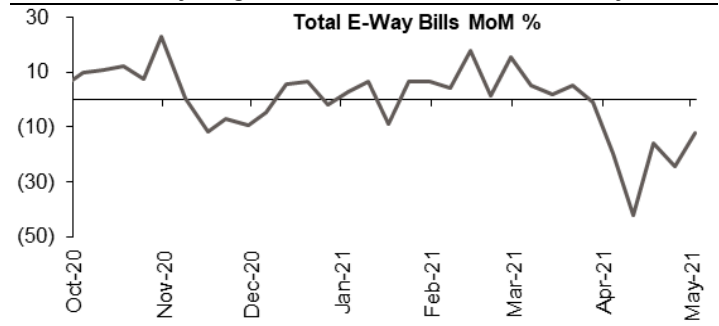
In terms of activity indicators, the Oxford Stringency Index has increased over the last few weeks but remains well below Q1FY21 levels. The mobility related activity indicators are showing a significant dip. However, there is heterogeneity in state-wide mobility trends amid different degrees of restrictions. Over the last month, recreational mobility is down 70% in Chhattisgarh, Maharashtra, Delhi, Karnataka, 60% in Uttar Pradesh, Kerala, Gujarat; 60% in Tamil Nadu with new lockdown and 50% in WB. Overall, Google retail and recreation mobility has fallen from Feb'21 and is at 30% below pre-pandemic levels. Meanwhile other indicators like e-way bills, electricity demand, state of rural and urban employment are showing slowing trends.

Exhibit 14: Power consumption has fallen 8% mom as on 1st May 21



Source: POSOCO, Emkay Research

Exhibit 15: E-way bill generation fell 12% mom as on 2nd May 21



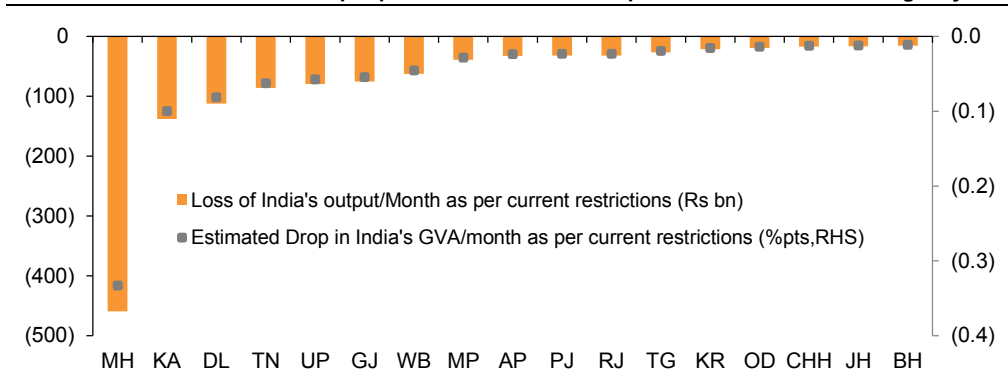
Source: GSTN, Emkay Research

Specifically, for Maharashtra, the state that contributes close to 14% of India's output, the current restrictions will curtail a tad more than a quarter of economic activity, again concentrated on tertiary sector while the secondary sector is relatively less impacted compared to the last wave. Maharashtra, being an industrial state, has 18% share in India's manufacturing, while trade and hotel and T&C form 9% and 15%, respectively, of India's sectoral share. As per ASI, 11% of India's industrial units and 20% of industrial profits come from Maharashtra, with the Konkan region and Pune having the highest number of industries. Our estimates suggest the current **Maharashtra restrictions would shave off 33 bps from full-year India GDP for every month the restrictions continue.**

Economic cost of the second wave less enduring and less painful?

Our bottom-up projections against respective states' current guidelines suggest that around Rs1.25tn worth of gross output will be impacted based on one month of localized lockdowns/restrictions, out of which ~45% is coming from Maharashtra. The assumptions of **loss of output would vary between 10% and 40% for the sub-sectors for each states**, depending on the extent of restrictions and extent to which their output would be affected by the lockdown. Any extension of the same will result in further loss of output from states. **This would lead to a monthly loss of GVA by 90 bps** from the projected FY22 levels for the overall domestic economy. This compares with: (1) **our mid-Apr'21 estimated loss of 40 bps** and (2) the first wave where the lockdown was nationalized and severe and would have intuitively led to loss of more than 5 percentage points in output in just one month.

Exhibit 16: Estimated loss of output per month state-wise as per current state-wise stringency



Source: Emkay Estimates, CSO

The impact on the tertiary sector will likely be maximum. Even as the secondary sector’s value-added technically may not be impacted as industries are allowed to operate, some movement restrictions, restrictions on the sale of non-essential goods in some states and overall weaker demand would keep capacity utilization of the manufacturing sector 10-25% lower than the usual one.

We reckon the situation is still very fluid as states continue to evaluate their case load peaks. However, the economic impact this time around is likely to be: (1) much more heterogeneous as each state has been hit to a different degree and has different health infra and mobility rules, (2) more asynchronous and staggered as different states will be hit at different points in time as the R factor continues to evolve and virus goes wider in spread, but (3) hopefully less enduring than the first wave, albeit the pace of vaccination drive remains key.

Exhibit 17: Current Covid related restrictions guidelines for various states

State	% Share in Total India GVA	Restrictions
Maharashtra	14.2%	All districts; Stricter restrictions imposed from Mid-Apr'21, except medical and essentials. Inter-city movement will be subject to 14 days home quarantine. Govt and Pvt office (essential only) to function at 15% capacity. This comes after 15 days of Sec 144 on Weekdays,
Delhi	4.0%	Lockdown announced till at least Mid-May, except essentials. Public transport at 50% capacity. Commercial establishments to remain closed
Odisha	2.7%	Night Curfew in urban areas; 10 out of 30 districts
MP	4.0%	Full lockdown imposed in state till May 15, essential services to continue. This comes after curfew till 30th Apr. Govt and Pvt offices to function at 10% capacity, except essentials. Social and Religious gathering banned
Punjab	2.7%	Weekend Curfews; Urban districts impacted; Night curfew, malls restrictions
Karnataka	7.6%	Full lockdown till May 24; Previously Weekend and night curfews, but were tightened in late Apr
Chhattisgarh	1.7%	Complete lockdown with only essentials allowed till April 19. Industrial and construction units will be allowed to function if they provide accommodation to the workers
Gujarat	8.2%	Most districts see night curfew; Restrictions on public gathering
Andhra	4.6%	Partial lockdown/curfew for 14-days from May 5; Complete lockdown in one district
Rajasthan	4.8%	All districts impacted; strict lockdown from May 10 to May 24. Other essential activities allowed. This comes after imposition of night curfew in late April. Govt offices(except some dept), malls, commercial establishments, workplaces to remain closed. Factories and construction exempted.
Bihar	3.0%	Partial lockdown till at least Mid-May. Essential services will be exempted. Certain restrictions on restaurants and movie theatre. Shops open till 7 pm.
Kerala	3.7%	All districts ; Partial lockdown with only essentials allowed till May 16; This comes after soft night curfew till April end
UP	8.3%	Partial 'corona curfew' till May 17; All essential services will be allowed, however, people would need an e-pass for intra-district and inter-district travel.
Tamil Nadu	9.0%	Complete lockdown from May 10 to May 24; Essentials, ration stores etc. allowed
Telangana	4.4%	Night curfew (9pm to 5 am)imposed
HP	2.2%	Curfew imposed. 5 day week for Govt offices at 50% capacity , commercial establishments remain closed on weekend, public transport at 50% capacity
WB	5.8%	50% attendance in state govt/pvt offices, Closure of schools, malls, gyms, cinema, parlours
Jharkhand	1.6%	shops will remain open till 2 pm and people will be allowed to travel till 3 pm
Uttarakhand	1.4%	Covid Curfew May10-18; so far they were following night curfews

Source: Media reports, Emkay Research

Growth impact to remain largely limited to Q1FY22; marking down growth by ~110bps

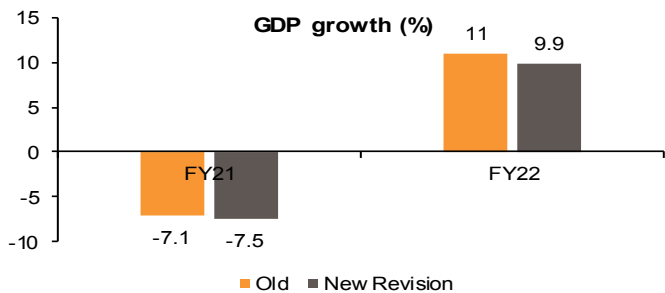
Going by the current dynamics, Q1FY22 would see a sequential negative print, but YoY would still be ~16.5% vs. 22%+ as per our initial forecast. For now, assuming Q1FY22 sees the maximum heat as Covid-19 cases peak in May'21, we mark down our real GDP forecast to 9.9% from 11% earlier. Upside risks have vanished but downside ones on overall growth would be contingent on how things evolve. The risk of spillover of Q1FY22 to Q2FY22 is there; however, much like last year, H2FY22 would be a catch-up period. Thus, assuming once the second wave subsides and as larger proportion of the population are vaccinated, pent-up demand could push GDP growth back up. But that is likely to be delayed to H2FY22, albeit some part of lost demand in services will not be compensated for.

That said, we understand it is too nascent to gauge the true impact of the second wave on macro variables. We believe that the impact is unlikely to be of the same magnitude as last year for below reasons:

- (1) **Firms are more experienced:** A segment of the economy has already adapted to the new post-Covid normal. Firms are more experienced, including the semi-organized and unorganized ones, and there has been a relatively smooth transition into pandemic-sensitive methods of working.
- (2) **The vaccination drive continues its traction:** This variable remains key and we discuss this more in details below. With the private sector sharing the burden of vaccination, in our base case scenario, we expect 100% of the total population to get vaccinated by Jul'22 and 70% by Mar'22. Studies have shown that we would need 65-70% of the population to be immune to keep the rate of infections down (“*achieve herd immunity*”) without restrictions on activities. The faster the vaccine traction, the faster would be the delinking between mobility and virus proliferation.

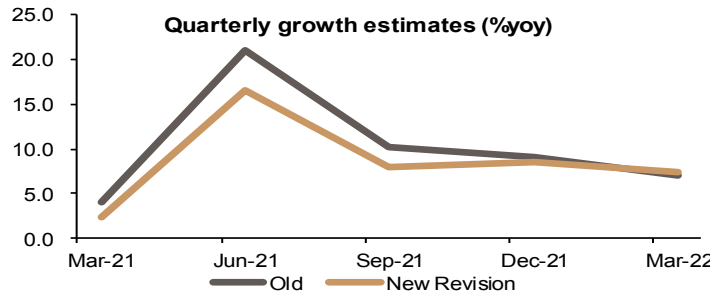
- (3) **Policy reaction functions better equipped:** Policy makers are more experienced on the Covid-19-led policy reaction front. Revenue spending trends ex interest payments are much better. The government has also decided to frontload spending and borrowing in H1 to limit the adverse impact on growth. Besides, financial conditions are more stable and have not been tightened despite the surge in cases. Accommodative domestic monetary policy is also likely to help the recovery.
- (4) **Positive global spillovers:** This time around the global growth backdrop is much better even with the West having endured successfully the second (and third) wave much before India. The growth traction in major economies like the US, Europe and China will have spillovers.

Exhibit 18: FY22 GDP growth revised to 9.9%...



