

Global Economics Comment: Vaccinating the Population: A Timeline (Struyven/Bhushan)

- With several vaccines approaching approval, we forecast monthly vaccinations for the large advanced economies combining estimates of supply (using data from five leading developers) and demand (using consumer surveys).
- In the US, we expect the first available doses to go to high-risk groups from mid-December onwards, leading to significant public health benefits from Q1 onwards, followed by widespread vaccination commencing in April.
- Looking more broadly, we expect large shares of the population to be vaccinated by late Q2 in all major DMs. The UK is expected to vaccinate 50% of its population in March with the US and Canada following in April, and the EU, Japan, and Australia in May. As production becomes abundant in Q2, demand drives vaccination and surpasses 70% across DMs in the fall.
- We explore a downside scenario where the AstraZeneca and Johnson & Johnson vaccines do not succeed and demand weakens. This scenario shows slower vaccinations in Europe, which is more reliant on these developers, but also less medium-run vaccinations elsewhere owing to weaker demand, which appears most fragile in the US and Japan.
- While the exact timeline remains quite uncertain, this analysis reinforces our baseline forecast that widespread immunization should drive a sharp pickup in global growth starting in Q2.

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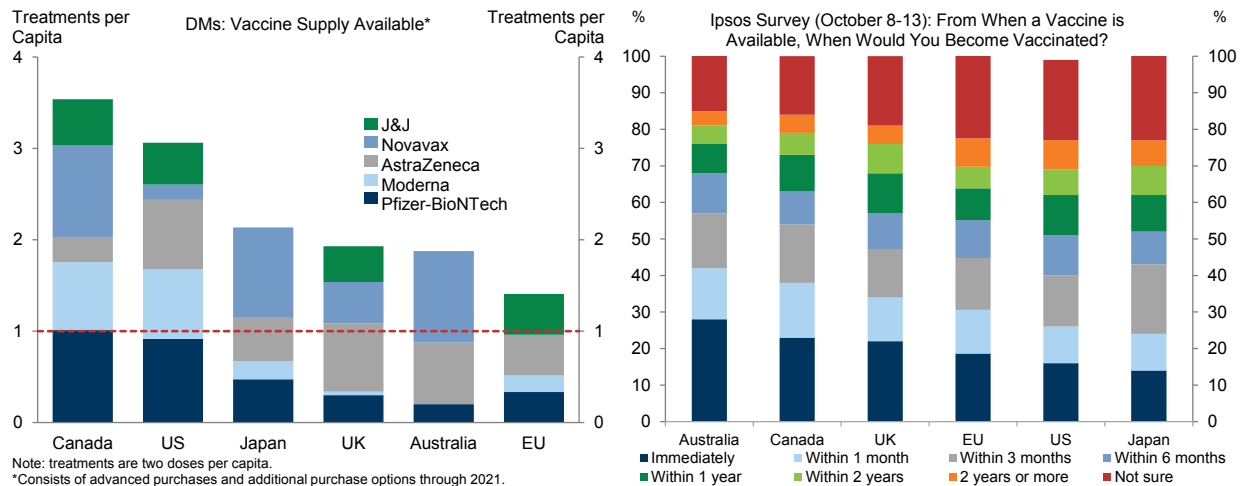
Vaccinating the Population: A Timeline (Struyven/Bhushan)¹

Following encouraging trial results from Pfizer-BioNTech, Moderna and AstraZeneca, the FDA is likely to approve the Pfizer-BioNTech and Moderna vaccines in coming weeks with FDA Advisory Committee meetings on December 10 and possibly December 17, respectively. Based on comments from European Commission President Ursula von der Leyen, the European Medicines Agency (EMA) is likely to authorize the three leading vaccines by year-end. With market focus shifting from approval to actual distribution, we forecast monthly vaccinations for six major advanced economies in five steps:

1. Global vaccine production: We use monthly global production projections from our health care equity analysts for Pfizer-BioNTech, Moderna, AstraZeneca, Novavax, and Johnson & Johnson. The projections assume that production gradually rises in early 2021 and achieves the announced targets.

