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Revisiting Covid Scarring in Emerging Markets

Chris Jackson and Jason Lu

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Revisiting COVID Scarring in Emerging Markets

Prepared by Chris Jackson and Jason Lu*

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ABSTRACT: The Covid-19 pandemic is expected to result in large and persistent losses in economic output, known as scarring. These losses were expected to be more severe in Emerging Markets than in Advanced Economies. This paper examines the impact of Covid on output in Emerging Markets so far and its implications for projections of economic scarring. While Covid has had a material impact on activity, the recovery has been stronger than initially expected. We find that these positive data surprises have over time been treated increasingly as transitory rather than a signal for the state of scarring. Second, we show that the composition of output losses has been qualitatively different from past last shocks. History suggests that the main driver of scarring is weak productivity. Covid losses, however, have so far been more skewed to employment with a smaller than usual impact on productivity. We argue that these findings suggest that scarring, while substantial, may be ultimately less severe than initially feared, at least over the medium term. We provide alternative sets of medium-term projections to indicate potential magnitudes.

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WORKING PAPERS

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1.Introduction

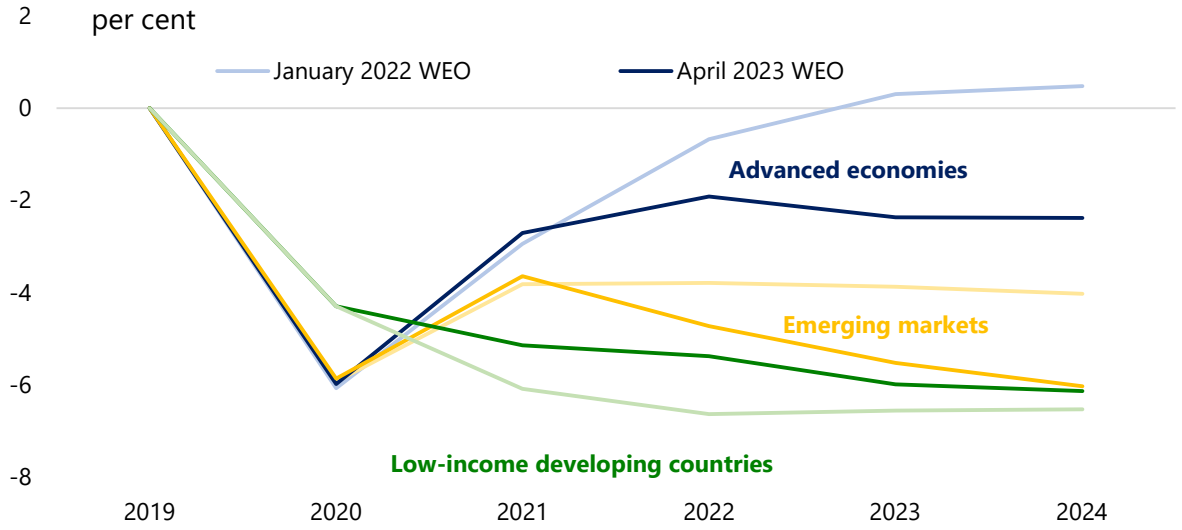
Global case rates of Covid-19 have fallen substantially since early 2022 as many countries around the world have successfully vaccinated their populations against the virus. The likelihood of severe symptoms or death has also fallen substantially. However, as of mid-2023, the global economy is still in a process of economic recovery from the pandemic. Even as attention shifts from the direct effects of the pandemic on public health and mobility, its lasting economic impact remains a prevalent subject of policy and research debate.

The economic shock of the pandemic was unprecedented in many respects. Lockdowns in 2020 led to a sudden contraction in output much larger than that seen in past recessions. Its impact was also felt unevenly across sectors and countries. Government restrictions and changes in people's behavior led to particularly sharp contractions in contact-intensive services. The pandemic also significantly affected people's patterns of work and mobility. These features have made projecting the medium-term implications of the Covid shock for the economy particularly challenging. Even as infection rates have fallen and restrictions have eased, there have been enduring and complex effects on supply chains and labor markets. Many economies have run up against these supply constraints in their recoveries, even as output has remained below trend.

At its onset, the Covid pandemic was widely expected to have a persistent negative impact on output, particularly in Emerging Markets (EMs). Experience suggested that large economic shocks are associated with economic "scarring" – persistent or long-term damage to economic activity (Barrett and others, 2021; Suphaphiphat and Shi, 2022). In addition, earlier work by Aguiar and Gopinath (2007) find that shocks to GDP have a more persistent effect on trend growth in EMs than in Advanced Economies (Aes). Post-Covid output losses were therefore expected to be particularly large among EMs relative to Aes in the medium term, which we interpret in this paper as five years after the start of the pandemic. The January 2022 World Economic Outlook (WEO), for instance, projected that the level of output in EMs by 2024 would be around 4% below that projected before the pandemic, while the level of output in Aes was projected to be closer to pre-pandemic trends (**Figure 1**). The weaker medium-term outlook for EMs relative to Aes reflected lower levels of policy support, additional disruption to education, and reduced access to vaccines (IMF, 2021).