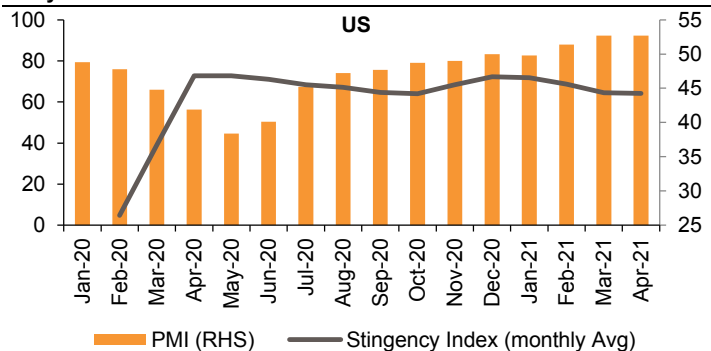
Source: CEIC, Emkay estimates

Exhibit 19: ...with major bump down seen in H1FY22



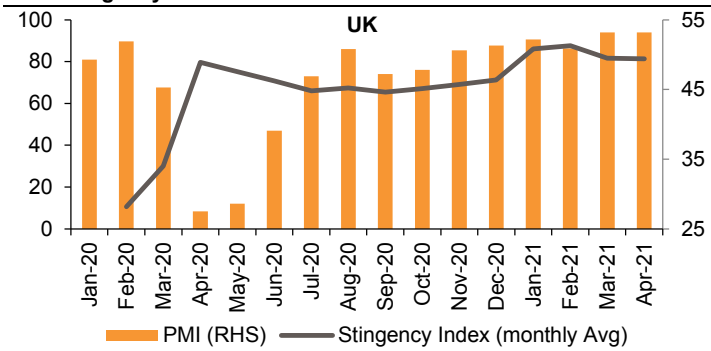
Source: CEIC, Emkay estimates

Exhibit 20: Higher stringency/new waves did not deter US growth story



Source: CEIC, Bloomberg, Emkay Research

Exhibit 21: UK also enjoys traction despite new waves and stringency



Source: CEIC, Bloomberg, Emkay Research

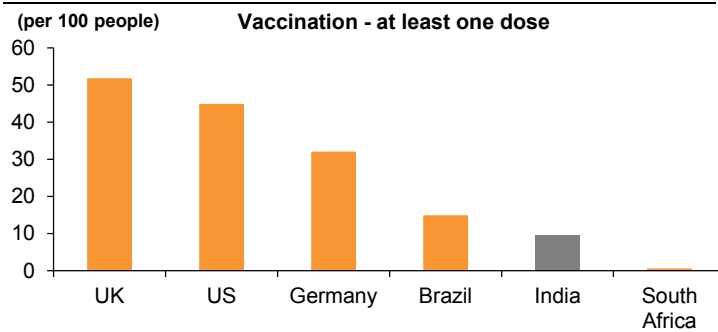
Our sector channel checks tried to seek clarity on the extent of business/demand impact and supply chain issues amid the Covid-19 wave. We reckon even as industrial sector restrictions or movement of goods have not been restricted, there has been a fall in capacity utilization to the tune of 15-20% and there has been a loss of final sales in sectors like Auto. Sectors like IT, and banking seem better-poised to weather the second wave. Our sector analysts do not see much deeper or protracted impact of localized lockdowns and see the expected recovery being delayed and not denied. *Please see Appendix for our sectoral view on the post Covid II wave.*

Vaccination progress remains key, still long way to go

We estimate the cost of vaccinating all population would be 0.6-0.7% of GDP, assuming no wastage and optimal distribution. However, vaccine decentralization and tiered-pricing come with its own challenges. The vaccination drive has overall slowed substantially. The supply gap is significant and can only be resolved by production ramp-up. Even after assuming enhanced supply from Jul'21 and an average of 5.6mn jobs per day, there will still be a supply gap of ~170mn jobs, if India intends to cover universal population by Dec'21. Our base case suggests that by Mar'22 and Jul'22, 70% and 100% of the universal population each will be vaccinated. The bull and bear case scenarios suggest a 5-11M early/delay in the trajectory, respectively.

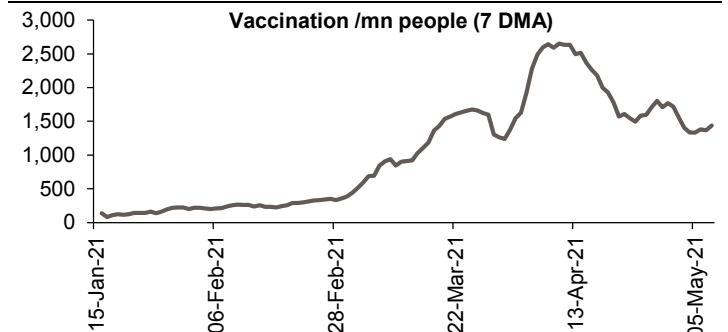
Given the strong positive externalities from vaccination, stepping up the vaccination drive remains the most viable and cheapest policy path to economic normalization. This, along with private sector participation, could further boost the process. Additionally, the subsidized vaccine costs would also help in preventing pricing from becoming a source of vaccine hesitancy. However, dual pricing (public vs. private sector) will also come with its own challenges. Besides, the supply gap is still significant and needs ramping-up of production.

Exhibit 22: India lags with vaccination of 9.6 per hundred vs. 52 in UK



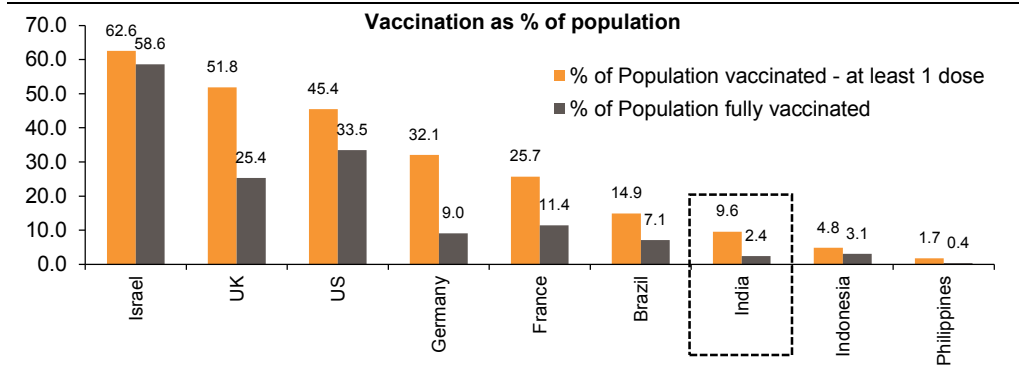
Source: ourworldindata.org, Emkay Research | Note: As on 7th May 21

Exhibit 23: ...and the pace has slowed in recent weeks



ourworldindata.org, Emkay Research

Exhibit 24: India managed to fully vaccinate only 2.4% of its population, Israel leads with 58% followed by US with 33%



Source: ourworldindata.org, Emkay Research | Note: As on 7th May 21

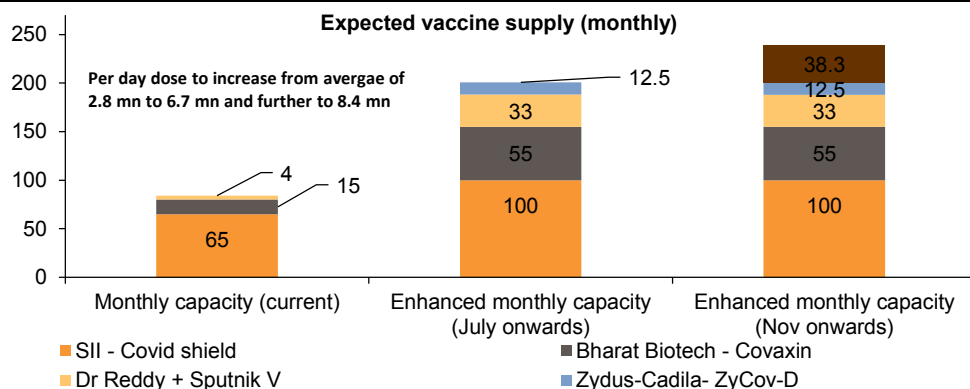
Regarding the pace of vaccination, as per Census estimates for 2021, about 68% of India's population is above 18, i.e., technically eligible for Covid-19 vaccines as per current guidelines. In order to cover this entire bracket, India needs 1,840mn doses of the vaccine (at two doses per person) and to cover the entire country's population ~2,750mn doses are needed. To cover 70% and 50% of the eligible population, this requirement reduces to 1,300mn and 930mn doses, respectively, assuming no wastage. As on Apr'21-end, 152mn doses had been administered (~90% of them being produced by SII), thus ~1700mn+ doses are required to cover the current eligible population. (out of which 17.9 mn doses have been covered in the month of May so far) While the policy focus at this point is only 18+, we think if the pace of vaccination production paces and appropriate approval secured, six months down the line the states may open the gates for sub-18 age group as well.

We have tried to chart a path of vaccination going forward for Centre and states. Since the situation is dynamic with reference to factors like vaccine capacity, new approvals and its timing, we have done the scenario analysis.

Key assumptions

- Current monthly production vaccine capacity of 84mn is largely led by three vaccines so far (SII's Covishield providing 85-90% and Bharat Biotech's Covaxin providing the rest 10% and marginal supply of 4 mn doses of recently approved of 'Sputnik V'.
- While few vaccines are in trial or still to enter India, we have considered three vaccines only for supply estimation for various scenarios till Jul'21. Post Jul'21, supply can be enhanced in the next 2 months (including "Sputnik V" with 30-70mn to be imported per month) and another fourth vaccine (ZyCov-D) is also considered with 13mn doses per month. With enhanced capacity for each producer, Jul'21 onward the supply trajectory enhances to total 200mn doses per month. Nov'21 onwards we have considered additional ~38 mn doses to account for the new vaccines which are in approval phases, taking the total monthly production to ~240 mn doses.
- On a daily basis, post Jul'21, the rate of administration is assumed at 5.6mn doses per day vs. the average of around 2.8mn per day till Jul'21, which would increase to 6.5mn per day from Nov'21. Our calculations also assume that six months down the line, states may open the gates for sub-18 group as well. We also assume no wastage of vaccination in our scenarios.

Exhibit 25: Covishield to supply 40% Nov'21 onwards from 90% currently

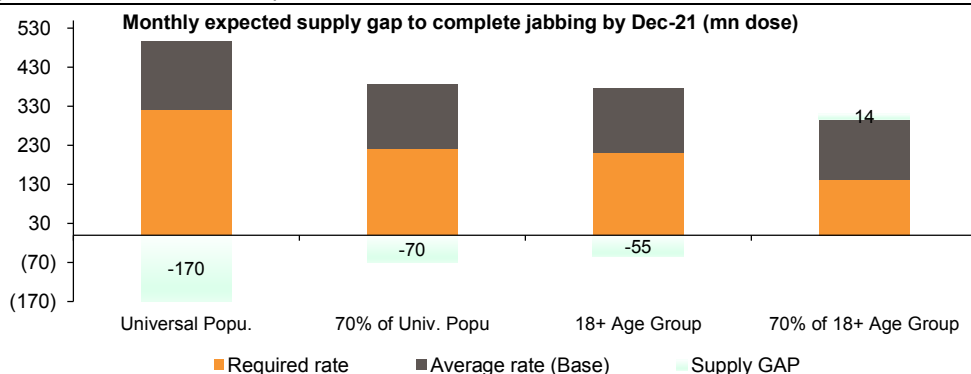


Source: Various media reports, Emkay Research estimates

Key takeaways

- Supply gap of ~170mn monthly average jabs if India intends to cover all population by Dec'21:** Our scenario analysis suggests that if India sticks to the run rate of average 5.6mn to 6.5 mn jabs a day (more than 2x of the current pace of 2.8mn assuming accelerated supply Jul'21 onward), 70% of the currently eligible 18+ population and roughly 47% of the total population (including 0-17+) can be covered by Dec'21. However, the required rate to complete 'jab for all population' by Dec'21 has to be 2x of average assumed pace of 5.6mn, and ~1.3x of average assumed pace for 18+ eligible population.

Exhibit 26: Supply gap for vaccinating 70% of universal population by Dec'21 is ~53mn doses/month (cumulative ~500 mn doses)



Source: Emkay Research estimates

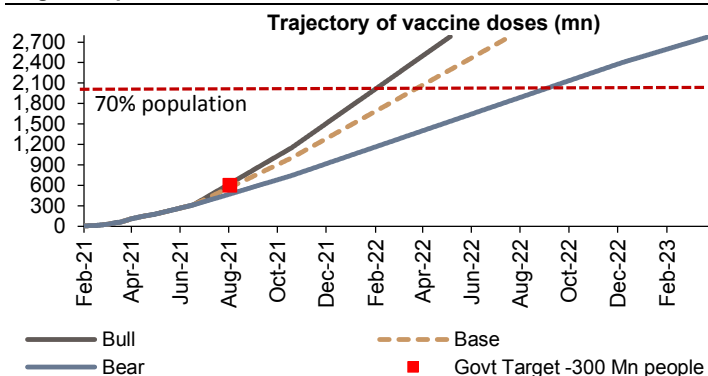
- A realistic pace of vaccination would mean universal population coverage by Jul'22** while a slower pace (bear case) could delay by 6-8 months. This, of course, assumes no wastage. However, the best-case scenario shifts that timeline to May'22. 70% of universal population should be jabbed and by Jan'22, 70% of the eligible 18+ population would be covered in the base-case scenario in Dec'21. Our bear-case scenario hints that 70% of eligible population (18+) is expected to be covered in 12 months (by Apr'22) with an average rate of 3.5mn doses and the universal jabbing for all can be done not before Mar'23.