2. Country vaccine supply: To allocate production across countries, we use data on agreements of purchases and purchase options, shown in the left panel of Exhibit 1, and data on initial deliveries. We assume the production share a country receives from a developer rises in the country’s initial deliveries, confirmed purchases, optional purchases, and population but falls to zero when contracted and optional purchases are delivered or when cumulative deliveries across the five developers exceed 90% of the population.²

Exhibit 1: Elevated Supply Agreements in North America; Surveys Suggest That Demand Is Likely to Rise Over Time



Source: Ipsos, Goldman Sachs Global Investment Research

3. Country vaccine demand: We use responses to the global Ipsos survey question of “From when a vaccine is available, when would you become vaccinated?” (Exhibit 1, right). This survey suggests that most people expect to wait some time before taking it,

¹ The authors thank Salveen Richter, Terence Flynn and Keyur Parekh for their input.

² We assume the country shares of monthly Pfizer-BioNTech and Moderna deliveries are a weighted average of its shares in initial deliveries (30% weight), confirmed purchases (20%), optional purchases (15%), and its population (35%). While the exact allocation is unknown, these weights imply early US deliveries closely matching guidance from public health officials.

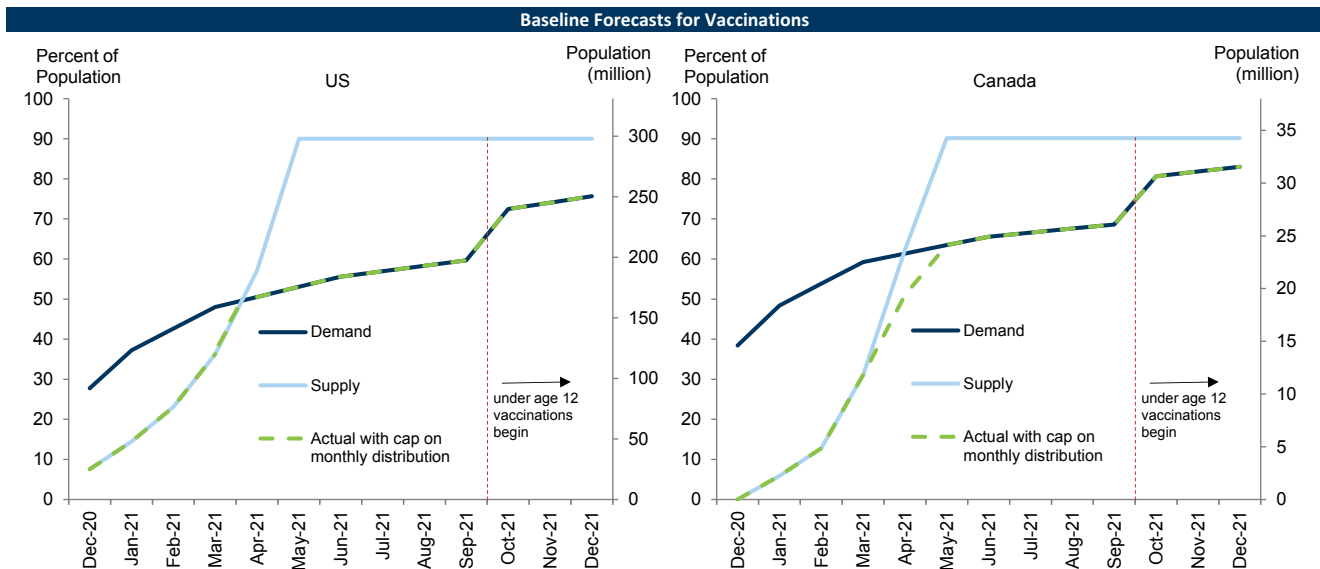
consistent with wanting to learn more about safety, side effects, and effectiveness. We also assume that demand will be more elevated and front-loaded than reported in the October Ipsos survey, which preceded recent trial results and upcoming public vaccination campaigns.³ Based on the expected timing of trials for children, we assume vaccinations for children under age 12 start globally in October 2021.

4. Vaccine distribution capacity: We assume a speed limit on distribution that rises from 10% of the population in December to 20% of the population from February 2021 onwards based on the peak speed of the flu vaccine US distribution this year, corresponding to 20% of the population per month.⁴

5. Country vaccinations: We estimate monthly vaccination as the minimum of supply, demand, and distribution capacity.⁵

Exhibit 2 illustrates the estimates of supply (light blue), demand (dark blue), and actual vaccinations (dotted green line) for the US and Canada. In both countries, vaccination is initially significantly limited by scarce supply, until additional capacity allows supply to exceed slowing demand in April. In Canada, the speed limit on distribution binds briefly in April. Demand drives vaccination from April in the US and May in Canada, rises gradually over the summer based on survey estimates, increases significantly with child vaccinations in the fall, and jumps past 70% in October in both countries.

