Note: The following is a redacted version of the original report published June 30, 2020 [9 pgs].

Global Markets Daily: Pricing the Probability of Virus Risks (Wilson)

- While our baseline forecast of the US cyclical outlook remains relatively optimistic, the market has renewed its focus on the possible downside risks to the outlook from the latest increase in new US virus cases.
- The tension at the heart of the market is between robust current cyclical news and the increased focus on downside risks from deteriorating medical news, and the key to markets in the near future is likely to involve understanding how the market's probabilities on these scenarios will shift going forward.
- We map our baseline forecast and risk scenarios for US GDP growth to S&P 500 levels and the implied probabilities the market is placing on health risks and show that the market is attaching a much higher weight to the downside risk case than a few weeks ago.

Dominic Wilson
+1(212)902-5924 |
dominic.wilson@gs.com
Goldman Sachs & Co. LLC

Focus: Pricing the Probability of Virus Risks

Our baseline forecast of the US cyclical outlook remains relatively optimistic, and we continue to argue that this baseline is not fully reflected in asset prices. Over the last few weeks, however, the market has renewed its focus on the possible downside risks to the outlook from the latest reacceleration in new US virus cases. The tension at the heart of the market is between robust current cyclical news and the increased focus on downside risks from deteriorating medical news.

In April, we introduced a framework for examining market pricing as a function of expected economic growth. Combining this with US GDP growth forecasts for our baseline outlook and the two main risk scenarios on virus outcomes, we can roughly benchmark where we would expect the S&P 500 to be in different states of the world. From there, we can back out an estimate of the implied probabilities that the market is placing on each scenario.

Our baseline forecast remains a relatively optimistic one. Our US economists now expect a more front-loaded recovery, with our latest forecasts showing -4.2% growth in 2020 and 5.8% in 2021. We recently quantified two risk scenarios related to the health outlook.[1] On the downside, we outlined the possibility of a potential large second wave of the virus that picks up sharply in Q4. In this scenario, we

[1] Our US economists also quantified a fiscal risk scenario, but since this is not directly related to the health issues in hand, and operates on a shorter horizon, we omit it from this analysis.

would expect slower growth in 2020 and a slower recovery in 2021 (-5.2% and 2.2%, respectively). On the upside, we considered an earlier-than-expected vaccine in the first quarter of 2021, which would likely lead to an immediate and sharp pickup in growth (-4.2% growth in 2020, and 6.8% in 2021). Exhibit 1 details our growth forecasts for each scenario.

Exhibit 1: Risks to our baseline growth outlook on both sides

	2020 QoQ AR				2021 QoQ AR				Annual Avg	
Scenario	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	2020	2021
Baseline	**-6.5**	**-33**	**33**	**8**	**6.5**	**5**	**4**	**3**	**-4.2**	**5.8**
Virus Downside	-6.5	-34	29	0	-4	7	8	6	-5.2	2.2
Vaccine Upside	-6.5	-33	33	8	9	8	3	3	-4.2	6.8

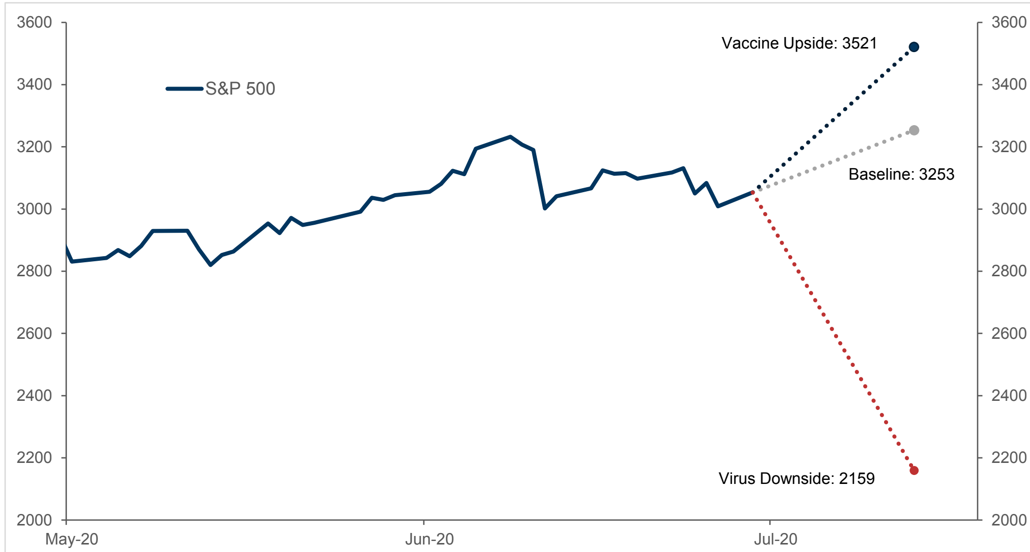
Source: Goldman Sachs Global Investment Research