Exhibit 27: Scenario analysis of Vaccination trajectory going forward

Scenario (mn doses)	Average Doses (till Jun-21)		Average Doses (post Jul-21)		Average Doses (post Nov-21)		Months to cover 70% eligible population (both dose)		Months to cover 100% eligible population (both dose)		Months to cover 70% universal population (both dose)		Months to cover 100% universal population (both dose)	
	Per Day	Per Month	Per Day	Per Month	Per Day	Per Month	No. of months	Month	No. of months	Month	No. of months	Month	No. of months	Month
Bull	2.7	80	7.0	209	8.3	248	7	Nov-21	9	Jan-22	9	Jan-22	13	May-22
Base	2.7	80	5.7	172	6.6	197	8	Dec-21	11	Mar-22	11	Mar-22	15	Jul-22
Bear	2.6	81	3.6	108	3.9	118	12	Apr-22	17	Sep-22	18	Oct-22	23	Mar-23

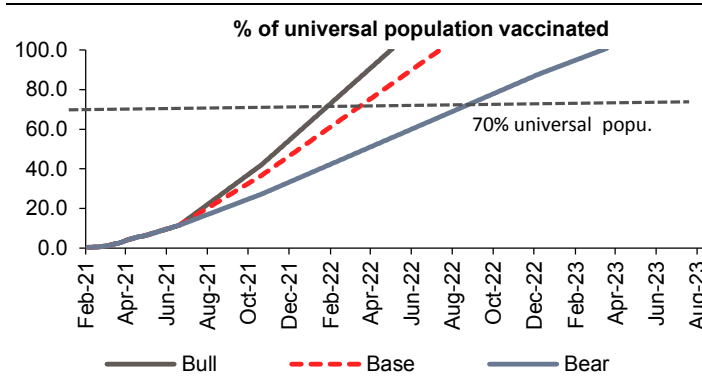
Source: Emkay Research Estimates

Exhibit 28: Govt. close to meeting its target of 600mn doses by 15th Aug'21 as per our bull case



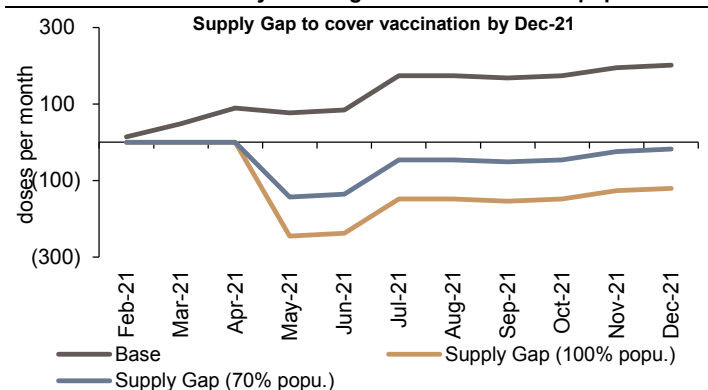
Source: Emkay Estimates

Exhibit 29: Realistically, 100% of universal population can only be covered not before Jul'22



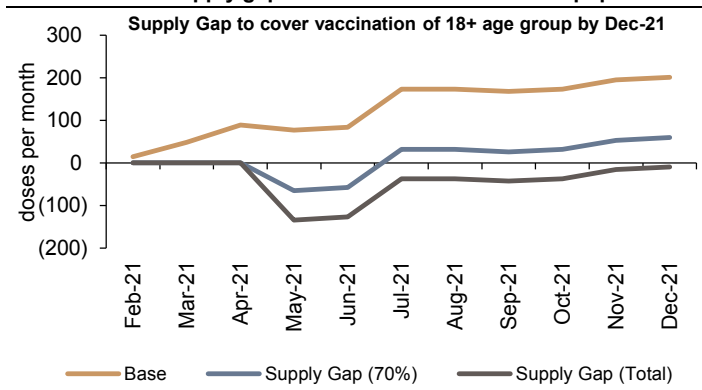
Source: Emkay Estimates

Exhibit 30: Shortfall likely to be significant for universal population



Source: Emkay Estimates

Exhibit 31: The supply gap much lesser for current 18+ population



Source: Emkay Estimates

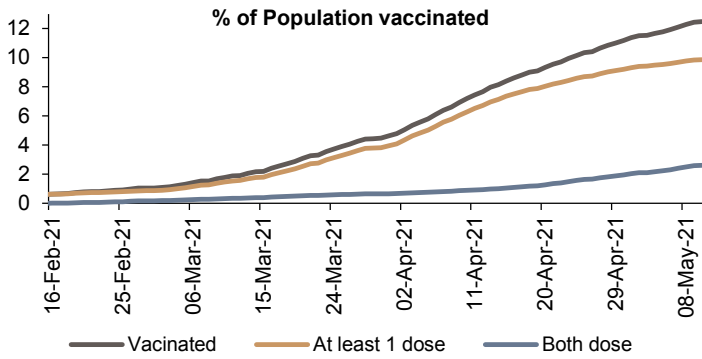
The skewness of state-wide vaccination drive

Till Apr'21-end, 32% of the eligible population (45+ age group, front-line workers) had got at least one dose but the absolute pace of vaccination has slowed since mid-Apr'21, reflecting binding supply constraints. The trends vary significantly state-wise, and not necessarily distributed in sync with either the total population or proportion of currently Covid-affected population. There is also a large dispersion in vaccine administration across states; for instance, Kerala, Chhattisgarh and Gujarat have administered one dose to more than 15% of their population, while states like UP and MP have delivered one dose to just 5% and 9% of the population respectively.

In the most vulnerable cohort (45+), 32% of the population has been administered at least one dose of vaccine; while states like Chhattisgarh (65%), Rajasthan (60%) and Gujarat (49%) have been at the forefront, and TN (16%), UP (20%) and Bihar (23%) are lagging. If we see city wise too, smaller cities have been able to have a faster vaccination drive.

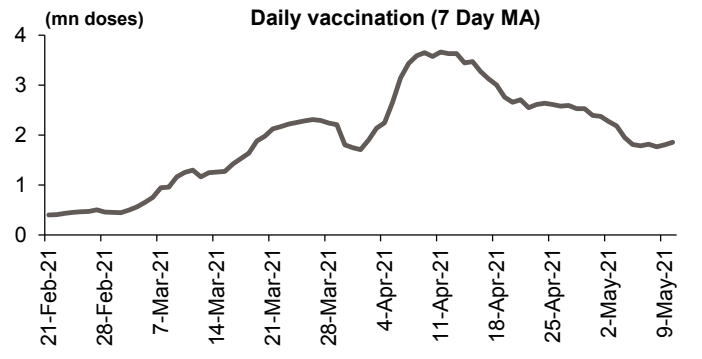
Our calculations for districts also suggest as on 7th May 21, top 40 districts by the number of new cases accounted for 33% of the cases but received only 18% jabs, showing that **the current vaccine strategy may have done a relatively sub-optimal job of prioritization.**

Exhibit 32: Only 2% of India's population fully vaccinated



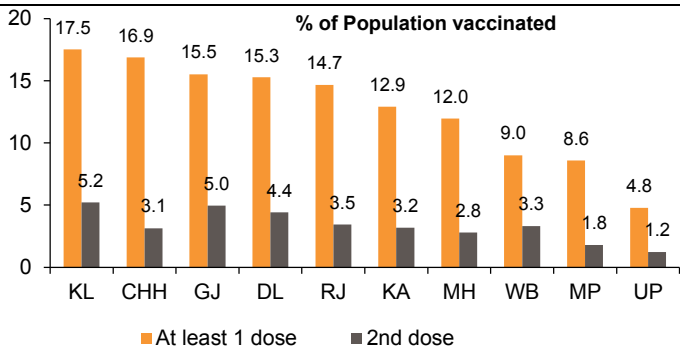
Source: CEIC, Emkay Research

Exhibit 33: Supply constraints lead to fall in daily vaccination



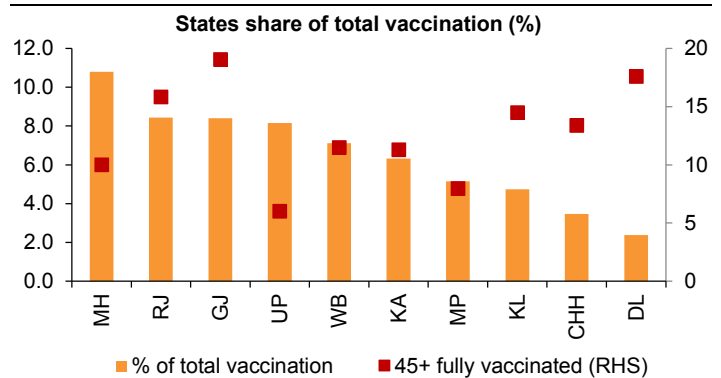
Source: CEIC, Emkay Research

Exhibit 34: KL, CHH, GJ and DL inoculated 15% of population with at least 1 dose



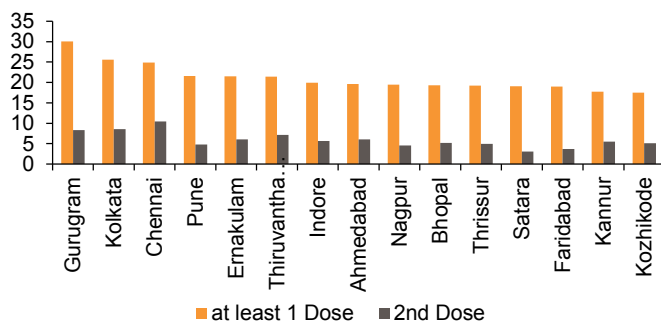
Source: Cowin.gov.in, Emkay Research

Exhibit 35: DL, GJ and RJ fully vaccinate 15% of 45+ age cohort



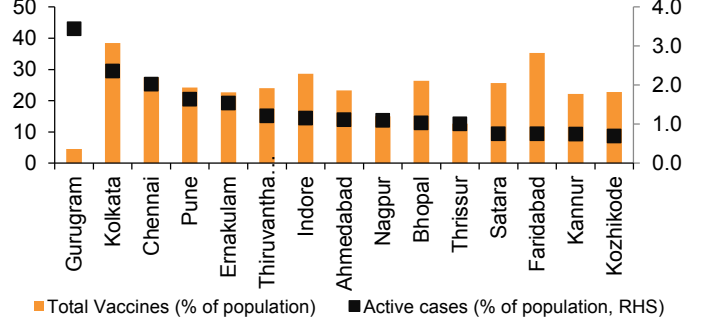
Source: Cowin.gov.in, Emkay Research

Exhibit 36: Most districts see the progress on second dose at snail pace



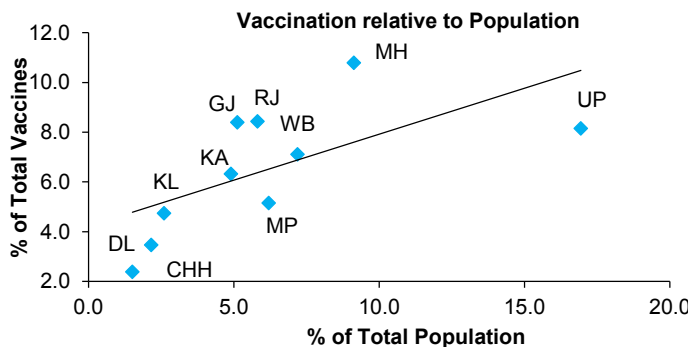
Source: Cowin.gov.in, Emkay Research | Note: Data as on 10th May 21

Exhibit 37: Skewness seen in distribution when seen in light of cases



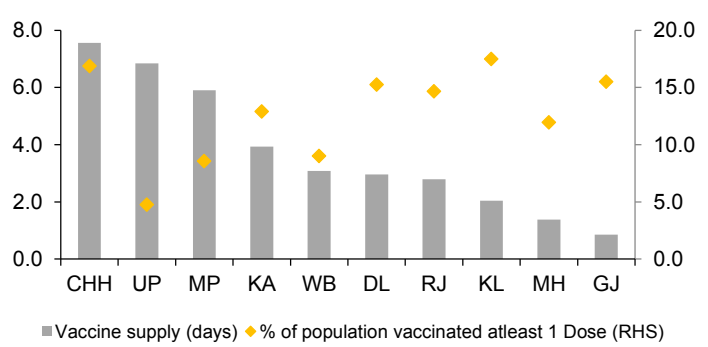
Source: Cowin.gov.in, Emkay Research | Data as on 7th May 21

Exhibit 38: Population consideration vs. vaccine allocation



Source: Cowin.gov.in, Emkay Research | Data as on 10th May 21

Exhibit 39: Centre-State coordination needed for better spread



Source: Cowin.gov.in, Emkay Research | Data as on 10th May 21

Is there an optimal vaccination strategy?

It is debatable whether decentralization, privatization or tiered-pricing of the vaccine is indeed the fastest or the best strategy to cover wider population, given state-wide socio-economic and bargaining disparities amid current vaccine production monopoly. We tried to assess optimal vaccine distribution which aims at maximizing welfare and minimizing health impact. Our weighted distribution matrix based on parameters suggests that states like UP, Delhi and TN have a much lower current share than they need, whereas GJ, RJ, and MH have received relatively more vaccine share so far. At the current pace, UP and MH would take 15 and 17 months, respectively, to cover universal population vs. our national base case of Jul'22.

We reckon it is not easy to estimate state-wide timelines on vaccination, given factors like 1) ability of each state to negotiate with private players, 2) proportion of central support on supply for 45+ age group, 3) number of vaccination sites in each state/district, and 4) varied state health infrastructure.

We tried to project state-wise timelines of vaccination with some standardized assumptions. With the assumed augmented national supply Jul'21 and Nov'21 onwards in our base case (more than 2x of current supply), we assume each state starts their 18+ vaccination drive on time from May'21 and **vaccine supply to each state is disproportionality given as per the current pace of active cases** and not as per population. Our state-wide assessment of vaccination timelines depicts that:

1. Most major states (38% of total population) will be able to cover their eligible 18+ population by Feb'22 before national expected timeline of Mar'22
2. Densely populated states such as **WB, UP** would mostly have a delayed drive with 18+ and universal population vaccinate not before Mar'22.

However, we reckon that these are extremely fair assumptions, with supply in proportion with each state's current needs and each state implementing it in line with its district wise population. But the situation is far from simple. Active cases will keep evolving and states will see peaks at different times. Thus, taking current active cases as a timeline anchor is not appropriate.

Besides, the procurement of vaccination will be decentralized with states and private sector also procuring vaccines, and manufacturers also having a say in the allocation of 50% vaccine supply. States are already reporting vaccine shortage, which might slow the pace of the next phase of vaccination and things may not even start on time.

Thus, using disproportionate supply of vaccine ahead in line with the **current state-wide ratio of national vaccine drive as an anchor**, we find that:

- (1) The pace of vaccination slows for Kerala for universal population and improves the maximum for Gujarat when compared using active cases as our anchor,
- (2) While it improves the most Rajasthan and Gujarat for 18+ population on timeliness, but Karnataka's timeline delays substantially. We note MP and UP are skewed toward sub-18 age cohort much more than the national population distribution and are likely to be the laggards.