Exhibit 2: We Expect Supply to Exceed Demand in April in North America



Source: Goldman Sachs Global Investment Research

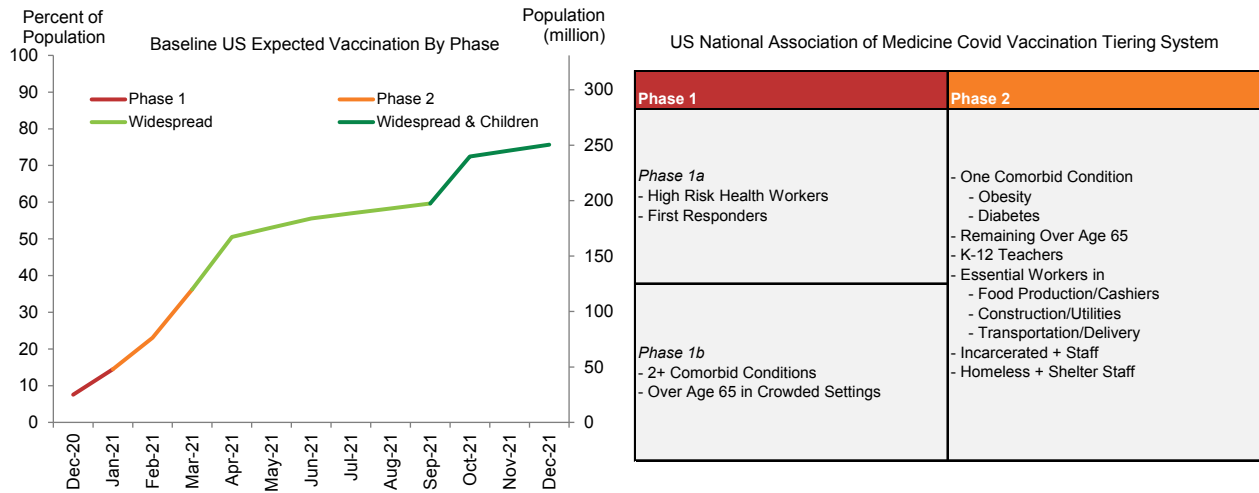
³ To incorporate these expected increases in demand, we adjust the surveys following two approaches and then take a weighted average across approaches. First, we assume that 50% of those who said ‘not sure’ move to one of the categories with a timeframe of less than a year. Second, we assume that everyone moves forward two categories, with for instance ‘within 1 month’ and ‘within 3 months’ moving to ‘immediately’.

⁴ While more limited experience with Covid-19 vaccines, the double dose regimen, and cold storage requirements suggest a slower distribution relative to the flu vaccine, the large resources and public focus on distributing Covid vaccines suggest a faster distribution.

⁵ For simplicity, we count vaccination starting from the first dose onwards even though most leading vaccines will require a second shot delivered 3-4 weeks later.

Exhibit 3 shows our expected timeline for actual US vaccinations by tiering phase. High-risk groups, mostly health care workers and individuals with comorbid conditions, will likely receive the first available doses from mid-December, likely leading to significant public health benefits from Q1 onwards, followed by widespread vaccination from early April.

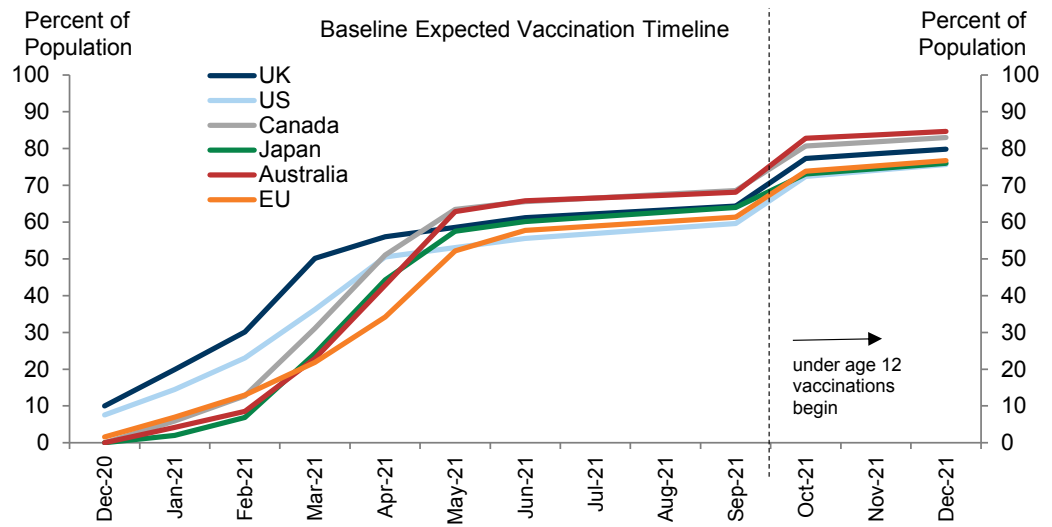
Exhibit 3: We Expect the First Available US Doses to Go to High-Risk Groups from December Onwards Followed by Widespread Vaccination Commencing in April