We examine the impact of the pandemic in EMs so far relative to these expectations of large scarring effects and consider the implications for projections of economic scarring in the medium term. While several studies have explored assessments of Covid's medium-term economic damage in the year or so after the start of the pandemic based on the initial economic shock (IMF 2020, 2021; World Bank 2020), fewer recent studies have tracked how those losses have evolved and their implications for forecasts of output. In part this is because more recent shocks – namely Russia's war in Ukraine – have complicated the analysis of the latest data. Nonetheless, our understanding benefits from more than two years of data since the onset of the pandemic. Our focus is on the universe of EMs with available data; we do not single out individual country forecasts but focus on aggregate trends. Moreover, our analysis examines Consensus forecasts as well as the forecasts from the IMF's WEO.

Figure 1: Deviation in GDP from pre-pandemic forecast



Source: Haver, WEO and staff calculations

We take two approaches to this question, both of which draw on a top-down perspective across Emerging Markets. First, we document how the impact of Covid on activity in EMs has evolved relative to expectations. We find that Covid had a material and persistent impact on activity but also that the recovery has proved stronger and faster than expected. We employ a simple Bayesian framework to explore how projected estimates of scarring have responded to news about the speed of the recovery. We find that estimates of scarring were more sensitive to downside data news early in the pandemic, but less responsive to the string of upside data since. As a result, we argue that economic forecasts have taken on too little positive signal from the faster-than-expected recovery. In other words, positive data surprises have been treated as transitory, rather than a signal that scarring may be smaller than initially feared.

Our second approach explores the composition of output losses from Covid so far and how this differs from past recessions. Scarring from past economic shocks was driven mainly by persistently weak productivity, and weak Total Factor Productivity (TFP) in particular (Barrett and others, 2021). During Covid, however, a larger than usual portion of output losses has been accounted for by lower employment; the impact on TFP – the usual main driver of scarring – has been smaller. Moreover, the latest shortfall in employment reflects weak labor participation rates rather than elevated unemployment. The larger contribution of weak employment reflects the unique nature of the Covid shock to working patterns and labor market flows. While the impact on labor supply has been large it has not been as persistent as in other past recessions or crises. By 2022, around two thirds of the shock to employment had unwound compared to only around a tenth three years after a financial crisis.

Finally, we draw implications from the pattern of data revisions and composition of output losses for medium-term scarring prospects in EMs. We find that had the series of positive data surprises continued to be treated as a positive signal about scarring, the projected level of scarring would be ½pp to 2pp lower than WEO or Consensus estimates of scarring. Complementary to this, we also construct a bottom-up estimate of scarring, considering a range of estimates for the persistence of the shock to productivity and the labor market. These also suggest that there is still potential for Covid-related output losses to improve. In our central case, we project Covid-related scarring to reduce to around -2 to -2½% by 2025. This is more optimistic than the pre-war projections in the January 2022 WEO or Consensus in which output losses build to -3½ to 4%.

The implications of these estimates for the outlook are complicated by the confounding effects of Russia's war in Ukraine. Spillovers from the war are likely to have weighed on recent activity and may imply additional scarring effects. Parsing the effects of the two distinct shocks is therefore difficult in practice. To the extent that many pre-war forecasts were generally based on a more pessimistic outlook for Covid-related scarring than we argue here, then growth may not slow to the extent that is projected. Indeed, as we show, growth in 2022 has proved surprisingly resilient despite the onset of new shocks to the global economy.

There are some important caveats. First, we take an aggregated and top-down view of trends across Emerging Markets. Our intention in this is to pick out the broad trends across these economies rather than focus on idiosyncratic effects or explore in detail specific channels; we leave this to further research. Growth across EMs sees substantial co-movement; a principal component of EM GDP growth rates explains half of the total variation in EM growth rates.[1] Therefore, it is natural to consider Covid scarring at a high level across EMs rather than tailoring the analysis to each individual country. Second, our attention is restricted to Emerging Markets and therefore excludes Lower Income Countries (LICs). Therefore, our conclusions about Emerging Markets and middle-income economies may not translate to LICs, which started from more vulnerable positions and could afford lower levels of policy support. Third, our perspective is on the medium term, by which we mean five years after the start of the pandemic. This horizon arguably underplays the impact of the disruption to education, which may prove to be the most significant economic impact of the pandemic in the long run, but which we estimate to be modest in the five years after the start of the pandemic. Finally, our focus is also exclusively on the impact of Covid; we do not consider other important factors that may affect trend growth rates over the medium term.

[1] Results available on request.