Exhibit 40: Probable vaccination timeline for major states

Based on	MH	UP	KA	G J	WB	DL	MP	CHH	KL	RJ	All India (our base case)
Current Vaccination share of total current supply											
Total Population	May-22	Jul-22	Apr-22	Feb-22	Jul-22	Feb-22	Jul-22	Feb-22	Jan-22	Mar-22	Jul-22
18+ Population	Feb-22	Mar-22	Jan-22	Nov-21	Mar-22	Dec-21	Mar-22	Nov-21	Nov-21	Nov-21	Mar-22
Current active cases share of current national cases											
Total Population	Jan-22	Jul-22	Oct-21	Jul-22	Jul-22	Feb-22	Jul-22	Feb-22	Sep-21	Jul-22	Jul-22
18+ Population	Nov-21	Mar-22	Sep-21	Mar-22	Mar-22	Dec-21	Mar-22	Nov-21	Aug-21	Mar-22	Mar-22

Source: Emkay estimates

Centralization of vaccine negotiations and/or optimal (if any) state-wide distribution?

It is debatable whether decentralization or privatization of vaccine is indeed the fastest and best strategy to cover the wider population, especially as we are yet to see peaks in cases in most states. We understand health is a state subject in India.

However, our sense is that minimization of damage from the second Covid wave could focus on:

- (1) Given **higher population density** (and incidentally higher cases too) in urban areas (implying higher risk of contagion), the government should aim to cover the urban population first in most states. Besides, the infrastructure to administer the vaccine is also better in urban sectors and the skewed focus could minimize economic cost.
- (2) Prioritizing regions/districts that have **higher case concentration**. This also partly as higher mortality may be reducing vaccine hesitancy and increasing demand much faster in areas with higher case load.
- (3) A **centralized negotiation planning**, coordination and prioritization of delivery of vaccines would imply centralized price and quota negotiations with producers (virtually a case of monopoly at this time) and supplying the same to states and private hospitals appropriately as per case load/population.

This approach is similar to that of the US, which, despite being a pioneer in decentralization/privatization and free market ideology, followed a centralized negotiation and allocation of vaccine policy. The country has been at the forefront of vaccine drive globally.

Weighted distribution measure for ideal vaccine distribution

However, there are still challenges here. Ideally, the vaccination distribution should be done as per the state's population share, implying each state's vaccination drive gets aligned to the national average timeline. Preferring economically important states/districts may not be socially cost-optimal as human life has to be treated equally. However, targeting low-hanging fruits could still give optimal results, say by focusing on higher cases and population density in urban areas (implying higher risk of contagion), which also incidentally have better infra for jab administration.

We tried estimating the ideal state share by creating a weighted distribution measure based on parameters like population and its density, urban/rural ratio, current R factor, and active case and death load. Our measure suggests that states like UP, Delhi and TN have a much lower current share than they need, whereas Gujarat, RJ and MH received more.

Exhibit 41: Our estimate of optimal share differs from the current share of vaccine distribution

States	Share of Total Population (%)	Share of 18+ Population (%)	Share of current active cases (%)	Current share in vaccination supply (%)	Our estimate of optimal share in gross vaccine supply (%)	Gap (%pt)
Uttar Pradesh	16.9	15.7	8.0	6.2	9.9	-3.7
Maharashtra	9.1	9.7	18.9	10.2	8.9	1.3
Bihar	9.0	7.8	3.2	5.9	6.0	-0.2
West Bengal	7.2	7.7	3.5	5.9	5.6	0.3
Madhya Pradesh	6.2	5.9	2.6	2.8	3.8	-1.0
Tamil Nadu	5.6	6.2	3.7	3.4	4.8	-1.4
Rajasthan	5.8	5.5	5.6	7.7	4.2	3.6
Karnataka	4.9	5.2	13.5	6.3	5.8	0.5
Gujarat	5.1	5.2	4.2	9.4	4.0	5.4
Andhra Pradesh	3.9	4.2	4.6	4.5	4.2	0.3
Odisha	3.4	3.3	2.0	1.9	2.6	-0.7
Telangana	2.8	3.0	2.2	2.8	2.5	0.3
Kerala	2.6	2.8	10.5	3.5	4.5	-1.1
Jharkhand	2.8	2.6	1.7	1.1	2.5	-1.3
Assam	2.6	2.5	0.9	3.8	2.8	1.0
Punjab	2.2	2.4	1.8	3.2	2.5	0.7
Chhattisgarh	2.2	2.1	3.6	2.2	2.2	0.0
Haryana	2.2	2.2	3.2	3.2	2.9	0.4
Delhi	1.5	1.6	2.7	3.5	5.2	-1.7
Jammu and Kashmir	1.0	1.0	1.1	2.9	0.9	2.0
Uttarakhand	0.8	0.9	1.7	1.6	1.6	0.0
Himachal Pradesh	0.5	0.6	0.7	1.7	0.5	1.2

Source: Emkay estimates; Note: Our estimates of optimal proportions take the wtd approach of population and its density, urban/rural ratio, current R-factor, and active case and death load

Case study: The curious case of Maharashtra

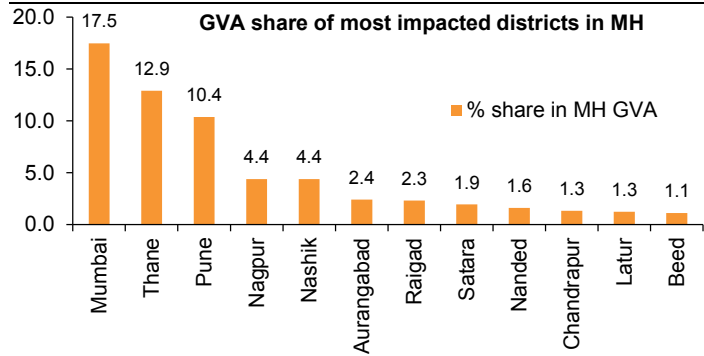
Maharashtra has been leading the pack in terms of its share in India's case load, even as it is down to now around 13% of total active cases compared to high of 60% in late Mar'21. We note that much like the national level, even Maharashtra caseloads were concentrated in urban districts, with Top-5 out of 36 districts accounting for ~50% of total cases in the state.

Maharashtra contributes the maximum to national output (~14% of GVA), accounting for roughly 11% and 20% of India's industrial units and profit, respectively, and 13% of India's employment. Pune and Konkan (districts among the key infected ones in Maharashtra) are the most densely industrialized. Top-5 most impacted districts contribute to ~51% of Maharashtra's output. Our channel checks suggest that capacity utilization is running ~15% lower than the average capacity utilization for most belts of manufacturing in Maharashtra. Our assessment of **Maharashtra lockdown depicts loss of 0.33% of monthly gross national output with current lockdown state.**

Exhibit 42: Maharashtra is an economically crucial state and has hit the maximum output loss

%	GST collection (ex-imports)	E- Way Bill (Asset Value)	Net Value added	Total Output	Productive Factories	Wages to Capital	Wages to workers
Maharashtra	18.5	16.5	18.2	14.8	11.5	14.0	14.9
Gujarat	8.9	12.8	14.4	16.8	11.1	17.1	10.8
Karnataka	8.6	7.7	7.2	6.9	5.7	6.2	8.4
Uttar Pradesh	6.8	8.3	7.9	6.8	6.5	4.5	5.9
West Bengal	4.8	5.2	2.5	4.0	4.1	3.6	4.2
Delhi	4.3	3.9	0.5	0.9	1.5	0.4	0.6
Madhya Pradesh	3.0	1.3	2.7	2.8	1.9	4.1	2.3
Chhattisgarh	2.8	0.8	1.0	1.5	1.3	3.5	1.7
Kerala	2.0	2.6	1.7	2.0	3.3	1.5	2.2
Total	59.7	59.3	56.2	56.5	46.8	55.0	51.2

Source: ASI 2016-17, Emkay Research

Exhibit 43: Top-5 most Covid impacted districts make 51% of MH GDP

Source: CEIC, Emkay Research

Exhibit 44: Impacted districts are heavy manufacturing belts of MH

Districts	% share in MH GDP	Mfg units (#)	Investment (Rs bn)	Employment (mn)
Mumbai	17.5	1,012	207	0.14
Konkan ex Mum (Thane,Raigard,Ratnagiri,Sindugard)	16.9	14,010	592	0.45
Pune	10.4	13,582	782	0.60
Nashik	4.4	8,647	95	0.11
Nagpur	4.4	3,846	179	0.11
Aurangabad	2.4	7,917	124	0.09
Amravati	1.5	2,599	78	0.04
Total	57.5	51,613	2,057	1.54

Source: MIDC, Emkay Research

We tried studying the current vaccination drive district-wise and found out that so far Mumbai, Pune and Thane districts are leading the vaccination drive. The state's vaccination drive has also slowed from early Apr'21 and has not been consistent. Just in past one week it slowed from 0.56mn doses per day (27th Apr'21) to 0.29 mn on 10th May'21 before falling to 79,000 doses per day on 4th May'21 -- a fall of 86%; the national average has fallen 48% from 3.36mn doses per day to 1.7mn doses per day during the same period. This essentially echoes supply issues as binding constraint.

However, we did notice that Maharashtra's current drive has focused largely on urban or most infected ones or more densely populated ones. Mumbai, Pune, Thane, Nagpur and Nashik are urban and populated having vaccine share of 45% of State. If we assume the current disproportionate distribution of vaccine in favor of most infected/populated, most of these five districts (contributing 51% to MH GDP) would be vaccinated by Nov'21 for the 100% of 18+ population in each district. This is three months faster than the state's expected trajectory of Feb'22 and could alleviate large part of the economic pain. However, if we do it for 70% of universal population, the timeline increases to Jan'22, yet faster than Maharashtra's timeline of Feb'22 for 70% of universal population. We note Nashik and Thane are still laggards as per the current vaccination drive. Based on the current vaccination rate, total population can be completed by May'22 and 18+ by Feb'22, while districts like Nashik and Thane extending beyond May'22.

Exhibit 45: Probable vaccination completion timeline for top 5 districts in Maharashtra

Based on	Mumbai	Pune	Nagpur	Nashik	Thane	MH Total
Current Vaccination share of total current supply						
Total Population	Jan-22	Dec-21	Jan-22	May-22	May-22	May-22
18+ Population	Nov-21	Oct-21	Nov-21	Feb-22	Feb-22	Feb-22
Current active cases share of current national cases						
Total Population	Jan-22	Sep-21	Aug-21	Nov-21	Jan-22	Jan-22
18+ Population	Nov-21	Aug-21	Jul-21	Oct-21	Nov-21	Nov-21

Source: Emkay Research estimates

The Cost of vaccination: Who bears what?

We estimate the total cost of vaccination drive in a no wastage scenario is ~0.6-0.7% of GDP, of which states would bear 0.25% of GDP, private sector ~0.4% of GDP and Centre bears the least cost. For states, the fiscal burden of vaccination would understandably vary as per their population and its distribution skewness toward the sub-45 age group. Our cross-state assessment shows that UP, MP and Chhattisgarh lead the pack (cost % GDP). The FY22BE the health spending is budgeted at ~0.8% of SGDP. The bump-up can be borne easily as consolidated state GFD/GDP stands at ~3.3% of GDP, amid deficit cap of 4% of GDP this year—giving them breather to loosen their purse strings. However, states' response should expand beyond health to tailor-made income support and managing labor market dislocations whose reallocation to the rural sector is sub-optimal and implies loss of overall factor productivity.

As we have argued before, the decentralization and privatization drive of vaccines has meant that each state and private player will have to individually bargain with manufacturers on their share of output.

The two major producers have already declared their prices. SII is said to charge states Rs300/dose (from Rs400 initially) and private hospitals at Rs600/dose. Bharat Biotech will charge Rs400 and Rs1,200 per dose, respectively, to state governments and private hospitals. The pricing makes it evident that both companies will prefer to sell to private hospitals.

We tried to assess the cost burden for each state as per the expected proportion of national supply that each player (Centre, States, and private sector) will get. As of now 50% of vaccine supply will be allocated to Centre and the rest will be allocated between states and the private sector. We assume that states and the private sector bear the vaccination burden of, respectively, 60% and 40% population of 18-44 age group, and also as vaccination becomes universal, sub-18 age group as well in the same proportion. The Centre covers 70% of the 45+ population in each state and the rest will be taken up by the private sector.

We conclude that the total cost to the Centre for eligible population will be ~Rs100bn. Since by Mar'22, all of the 45+ age group population will be covered in our base case, the full cost will hit in FY22 for the Centre (0.04 % of GDP). We note the Centre has budgeted 0.33% of GDP for health expenditure in FY22BE after 0.42% in FY21RE. India's health infra still remains much lower than most comparable EM and DM nations.

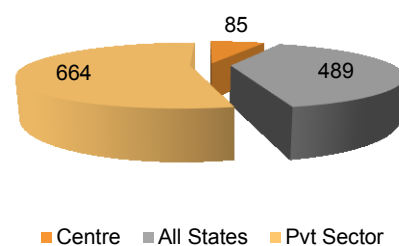
Exhibit 46: States cater to maximum population cohort...