We can translate these three scenarios into rough estimates of S&P 500 levels that we think would be consistent with each outcome. We showed in previous work that S&P 500 returns could be explained in part by consensus forecast revisions over the following two years. As we showed in a subsequent exercise, we can use this framework to estimate the implied level for the S&P 500 under the thought experiment that the market consensus moved to the GS growth forecasts in each of our three scenarios.[2] From this, we get predicted S&P 500 values of roughly 3253 for our baseline scenario, 3521 for our vaccine upside scenario, and 2159 for our virus downside scenario, as shown in Exhibit 2.[3]

2 Specifically, we regress the percent change in the S&P 500 index on changes in 1y and 1y1y GDP growth forecasts between survey dates from April 2003 to April 2020. We then take the coefficients from our S&P 500 and growth revisions regression and apply them to these hypothetical revisions in 1y and 1y1y expected growth for each scenario. We cumulate the predicted percent change in the S&P 500 from January's survey date through July's survey date for each growth scenario and apply that percentage change to the level of the S&P 500 on January's survey date.

3 As a cross-check, we also performed this same exercise with the coefficients from our growth factors and growth revisions regression, which we then "translated" into S&P 500 levels using asset sensitivity betas from our factor framework. We obtained similar results.

Exhibit 2: Pricing the S&P 500 in each scenario

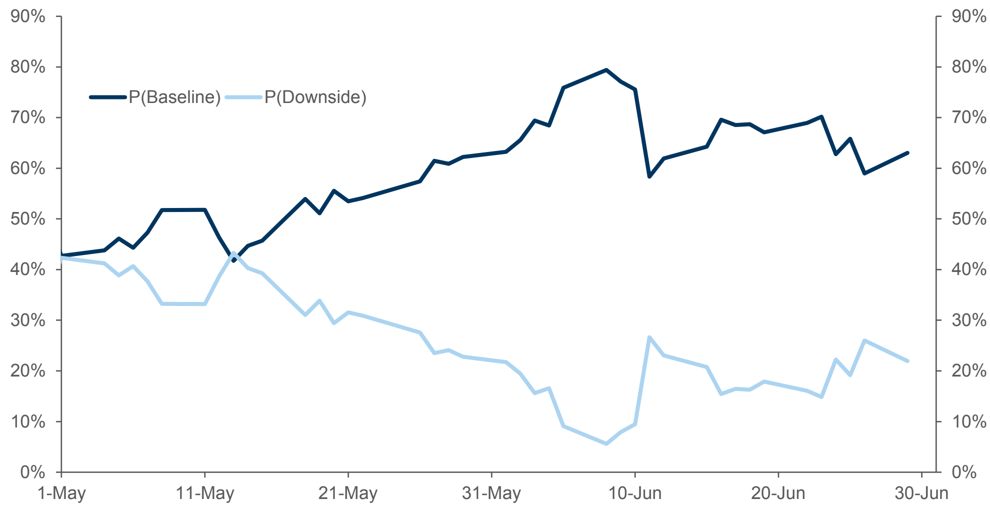


Source: Goldman Sachs Global Investment Research

Seen through this prism, the equity market rally through the first week of June, and the sell-off since then, can be understood as the market putting a higher weight on the risk of a downside outcome. We can illustrate that process by backing out the implied probabilities that the market is pricing in for each scenario at different points in time from our predicted S&P 500 values. Clearly, this is a rough exercise that requires several assumptions, but we find it helpful as a way to think about market views as market participants balance economic and medical news flows. We assume first that at any given time the current level of the S&P 500 is a weighted average of our three predicted S&P 500 levels, weighted by the probability that the markets are placing on each. Second, we assume that these scenarios are the only scenarios (that is, that their probabilities sum to 1). Third, we assume that over the last month or two, the probability of the vaccine upside scenario has been relatively stable and fixed at 15%.[4] Using a time series of the S&P 500 in recent months, we can then generate implied probabilities based on the S&P 500 level that day for the baseline and two risk scenarios. Exhibit 3 shows the implied probability of the downside case falling steadily through June and then turning sharply higher after the first week of June. The timing of that shift roughly matches the timing of the shifts in US case growth news.

[4] Changing the assumptions on the (fixed) probability of upside medical news simply shifts the whole path of probabilities up or down but does not change the pattern over time.

Exhibit 3: Markets placing more weight in recent weeks on the downside scenario



Source: Goldman Sachs Global Investment Research