Source: National Association of Medicine, Goldman Sachs Global Investment Research

Looking more broadly, our baseline forecast is that large shares of the population are vaccinated by the end of Q2 in all major DMs (Exhibit 4). The UK is expected to vaccinate 50% of its population in March with the US and Canada following in April. We forecast that the EU, Japan, and Australia reach this 50% threshold in May. As production becomes abundant by mid-Q2, vaccination rises gradually with demand and surpasses 70% across all DMs in the fall when children become eligible.

Exhibit 4: Under Our Baseline Forecast, Large Shares of the Population Are Vaccinated by the End of Q2 in All Major DMs

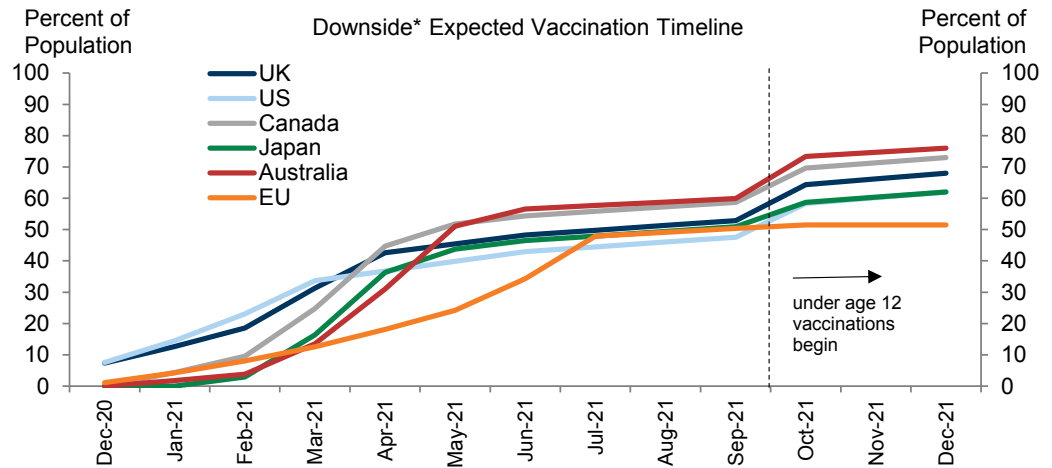


Source: Goldman Sachs Global Investment Research

We next explore a downside scenario. This scenario assumes that (1) the AstraZeneca and Johnson & Johnson vaccines, which are both viral vector vaccines, do not succeed (perhaps reflecting safety events), and (2) vaccine demand measures fall back to October 2020 Ipsos survey levels. In this scenario, supply rises much more slowly in the EU, reflecting a larger reliance on both developers. In the medium run, vaccination levels are the lowest in the EU (assuming no new contracts are signed) but also the US and Japan, where the decline in demand leaves vaccination at relatively low long-term levels. In contrast, Australia and Canada are more resilient, benefiting from diversified supply contracts and relatively strong vaccine demand measures.

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Exhibit 5: Europe Appears More Vulnerable to a Downside Scenario Where AstraZeneca and Johnson & Johnson Vaccines Do Not Succeed



*For the downside scenario, we assume that AstraZeneca and J&J vaccines do not get approved. We expect this to weaken demand and so do not make positive adjustments to the October Ipsos survey as in our baseline.

Source: Goldman Sachs Global Investment Research

The medium-run effects of the various vaccine candidates, their impact on transmission, vaccine supply, and especially vaccine demand remain quite uncertain and imply that risks are skewed to a later timeline. Moving in the other direction, the global vaccine pipeline is deeper than the top-5 Western candidates our simulations consider. Taken together, this analysis reinforces our baseline forecast that widespread immunization should drive a sharp pickup in global growth starting in Q2.

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