National level Cost of vaccination (Rs bn)			
	Centre	All states	Pvt Sector
Vaccinated so far (45+) - Till Apr 30 incl. frontline	42	0	0
45+ (May 1 onwards)	43	0	125
18-44+	0	276	230
0-17+ (Assuming October onwards)	0	213	309
% of universal population covered	18	45	37

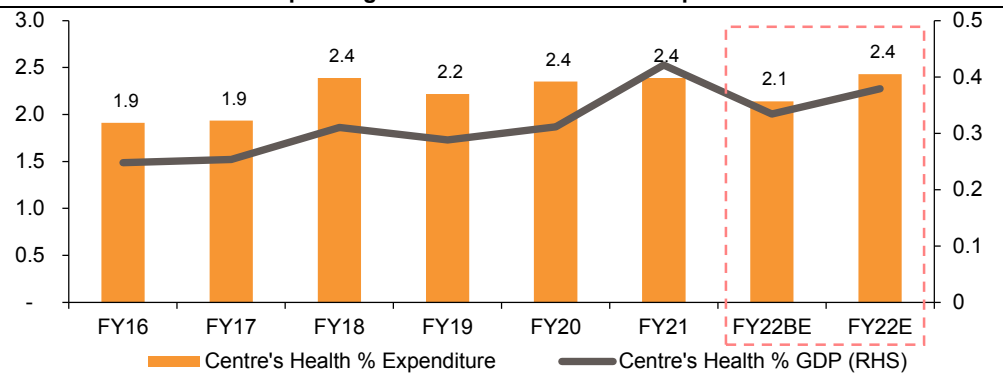
Source: Census projection 2021, Emkay research estimates

Exhibit 47: ...with public sector cost still lower than private

Cost sharing of universal vaccine drive (Rs bn)



Source: Emkay research Estimates

Exhibit 48: Centre's health spending share to increase in total expenditure vs. FY22BE

Source: Union Budget, Emkay Research Estimates

Exhibit 49: India's health infrastructure remains dismal compared to peers and DM economies

Country	Gen. Govt. health expenditure (% of GDP)	Gen. Govt. health expenditure (% of public expenditure)	Hospital beds (per 1,000 people)	Nurses and midwives (per 1,000 people)	Physicians (per 1,000 people)
India	1.0	3.4	0.5	1.7	0.9
Indonesia	1.4	8.5	1.0	2.4	0.4
China	3.0	8.9	4.3	2.7	2.0
East APAC	4.4	..	4.5	3.4	1.7
Brazil	4.0	10.3	2.1	10.1	2.2
South Africa	4.5	13.3	..	1.3	0.9
United States	8.5	22.5	2.9	14.5	2.6
United Kingdom	7.9	19.2	2.5	8.2	2.8
Italy	6.4	13.2	3.2	5.7	4.0
Germany	8.9	20.0	8.0	13.2	4.2
France	8.3	14.8	6.0	11.5	3.3

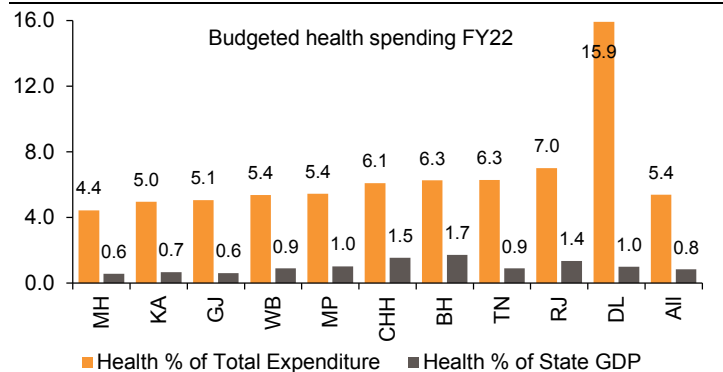
Source: World Bank; data for 2018, Emkay Research

Inter-state vaccine math suggests UP and MP to bear the highest cost

For states, the fiscal burden of vaccination would understandably vary as per their population density. We note that even pre-pandemic health spending in states like Maharashtra, Gujarat, and Kerala was below the national average in terms of the share in total expenditure and as % of GDP. On the other hand, states like Delhi, Rajasthan and Bihar spend the most on health. The national average of health spending by states is still less than 1% of SGDP.

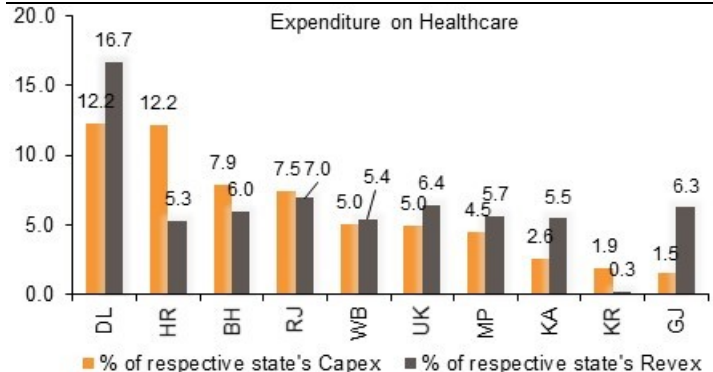
While health spending increased in FY21 in most states (averaging 5.7% of total expenditure vs. average of 5.1% in last three years), health spending growth has been budgeted to reduce in most major states in FY22 from FY21, albeit higher than pre-pandemic levels, partly still accounting for the expected vaccine drive. However, as % of GDP, the spending pattern for most states has not changed much. For FY22BE the health spending for all states is expected to be ~5.4% total states' expenditure and ~0.8% of SGDP.

Exhibit 50: Delhi's health spending share highest among states



Source: State Budgets, Emkay research Estimates

Exhibit 51: ...while Haryana too spends decently on health capex

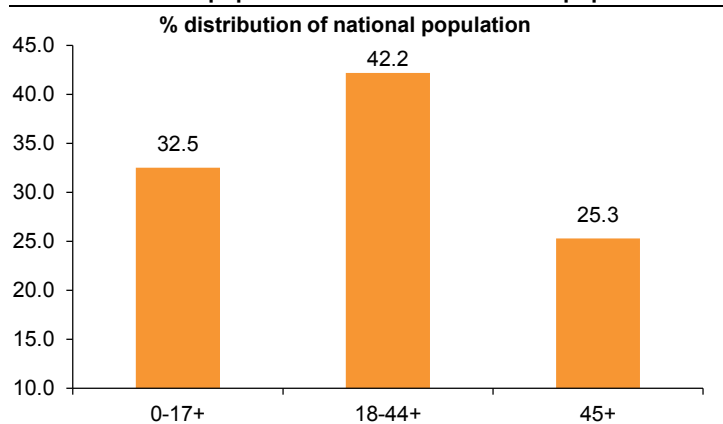


Source: State Budgets, Emkay research Estimates

Our costing structure assumes that the Centre takes the vaccination load of 70% of 45+ population and the private sector takes the rest 30% largely because the Centre is getting 50% of total vaccines production in India. Meanwhile, the Centre takes no burden for 18-44 age bracket and 0-17 bracket, and states lead the game by covering roughly 60% of population and the private sector covering the rest of it.

Our cross-state assessment of vaccination cost **shows that UP and Maharashtra are likely to bear the maximum cost of vaccination**, while seen from the lens of each state's gross output or GDP, states like UP, MP and Chhattisgarh lead the pack. This is, of course, on account of the fact that **UP and MP population is more skewed toward the sub-45 age group** and thus comes in the purview of the respective state for jabbing.

Exhibit 52: India's population skewed toward 18-44 population...



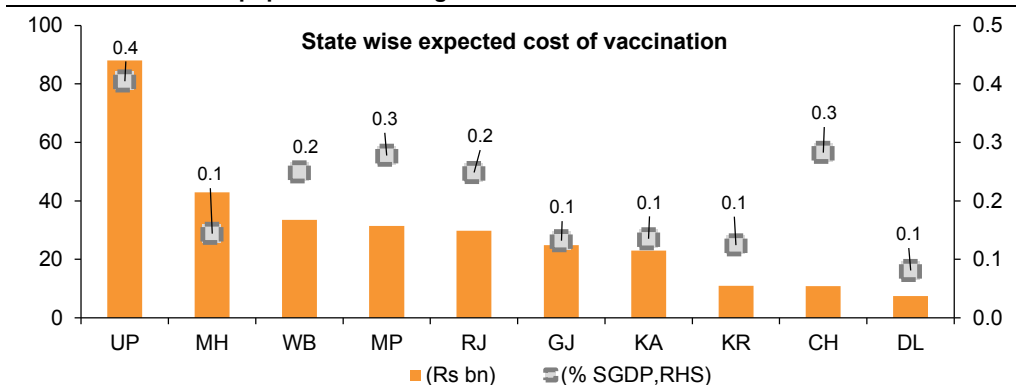
Source: Census projections 2021, Emkay Research Estimates

Exhibit 53: ...while UP has highest sub-18 population

Population distribution (%)	0-17+	18-44+	45+	% population vaccination burden ex-Centre
UP	37.9	41.6	20.6	79.4
Maha	27.9	44.1	28.1	71.9
Gujarat	31.2	42.9	26.0	74.0
Karnataka	28.1	43.6	28.3	71.7
W. Bengal	27.3	43.7	29.0	71.0
MP	36.3	41.2	22.5	77.5
Kerala	25.8	38.2	36.0	64.0

Source: Census projections 2021, Emkay Research Estimates

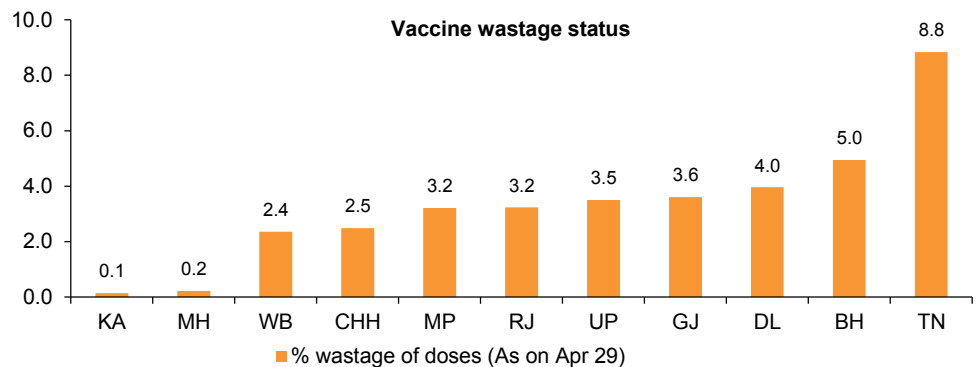
Exhibit 54: Universal population coverage could dent UP's fiscal the most



Source: State Budgets, Emkay Research Estimates

This assumes that states are bearing 60% of 18+ and sub-18 age group population vaccination for free, and the private sector shares the rest of the burden, with smooth and uniform health infrastructure and zero wastage. We note that as of now, Karnataka and Maharashtra have had the lowest vaccine wastage of 0.22%, while UP and Punjab wasted over 3.5% of their allocation and TN almost 9%.

Exhibit 55: TN leads the pack in Vaccine wastage



Source: PIB, Emkay Research

What should be the ideal economic response beyond the vaccine mandate?

While the financial conditions remain comfortable unlike the first Covid wave, the monetary response function has so far focused on 1) reaffirming the current policy accommodation and 2) on regulatory front, helping banks manage their asset quality and support the stressed borrowers, especially MSMEs. We may see more steps in the same line ahead. On conventional policy rates, **we do not see any change in the repo rate until at least H2CY22**. The reverse repo hike may be the first signaling mechanism for the RBI but we do not see that happening in FY22 either.

However, given the shock asymmetry, the Centre and state-specific fiscal response will be a more effective tool in terms of contemporaneous multiplier impact on growth.

On the Centre's front, an additional fiscal burden of ~0.2-0.3% of GDP will be added in providing free food grains to the vulnerable section of society, over and above the vaccine cost of around Rs100bn. We acknowledge the Centre had assumed a wide fiscal deficit of 6.8% even before the second wave hit India. The new headwinds of 1) new Covid subsidies cost, 2) risk of missing divestment target of Rs1.75tn, and 3) lower nominal GDP could risk a fiscal slippage and would more than offset the tailwinds from factors like modestly budgeted tax growth.

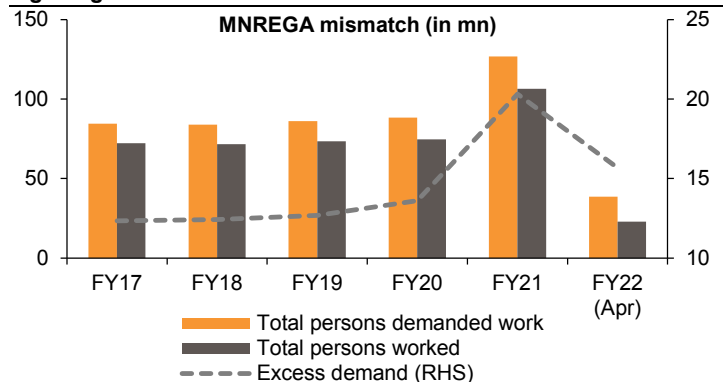
State-wise response should ideally focus on:

- (1) **Managing labor market dislocations:** Labor market scars had barely healed fully before the second Covid wave. While the employment/population ratio remains 2 percentage points lower than pre-Covid-19 level, the CMIE unemployment rates in rural and urban sector have started inching up again. On the other hand, the demand-supply mismatch in MNREGA is already acute as some migrants still have not returned in urban areas.