Based on these estimates, the market came close to pricing balanced risks around our baseline growth view in the immediate aftermath of the payrolls release at the beginning of the month. With the medical news still supportive at that point, the market's weight on the downside case was low (well below 10% in our simple analysis). Because the downside case for equities implies a much lower index level (essentially a return to the March lows) than the baseline, the market can drop meaningfully simply by increasing the risks it places on that case even if that scenario remains a long way from the central case. We think some version of that process is what has occurred in the last three weeks. Using these simple estimates, the fall in the equity market since the beginning of June is consistent with a roughly 20 percentage point increase in the probability of our downside case (to a little over 25%).

The picture here is obviously simplistic. In practice, the distribution is much more complicated than the three cases we consider and a range of other outcomes are possible, so we would not take the exact probabilities too literally. Still, we think this simplification is helpful in allowing us to put some consistent structure and parameters on the basic market problem and to clarify views. The key to markets in the next month or two is likely to involve understanding how the market's probabilities on these scenarios will shift going forward.

With the virus news deteriorating after a period of significant market relaxation, it is not surprising that the market is placing an increased weight on downside risks in recent days. As the market drops, however, the balance of risks naturally changes. The implied upside both to the S&P 500 levels implied by our baseline growth view (8% higher than Friday's close) and to the upside vaccine scenario (17% higher) are steadily becoming more meaningful again. The weight being applied to the downside case is rising to a point where we think it is reflecting the underlying risk more fully. Our framework implies that for the equity market to move below 2825 (6% below Friday's close) you would need to believe the downside case should be the modal view. As we move closer to that point, the gap between our forecasts and the market's is becoming more noteworthy.

By the same token, if this broad approach is correct, the market is likely to struggle to find a firm footing unless it can begin to reduce the risks it attaches to the downside case. That is likely to be difficult unless the news flow suggests either that the infection spread is no longer accelerating or that the impact on economic activity is proving to be manageable. It is also important that the more reassuring news in parts of the country outside the new hotspots continues.

So far, the medical news is mostly still deteriorating. But evidence that behavior is becoming more cautious and that more forceful efforts are now taking place to reduce activities that show association with increased spread (more enforcement in mask-wearing, restrictions on bar and indoor dining and, in Florida, beach closures) make it more likely that we will see some progress in the case data within 2-3 weeks. Although the market has worried about the economic impact of these shifts, we think concerted action in these areas would provide the basis for a better medium-term picture. However, prior lockdowns illustrated that there is a meaningful lag between taking action and seeing its impact in the statistics. Given these lags, mortality statistics, which have so far remained reassuring, may also start to pick up given recent increases in cases and hospitalizations. As a result, even if recent measures are reasonably effective, we think the market may need to navigate further negative headlines in the next week or two.

The author would like to thank Vickie Chang for her significant contribution to this work.

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