Another labor exodus of the same sorts in rural areas would only make labor resource allocation less efficient (indirect cost to the economy) and create scarcity in the urban sector and oversupply in rural while also risking spreading the virus in rural areas. We note income per farmer is around one-third of the income per non-agriculture worker in the rural sector and farm labor productivity is almost one-fourth of non-farm. Thus, not managing the same is sub-optimal and a dead-weight output loss, impacting both productivity and income.

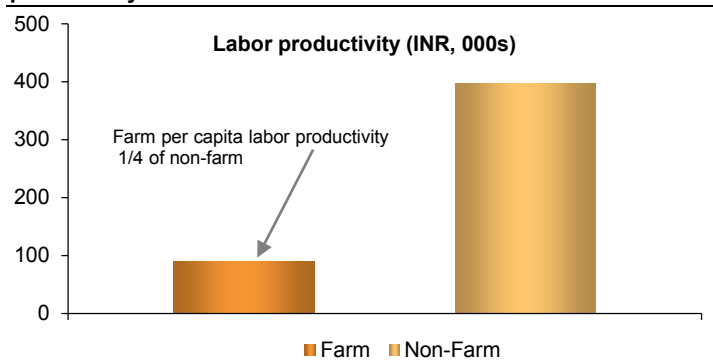
- (2) **Tailor-made income support:** The income support could be focused on migrant labor and even urban poor in either cash, coupons or kind. This would also prevent another round of reverse migration. Among the key states, Maharashtra and Delhi have already announced free meals and cash transfers for registered construction/migrant workers.

Exhibit 56: MNREGA demand supply mismatch increased amid high migration



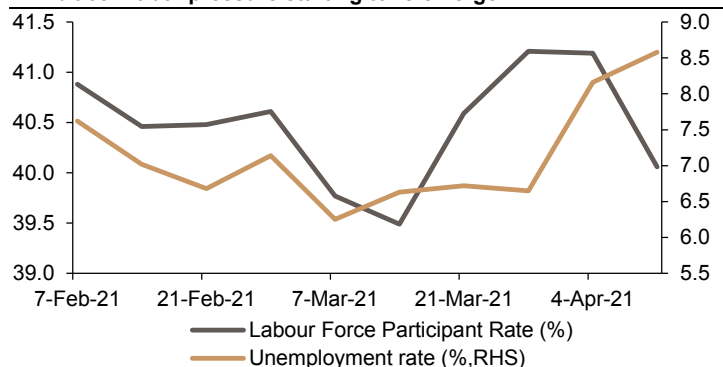
Source: MNREGA, Emkay Research

Exhibit 57: ...disguised Agri employment implies lower labor productivity



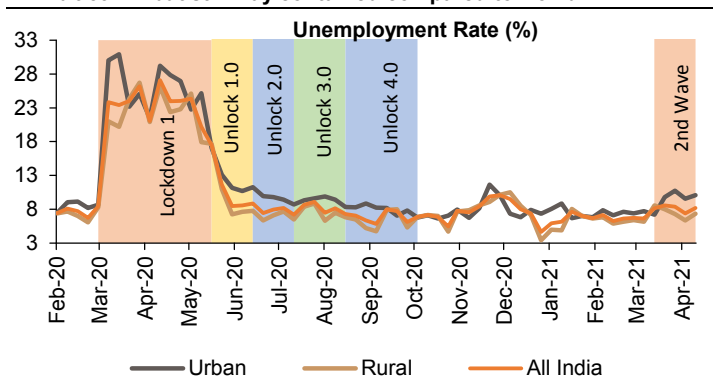
Source: NSSO, CEIC, Emkay Estimates; Data for FY18

Exhibit 58: Labor pressure starting to re-emerge...



Source: CMIE

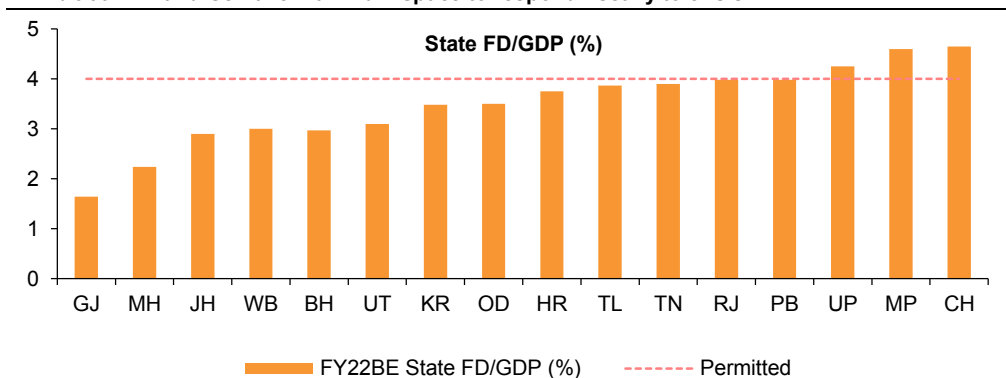
Exhibit 59: ... but still way contained compared to Covid-I



Source: CMIE

States have capacity to expand their fiscal space. Our assessment of 18 state budgets show that consolidated state GFD/GDP stands at around 3.3% of GDP while the deficit cap is 4% of GDP this year, giving them room to loosen their purse strings. Significantly impacted states of Maharashtra and Gujarat, generally seen as fiscally more prudent, have budgeted modest FD/GDP ratios of 2.2% and 1.6%, respectively, and thus may have more space to respond if needed.

Exhibit 60: MH and GJ have maximum space to respond fiscally to crisis



Source: State Budgets, Emkay Estimates

The RBI has already enhanced the WMA limit for states by around 46% to Rs470bn and also extended the overdraft facility, which could help in temporary cash mismatch for states. The risk of SDL spreads widening again could be managed by the RBI by expanding its GSAP/OMO program SDLs.

Appendix: State- and district-wide vaccination snapshot and our research desk's sectoral assessment post the Covid wave

Exhibit 61: Vaccination snapshot of Top-10 states

State	Total Population (mn)	Total Dose (mn)	Dose 1 % of Total Dose	% of Population Fully Vaccinated	% of age group vaccinated (at least 1 dose)		Growth over 1st peak (times)	New Cases		45+ population fully vaccinated (%)	% of National population	% of total vaccination	% of active cases	1st dose as % of population	2nd dose as % of population
					45+ Yr	60+ Yr		May 7th	First wave peak						
Maharashtra	124	18	81.01	2.80	35.80	40.32	2	62,194	24,619	9.98	9.13	10.80	16.50	11.96	2.80
Uttar Pradesh	231	14	79.44	1.24	20.19	24.02	3	26,622	6,029	6.00	16.94	8.16	6.25	4.77	1.24
Gujarat	70	14	75.82	4.95	49.96	58.12	8	12,545	1,379	19.04	5.12	8.40	3.73	15.53	4.95
Karnataka	67	11	80.20	3.19	40.81	48.00	4	49,058	9,366	11.27	4.90	6.33	15.07	12.92	3.19
Delhi	21	4	77.57	4.42	45.36	48.94	3	19,133	4,432	17.60	1.51	2.38	2.30	15.27	4.42
West Bengal	98	12	73.06	3.32	27.24	33.99	5	18,431	3,197	11.46	7.20	7.11	3.36	9.01	3.32
Madhya Pradesh	85	9	82.74	1.79	34.37	42.07	4	12,421	2,391	7.96	6.20	5.15	2.91	8.58	1.79
Chhattisgarh	29	6	84.30	3.14	65.31	66.06	3	13,846	3,809	13.37	2.16	3.47	3.38	16.88	3.14
Kerala	35	8	77.08	5.21	43.72	54.31	9	42,464	4,351	14.47	2.60	4.74	11.32	17.52	5.21
Rajasthan	79	14	80.96	3.45	60.15	78.56	9	17,532	1,793	15.83	5.82	8.44	5.35	14.67	3.45

Source: CEIC, Emkay Research

Exhibit 62: Snapshot of top districts impacted by Covid and their vaccination status

District	Vaccine administered ('000)				Total Doses ('000)	Dose 1 % of Total Dose	% of Population Fully Vaccinated	Growth over 1st peak (times)	New Cases		% of population			May 7th Active Cases % of Pop
	18-30 yr	30-45 yr	45-60 yr	60+ yr					May 7th	First wave peak	at least 1 dose	2nd dose	Total Vaccines	
Mumbai	101	207	988	793	2,762	75.62	5.41	0	3,040	2,411	16.79	5.41	22.20	0.38
Pune	91	212	952	778	2,490	81.69	4.83	1	8,998	4,938	21.57	4.83	26.40	1.03
Nagpur	45	98	421	343	1,118	81.16	4.53	1	4,484	2,176	19.50	4.53	24.03	1.21
Nashik	29	79	315	251	834	80.80	2.62	0	2,845	1,909	11.03	2.62	13.66	0.57
Thane	60	120	556	405	1,440	79.32	2.69	0	2,529	2,203	10.33	2.69	13.02	0.31
Raigad	17	33	117	89	313	81.89	2.15	0	1,159	868	9.72	2.15	11.87	0.42
Aurangabad	24	60	180	141	498	81.36	2.51	1	1,099	481	10.94	2.51	13.44	0.31
Satara	18	44	262	247	665	86.01	3.10	2	1,993	774	19.04	3.10	22.13	0.75
Palghar	16	31	101	78	280	80.34	1.84	2	1,607	474	7.52	1.84	9.36	0.58
Chandrapur	14	28	100	91	278	84.30	1.98	2	1,004	346	10.62	1.98	12.59	1.01
Latur	15	30	87	105	283	83.95	1.85	2	869	334	9.67	1.85	11.52	0.49
Nanded	18	38	140	125	371	86.68	1.47	1	553	279	9.56	1.47	11.03	0.16
Beed	11	28	83	105	282	80.73	2.10	3	1,314	317	8.79	2.10	10.89	0.60
Lucknow	54	63	207	160	647	74.86	3.54	1	1,979	896	10.54	3.54	14.09	0.48
Prayagraj	27	42	131	114	402	78.11	1.48	1	563	366	5.28	1.48	6.75	0.09
Ghaziabad	14	22	156	111	380	79.96	1.63	1	685	299	6.49	1.63	8.12	0.12
Kanpur	23	35	186	165	510	79.99	2.23	1	813	411	8.91	2.23	11.14	0.18
Varanasi	23	36	122	98	354	78.76	2.05	3	909	215	7.59	2.05	9.64	0.25
Gurugram	40	64	195	154	582	78.28	8.35	8	3,588	394	30.07	8.35	38.41	2.36
Faridabad	27	39	154	124	411	83.67	3.71	5	1,587	282	19.02	3.71	22.73	0.70
Raipur	22	37	198	113	471	78.43	2.50	0	818	1,109	9.10	2.50	11.60	0.24
Durg	13	22	198	123	444	80.09	2.64	0	443	322	10.63	2.64	13.27	0.14
Ahmedabad	128	195	606	486	1,851	76.48	6.03	3	3,837	1,008	19.62	6.03	25.66	0.76
Surat	11	23	109	69	293	71.94	1.35	3	1,209	280	3.47	1.35	4.82	0.21
Vadodara	18	30	134	114	379	78.10	1.99	7	1,038	127	7.10	1.99	9.09	0.25
Rajkot	50	68	242	209	770	73.92	5.28	2	496	145	14.96	5.28	20.24	0.11
Jamnagar	25	33	120	117	398	74.15	4.76	5	726	129	13.67	4.76	18.43	0.27
Bangalore	27	35	177	135	485	76.97	1.05	5	22,335	3,865	3.52	1.05	4.57	3.44
North Parganas	26	66	325	343	1,010	75.21	2.50	7	3,957	507	7.59	2.50	10.09	0.24
Kolkata	56	91	544	459	1,537	74.84	8.60	7	3,915	475	25.58	8.60	34.18	0.58
Gwalior	12	22	145	110	353	81.57	3.21	4	910	201	14.18	3.21	17.39	0.51
Indore	29	49	338	237	838	77.93	5.65	4	1,753	381	19.93	5.65	25.57	0.52
Bhopal	32	56	222	148	581	78.68	5.23	6	1,576	213	19.29	5.23	24.51	0.65
Kozhikode	23	38	218	262	699	77.39	5.12	7	4,200	545	17.52	5.12	22.64	1.54
Ernakulam	34	49	257	366	903	78.10	6.03	13	5,361	383	21.49	6.03	27.52	2.02
Malappuram	18	37	223	222	618	81.00	2.85	10	3,949	351	12.16	2.85	15.01	1.10
Thrissur	18	34	236	314	755	79.63	4.93	12	3,738	296	19.26	4.93	24.19	1.64
Thiruvananthapuram	29	56	263	361	945	74.98	7.16	4	3,950	820	21.46	7.16	28.61	1.16
Kannur	16	29	175	229	587	76.33	5.51	11	3,139	260	17.77	5.51	23.28	1.12
Chennai	79	130	497	449	1,641	70.41	10.45	5	6,446	1,007	24.87	10.45	35.32	0.76

Source: covid19india.org, Cowin.gov.in, Emkay Research

Exhibit 63: Sectoral view post Covid II

Sector/ Industry	View on sectoral recovery beginning of CY'21 vs Post Covid -II	Extent of business/demand impact post Covid-II
Auto	Positive view remains. However, there could be loss in sales in near-term due to lock-downs, which could have a marginal impact on full year FY22E volumes. Our estimates for FY23E should remain broadly unchanged.	There could be loss in sales in near-term due to lock-downs across states. CV, Tractor and 2W segments are witnessing higher impact on sales volumes. In comparison, PV segment, is witnessing lower impact due to pending order-book and relatively low dealer inventories.
Banks	We expected strong credit growth in FY22 - 10-11% on the back of revival in retail credit. But now due to second wave induced lockdown we expect credit growth recovery post lifting of lockdown. On the asset quality front, we expected improvement in FY22 due to better recoveries. We now expect improvement in asset quality to get delayed, but expect lower incremental stress in retail/SME portfolio.	We expect Credit growth to bounce back strongly post lifting of lockdowns, driven by home/auto loans and overall impact on credit growth to be in range of 100-130bps for our coverage Banks. Overall-retail GNPA ratios, which were expected to improve might not fully materialize but we expect incremental stress due to Covid-II wave to be lower in the retail/SME portfolio.
NBFCs	Most NBFCs outperformed b/w Nov-Feb but now demand hit will impact negatively. Limited impact for NBFCs with presence in rural and semi-urban regions as the lockdowns in tier 2 and tier 3 cities remain less stringent. Although the preparedness from the previous shutdown and well-placed liquidity buffer provide comfort, the challenges remain. NBFCs with high urban portfolio will face the brunt of it. We remain wary of asset quality movement and surge in credit costs amid the re-imposition of lockdowns.	NBFCs with urban portfolio - customers and products such as PL, durables and somehow housing will be the most impacted. Rural may remain resilient. But considering lower interest rates and competitive environment among developers, housing demand will see limited impact. We remain highly cautious towards unsecured products such as PL, urban MFI loans and credit cards where the defaults might be relatively higher.
Insurance	We expect NBP to grow with the resurgence of Covid-19 pandemic, especially driven by demand for Protection products, thereby improving VNB margins for life insurers. Any material slowdown in ULIP sales, extensive increase in mortality or significant raise in reinsurance premia can pose challenge to the recovery of the sector.	Although we expect low impact on the companies under coverage as protection products gain traction along with revival of ULIP product sale reflecting healthy NBP, we remain watchful of shift in demand from protection products with the end of pandemic and introduction of vaccination.
Consumer staple	Discretionary and out of home categories were expected to reach pre-Covid levels by Q4FY21/Q1FY22. Whereas some health & hygiene categories were expected to moderate as Covid tailwinds reduced. Demand of other staples was expected to improve marginally on full unlocking	We don't see much impact on overall sector due to better supply chain preparedness. Discretionary and out of home categories may however be impacted severely result in 5-10% impact on overall Q1FY22 estimates.
Consumer Discretionary /Retail	We were expecting sequential recovery to continue with Q1 FY22 sales reaching / growing vs pre-covid levels in Apparel/QSR. In jewellery strong wedding season / pent up demand was expected to drive higher growths in beginning of FY22. In Paints demand trends were expected to stay strong delivering double digit volume growths	*60-70% store closures across categories in retail industry in Q1FY22; may see a 20-30% cut in our FY22 estimates. FY23 impact though may be very less. *QSR/Grocery (essential goods) relatively better placed and delivery channel offsetting the loss in footfalls * Expect recovery in jewelry can be faster due to pent-up demand similar to FY21. *Apparel recovery shall be slower but pent up rebound may help later. In Paints, closure of retail outlets in Q1 to be covered by pent up demand but expect some earnings downside
Consumer durables	Demand across the product categories was strong at the start of CY21 and was expected to sustain at least till Q3FY22, given the favorable base. Post relaxations regarding on-ground movement, we expect to see business recovery. Deferment of demand, change in lifestyle with certain proportion of demand being converted into sales without festive season and fresh demand due to under construction houses shall augur well.	Extent of impact on demand will be known once the lockdowns are lifted as seasonal product like RAC has majority of sales till June. For other product categories demand is expected to rebound once state govt relax lockdown restrictions. Additionally, state and central govt spends on infra projects will also define the demand for cables.
Telecom	No change in the view as telecom has been one of the critical category. Additionally, digital recharges have increased substantially over the last fiscal, resulting to lower impact due to lockdowns. However, there will be marginal impact on the sale of smartphones	Negligible impact as online recharges have increased
Cement	We expect strong demand recovery owing to government spending on infrastructure, affordable housing and urban housing revival with low interest rate.	In near-term, volumes may get impacted by 15-20% on QoQ basis in Q1FY22 owing to lockdowns. However, we expect sharp recovery in coming quarters owing to pent-up demand. It is a 'deferment' of demand and not 'loss of demand'.
Real Estate	Structural levers (low interest rates, sector consolidation, higher housing affordability, supportive government policies) to drive sustainable recovery in the residential market.	Near-term demand impact as buyer's postpone property purchasing decision.
Metals	Ferrous and nonferrous prices seen strong due to demand from China, overall sector to see revenue growth lead by exports.	Small companies where business is domestic and exports are not possible to see impact rest no major impact likely.
IT	No change in the view as IT companies have already embraced the WFH model and already have all the necessary approvals in place.	No impact as the developed economies are not impacted
Oil & Gas	We expected oil/gas demand to recover to pre- Covid levels. Post Covid-II, autofuel sales will be impacted in April-May and depending on extent of lockdown, June could see some impact. CGD volumes are also expected to fall 25-30% due to strict lockdowns in major cities.	Demand impact on petroleum products expected to be 5-6% in Q2 while double digit decline expected in CGD volumes. We expect it to be a temporary blip however and by Q3-Q4CY21, oil/gas volumes should recover fully.
Capital Goods	Expectation of slight delay in ordering the tendering process, though key sectors should make up during the year	Some slowdown expected based on lower labour availability in 1Q
Utility	Power demand had come back of 5% CAGR from 2 year perspective which is also a long term demand growth number	Demand has already moderated due to partial restrictions. Evening demand impact has been more
Pharma	With the pandemic related restriction easing, we expect IPM to grow at a high single to low double-digit rate in the coming months.	While the view remains the same, volume growth could remain weak in the near term due to renewed lockdowns. Companies with high exposure to Covid portfolio are expected to do well in the near term.

Source: Emkay Research estimates

Emkay Alpha Portfolio – Nifty

EAP-Nifty (25 stocks)

Company Name	Nifty Weight	Nifty EAP Weight	OW/UW (%)	OW/UW (bps)
Agri Input & Chemicals	0.54	0.00	-100%	-54
UPL	0.54	0.00	-100%	-54
Auto & Auto Ancillaries	5.27	8.06	53%	279
Bajaj Auto	0.79	1.28	63%	50
Eicher Motors	0.53	1.51	187%	98
Hero Motocorp	0.58	0.00	-100%	-58
Mahindra & Mahindra	1.15	0.00	-100%	-115
Maruti Suzuki India	1.39	2.41	73%	102
Tata Motors	0.85	2.87	239%	203
BFSI-Banks	26.00	30.69	18%	470
Axis Bank	2.81	4.78	70%	197
Bandhan Bank	0.00	0.89	NA	89
HDFC Bank	9.61	9.58	0%	-3
ICICI Bank	6.55	6.53	0%	-2
Indusind Bank	0.82	3.74	358%	292
Kotak Mahindra Bank	4.07	1.05	-74%	-302
State Bank of India	2.14	4.13	93%	199
BFSI-Insurance	1.48	2.04	38%	56
HDFC Life	0.87	0.37	-58%	-50
SBI Life	0.61	1.67	174%	106
BFSI-NBFCs	10.35	7.97	-23%	-238
Bajaj Finserv	1.07	0.00	-100%	-107
Bajaj Finance	2.27	0.00	-100%	-227
Cholamandalam Investment	0.00	0.98	NA	98
HDFC	7.01	6.99	0%	-2
Cement & Building Materials	2.61	5.09	95%	248
Ambuja Cements	0.00	0.99	NA	99
Grasim Industries	0.86	0.86	0%	0
Shree Cements	0.58	1.56	169%	98
Ultratech Cement	1.17	1.67	43%	51
Consumer Goods & Retail	11.05	5.51	-50%	-554
Asian Paints	1.79	1.79	0%	-1
Britannia Industries	0.64	0.00	-100%	-64
Hindustan Unilever	3.36	0.00	-100%	-336
ITC	2.80	1.79	-36%	-101
Nestle India	0.93	0.00	-100%	-93
Titan Company	0.94	0.94	0%	0
Tata Consumer	0.59	0.00	-100%	-59
United Breweries	0.00	0.99	NA	99
Engineering & Capital Goods	2.53	2.52	0%	-1
Larsen & Toubro	2.53	2.52	0%	-1
Information Technology	16.57	15.48	-7%	-109
HCL Tech	1.55	2.55	64%	100
Infosys	7.82	7.80	0%	-2
TCS	5.06	2.00	-61%	-306
Tech Mahindra	0.95	1.95	105%	100
Wipro	1.19	1.19	0%	0
Metals & Mining	3.94	5.30	35%	137
Coal India	0.45	0.45	0%	0
Hindalco	0.91	1.72	89%	81
JSW Steel	1.14	1.14	0%	0
Tata Steel	1.43	1.99	39%	56
Oil & Gas	11.39	6.99	-39%	-441
BPCL	0.64	1.68	160%	103
GAIL	0.00	0.00	NA	0
Indian Oil	0.38	0.89	136%	51
ONGC	0.63	1.14	79%	50
Reliance Industries	9.74	3.29	-66%	-645
Pharmaceuticals	3.62	5.58	54%	196
Cadila Healthcare	0.00	1.04	NA	104
Cipla	0.70	1.17	68%	47
Divi's Lab	0.80	0.00	-100%	-80
Dr. Reddy's Lab	0.98	1.72	75%	74
Sun Pharma	1.14	1.65	44%	51
Ports & Logistics	0.88	0.00	-100%	-88
Adani Ports	0.88	0.00	-100%	-88
Power	1.64	2.11	29%	47
NTPC	0.78	0.78	0%	0
Power Grid Corporation	0.86	1.34	56%	48
Telecommunications	2.14	2.65	24%	51
Bharti Airtel	2.14	2.65	24%	51
Cash		0.00		
Nifty	100.0	100.0		

Source: Emkay Research; Note: *We have internally capped single stock exposure to 10% in our EAP

Sector portfolio NAV

	Base					Latest	
	1-Apr-19	7-May-20	6-Nov-20	5-Feb-21	8-Apr-21	7-May-21	
EAP - Nifty	100.0	78.1	98.2	123.4	122.7	123.2	
Nifty50	100.0	78.8	105.1	127.9	127.5	127.0	

*Performance measurement base date 1st April 2019

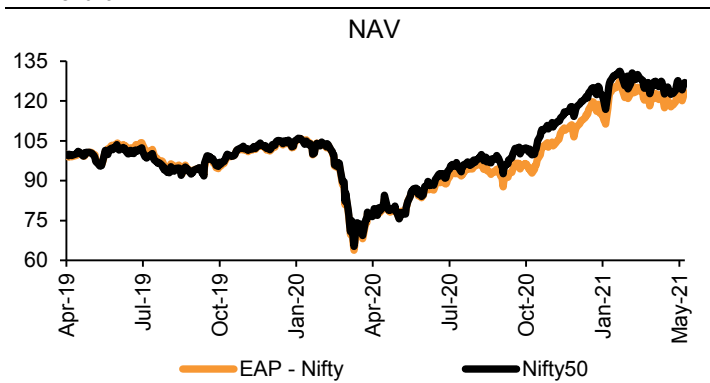
Source: Emkay Research

Price Performance (%)

	1m	3m	6m	12m
EAP - Nifty	0.4%	-0.2%	25.5%	57.7%
Nifty50	-0.3%	-0.7%	20.9%	61.1%

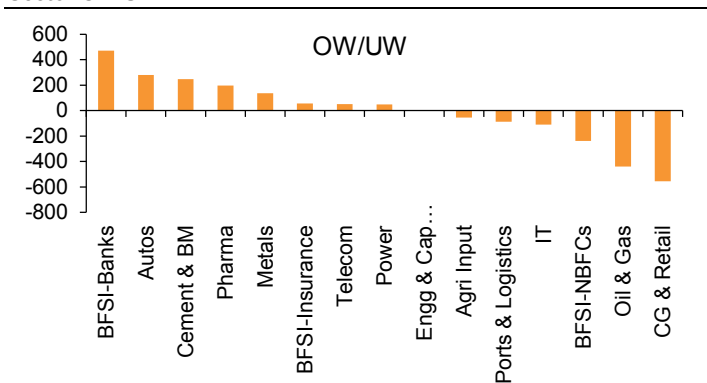
Source: Emkay Research

NAV chart



Source: Emkay Research

Sector OW/UW



Source: Emkay Research

Please see our model portfolio (Emkay Alpha Portfolio): [SMID](#)

“Emkay Alpha Portfolio – SMID and Nifty are a supporting document to the Emkay Alpha Portfolios Report and is updated on regular intervals”

Emkay Rating Distribution

Ratings	Expected Return within the next 12-18 months.
BUY	Over 15%
HOLD	Between -5% to 15%
SELL	Below -5%

Completed Date: 11 May 2021 12:09:04 (SGT)

Dissemination Date: 11 May 2021 12:10:04 (SGT)

Sources for all charts and tables are Emkay Research unless otherwise specified.

GENERAL DISCLOSURE/DISCLAIMER BY EMKAY GLOBAL FINANCIAL SERVICES LIMITED (EGFSL):

Emkay Global Financial Services Limited (CIN-L67120MH1995PLC084899) and its affiliates are a full-service, brokerage, investment banking, investment management and financing group. Emkay Global Financial Services Limited (EGFSL) along with its affiliates are participants in virtually all securities trading markets in India. EGFSL was established in 1995 and is one of India's leading brokerage and distribution house. EGFSL is a corporate trading member of Bombay Stock Exchange Limited (BSE), National Stock Exchange of India Limited (NSE), MCX Stock Exchange Limited (MCX-SX). EGFSL along with its subsidiaries offers the most comprehensive avenues for investments and is engaged in the businesses including stock broking (Institutional and retail), merchant banking, commodity broking, depository participant, portfolio management, insurance broking and services rendered in connection with distribution of primary market issues and financial products like mutual funds, fixed deposits. Details of associates are available on our website i.e. www.emkayglobal.com

EGFSL is registered as Research Analyst with SEBI bearing registration Number INH000000354 as per SEBI (Research Analysts) Regulations, 2014. EGFSL hereby declares that it has not defaulted with any stock exchange nor its activities were suspended by any stock exchange with whom it is registered in last five years, except that NSE had disabled EGFSL from trading on October 05, October 08 and October 09, 2012 for a manifest error resulting into a bonafide erroneous trade on October 05, 2012. However, SEBI and Stock Exchanges have conducted the routine inspection and based on their observations have issued advice letters or levied minor penalty on EGFSL for certain operational deviations in ordinary/routine course of business. EGFSL has not been debarred from doing business by any Stock Exchange / SEBI or any other authorities; nor has its certificate of registration been cancelled by SEBI at any point of time.

EGFSL offers research services to clients as well as prospects. The analyst for this report certifies that all of the views expressed in this report accurately reflect his or her personal views about the subject company or companies and its or their securities, and no part of his or her compensation was, is or will be, directly or indirectly related to specific recommendations or views expressed in this report.

Other disclosures by Emkay Global Financial Services Limited (Research Entity) and its Research Analyst under SEBI (Research Analyst) Regulations, 2014 with reference to the subject company(s) covered in this report

EGFSL and/or its affiliates may seek investment banking or other business from the company or companies that are the subject of this material. Our salespeople, traders, and other professionals may provide oral or written market commentary or trading strategies to our clients that reflect opinions that are contrary to the opinions expressed herein, and our proprietary trading and investing businesses may make investment decisions that may be inconsistent with the recommendations expressed herein. In reviewing these materials, you should be aware that any or all of the foregoing, among other things, may give rise to real or potential conflicts of interest including but not limited to those stated herein. Additionally, other important information regarding our relationships with the company or companies that are the subject of this material is provided herein. This report is not directed to, or intended for distribution to or use by, any person or entity who is a citizen or resident of or located in any locality, state, country or other jurisdiction where such distribution, publication, availability or use would be contrary to law or regulation or which would subject EGFSL or its group companies to any registration or licensing requirement within such jurisdiction. Specifically, this document does not constitute an offer to or solicitation to any U.S. person for the purchase or sale of any financial instrument or as an official confirmation of any transaction to any U.S. person. Unless otherwise stated, this message should not be construed as official confirmation of any transaction. No part of this document may be used by private customers in United Kingdom. All material presented in this report, unless specifically indicated otherwise, is under copyright to Emkay. None of the material, nor its content, nor any copy of it, may be altered in any way, transmitted to, copied or distributed to any other party, without the prior express written permission of EGFSL. All trademarks, service marks and logos used in this report are trademarks or registered trademarks of EGFSL or its Group Companies. The information contained herein is not intended for publication or distribution or circulation in any manner whatsoever and any unauthorized reading, dissemination, distribution or copying of this communication is prohibited unless otherwise expressly authorized. Please ensure that you have read "Risk Disclosure Document for Capital Market and Derivatives Segments" as prescribed by Securities and Exchange Board of India before investing in Indian Securities Market. In so far as this report includes current or historic information, it is believed to be reliable, although its accuracy and completeness cannot be guaranteed.

- This publication has not been reviewed or authorized by any regulatory authority. There is no planned schedule or frequency for updating research publication relating to any issuer.
- Please contact the primary analyst for valuation methodologies and assumptions associated with the covered companies or price targets

Disclaimer for U.S. persons only: This research report is a product of Emkay Global Financial Services Limited (Emkay), which is the employer of the research analyst(s) who has prepared the research report. The research analyst(s) preparing the research report is/are resident outside the United States (U.S.) and are not associated persons of any U.S. regulated broker-dealer and therefore the analyst(s) is/are not subject to supervision by a U.S. broker-dealer, and is/are not required to satisfy the regulatory licensing requirements of Financial Institutions Regulatory Authority (FINRA) or required to otherwise comply with U.S. rules or regulations regarding, among other things, communications with a subject company, public appearances and trading securities held by a research analyst account. This report is intended for distribution to "Major Institutional Investors" as defined by Rule 15a-6(b)(4) of the U.S. Securities and Exchange Act, 1934 (the Exchange Act) and interpretations thereof by U.S. Securities and Exchange Commission (SEC) in reliance on Rule 15a-6(a)(2). If the recipient of this report is not a Major Institutional Investor as specified above, then it should not act upon this report and return the same to the sender. Further, this report may not be copied, duplicated and/or transmitted onward to any U.S. person, which is not the Major Institutional Investor. In reliance on the exemption from registration provided by Rule 15a-6 of the Exchange Act and interpretations thereof by the SEC in order to conduct certain business with Major Institutional Investors.

ANALYST CERTIFICATION BY EMKAY GLOBAL FINANCIAL SERVICES LIMITED (EGFSL)

The research analyst(s) primarily responsible for the content of this research report, in part or in whole, certifies that the views about the companies and their securities expressed in this report accurately reflect his/her personal views. The analyst(s) also certifies that no part of his/her compensation was, is, or will be, directly or indirectly, related to specific recommendations or views expressed in the report. The research analyst (s) primarily responsible of the content of this research report, in part or in whole, certifies that he or his associate¹ does not serve as an officer, director or employee of the issuer or the new listing applicant (which includes in the case of a real estate investment trust, an officer of the management company of the real estate investment trust; and in the case of any other entity, an officer or its equivalent counterparty of the entity who is responsible for the management of the issuer or the new listing applicant). The research analyst(s) primarily responsible for the content of this research report or his associate does not have financial interests² in relation to an issuer or a new listing applicant that the analyst reviews. EGFSL has procedures in place to eliminate, avoid and manage any potential conflicts of interests that may arise in connection with the production of research reports. The research analyst(s) responsible for this report operates as part of a separate and independent team to the investment banking function of the EGFSL and procedures are in place to ensure that confidential information held by either the research or investment banking function is handled appropriately. There is no direct link of EGFSL compensation to any specific investment banking function of the EGFSL.

¹ An associate is defined as (i) the spouse, or any minor child (natural or adopted) or minor step-child, of the analyst; (ii) the trustee of a trust of which the analyst, his spouse, minor child (natural or adopted) or minor step-child, is a beneficiary or discretionary object; or (iii) another person accustomed or obliged to act in accordance with the directions or instructions of the analyst.

² Financial interest is defined as interest that are commonly known financial interest, such as investment in the securities in respect of an issuer or a new listing applicant, or financial accommodation arrangement between the issuer or the new listing applicant and the firm or analysis. This term does not include commercial lending conducted at the arm's length, or investments in any collective investment scheme other than an issuer or new listing applicant notwithstanding the fact that the scheme has investments in securities in respect of an issuer or a new listing applicant.

COMPANY-SPECIFIC / REGULATORY DISCLOSURES BY EMKAY GLOBAL FINANCIAL SERVICES LIMITED (EGFSL):

Disclosures by Emkay Global Financial Services Limited (Research Entity) and its Research Analyst under SEBI (Research Analyst) Regulations, 2014 with reference to the subject company(s) covered in this report:-

1. EGFSL, its subsidiaries and/or other affiliates do not have a proprietary position in the securities recommended in this report as of May 11, 2021
2. EGFSL, and/or Research Analyst does not market make in equity securities of the issuer(s) or company(ies) mentioned in this Research Report
Disclosure of previous investment recommendation produced:
3. EGFSL may have published other investment recommendations in respect of the same securities / instruments recommended in this research report during the preceding 12 months. Please contact the primary analyst listed in the first page of this report to view previous investment recommendations published by EGFSL in the preceding 12 months.
4. EGFSL, its subsidiaries and/or other affiliates and Research Analyst or his/her relative's does not have any material conflict of interest in the securities recommended in this report as of May 11, 2021.
5. EGFSL, its subsidiaries and/or other affiliates and Research Analyst or his/her relative's does not have actual/beneficial ownership of 1% or more securities of the subject company at the end of the month immediately preceding the May 11, 2021
6. EGFSL, its subsidiaries and/or other affiliates and Research Analyst have not received any compensation in whatever form including compensation for investment banking or merchant banking or brokerage services or for products or services other than investment banking or merchant banking or brokerage services from securities recommended in this report (subject company) in the past 12 months.
7. EGFSL, its subsidiaries and/or other affiliates and/or and Research Analyst have not received any compensation or other benefits from securities recommended in this report (subject company) or third party in connection with the research report.
8. Securities recommended in this report (Subject Company) has not been client of EGFSL, its subsidiaries and/or other affiliates and/or and Research Analyst during twelve months preceding the May 11, 2021

RESTRICTIONS ON DISTRIBUTION

General	This report is not directed to, or intended for distribution to or use by, any person or entity who is a citizen or resident of or located in any locality, state, country or other jurisdiction where such distribution, publication, availability or use would be contrary to law or regulation.
Australia	This report is not for distribution into Australia.
Hong Kong	This report is not for distribution into Hong Kong.
Indonesia	This report is being distributed in Indonesia by PT DBS Vickers Sekuritas Indonesia.
Malaysia	This report is not for distribution into Malaysia.
Singapore	This report is distributed in Singapore by DBS Bank Ltd (Company Regn. No. 16800306E) or DBSVS (Company Regn. No. 1860024G) both of which are Exempt Financial Advisers as defined in the Financial Advisers Act and regulated by the Monetary Authority of Singapore. DBS Bank Ltd and/or DBSVS, may distribute reports produced by its respective foreign entities, affiliates or other foreign research houses pursuant to an agreement under Regulation 32C of the financial Advisers Regulations. Singapore recipients should contact DBS Bank Ltd at 6327 2288 for matters arising from, or in connection with the report.
Thailand	This report is being distributed in Thailand by DBS Vickers Securities (Thailand) Co Ltd.
United Kingdom	This report is disseminated in the United Kingdom by DBS Vickers Securities (UK) Ltd, ("DBSVUK"). DBSVUK is authorised and regulated by the Financial Conduct Authority in the United Kingdom. In respect of the United Kingdom, this report is solely intended for the clients of DBSVUK, its respective connected and associated corporations and affiliates only and no part of this document may be (i) copied, photocopied or duplicated in any form or by any means or (ii) redistributed without the prior written consent of DBSVUK. This communication is directed at persons having professional experience in matters relating to investments. Any investment activity following from this communication will only be engaged in with such persons. Persons who do not have professional experience in matters relating to investments should not rely on this communication.
Dubai International Financial Centre	This research report is being distributed by DBS Bank Ltd., (DIFC Branch) having its office at units 608-610, 6 th Floor, Gate Precinct Building 5, PO Box 506538, Dubai International Financial Centre (DIFC), Dubai, United Arab Emirates. DBS Bank Ltd., (DIFC Branch) is regulated by The Dubai Financial Services Authority. This research report is intended only for professional clients (as defined in the DFSA rulebook) and no other person may act upon it.
United Arab Emirates	This report is provided by DBS Bank Ltd (Company Regn. No. 196800306E) which is an Exempt Financial Adviser as defined in the Financial Advisers Act and regulated by the Monetary Authority of Singapore. This report is for information purposes only and should not be relied upon or acted on by the recipient or considered as a solicitation or inducement to buy or sell any financial product. It does not constitute a personal recommendation or take into account the particular investment objectives, financial situation, or needs of individual clients. You should contact your relationship manager or investment adviser if you need advice on the merits of buying, selling or holding a particular investment. You should note that the information in this report may be out of date and it is not represented or warranted to be accurate, timely or complete. This report or any portion thereof may not be reprinted, sold or redistributed without our written consent.
United States	DBSVUSA did not participate in its preparation. The research analyst(s) named on this report are not registered as research analysts with FINRA and are not associated persons of DBSVUSA. The research analyst(s) are not subject to FINRA Rule 2241 restrictions on analyst compensation, communications with a subject company, public appearances and trading securities held by a research analyst. This report is being distributed in the United States by DBSVUSA, which accepts responsibility for its contents. This report may only be distributed to Major U.S. Institutional Investors (as defined in SEC Rule 15a-6) and to such other institutional investors and qualified persons as DBSVUSA may authorize. Any U.S. person receiving this report who wishes to effect transactions in any securities referred to herein should contact DBSVUSA directly and not its affiliate.
Other jurisdictions	In any other jurisdictions, except if otherwise restricted by laws or regulations, this report is intended only for qualified, professional, institutional or sophisticated investors as defined in the laws and regulations of such jurisdictions.

Emkay Global Financial Services Ltd.

CIN - L67120MH1995PLC084899

7th Floor, The Ruby, Senapati Bapat Marg, Dadar - West, Mumbai - 400028. India

Tel: +91 22 66121212 Fax: +91 22 66121299 Web: www.emkayglobal.com