2. The Evolution of Post-Covid GDP Losses and Scarring Estimates

We first assess how GDP losses related to Covid have evolved since the start of the pandemic and how these affected views of the medium-term damage from the pandemic. We measure output losses from Covid as the difference between the realized data and the projections in the pre-pandemic January 2020 WEO projections for EMs.[2] Although other shocks have occurred during that time, the difference between the two projections is likely to be overwhelmingly driven by Covid. We use the difference between the January 2020 pre-war projections and subsequent forecasts as estimates of the medium-term level of scarring due to Covid.

The pandemic had a substantial and sustained impact on economic output. The negative impact on GDP in EMs reached a peak of almost 11% relative to the pre-pandemic projections in 2020 Q2, broadly similar in aggregate to AEs. Output recovered sharply as case rates abated and some restrictions were lifted, but the recovery was punctuated by the reimposition of restrictions during further outbreaks in 2021 and 2022. Although the initial recovery was swift it was also incomplete. Before the outbreak of Russia's war in Ukraine and additional Covid outbreaks in China, the level of GDP in EMs was around 3% below the pre-pandemic forecast in 2022 Q1 (**Figure 2**). The recovery has also lagged AEs where GDP was just under 1½% below trend in 2022 Q1.

Figure 2: Pre-war GDP relative to pre-pandemic trend

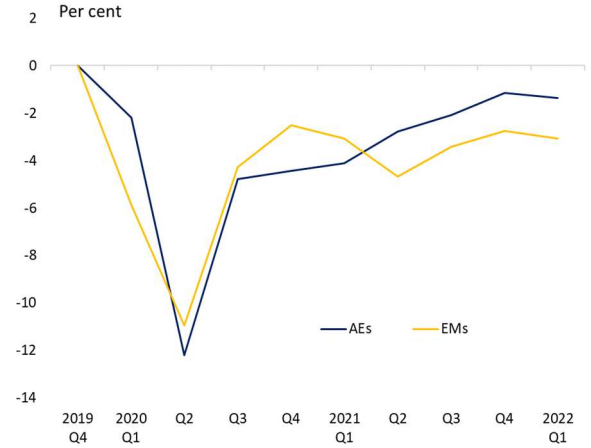
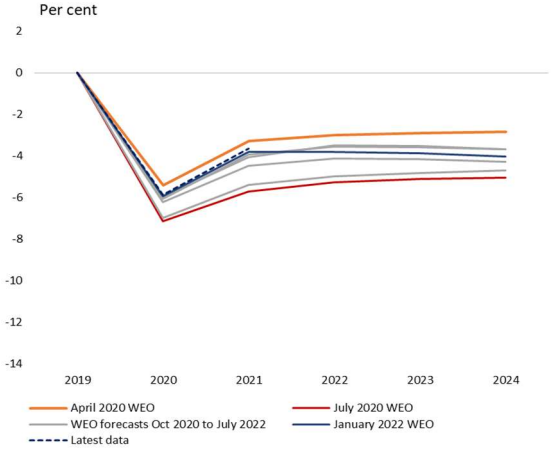


Figure 3: GDP relative to pre-pandemic trend in EMs



Source: Haver, WEO and staff calculations

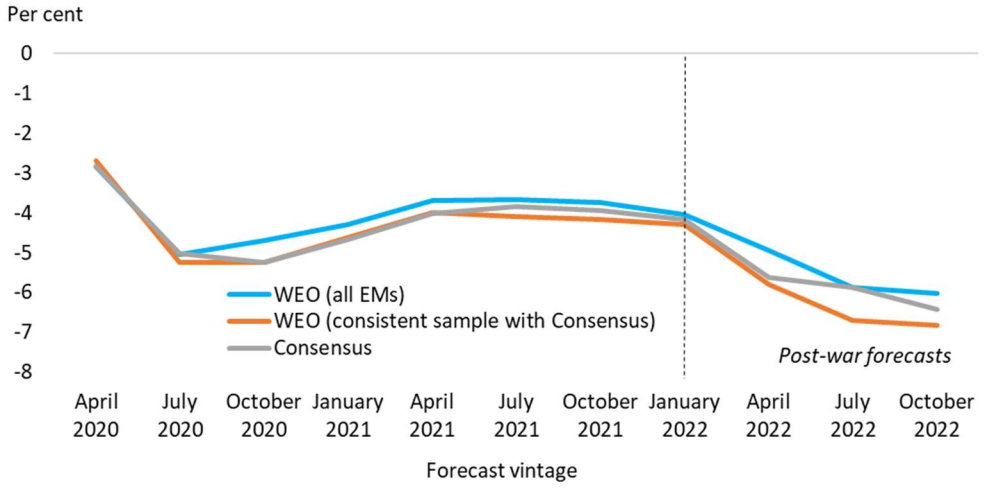
Although the recovery has been incomplete, it has also been stronger than expected. The July 2020 WEO projected that the level of GDP in EMs would be almost 5½ below trend in 2021 (**Figure 3**). But as economic activity recovered faster than expected following the initial Covid wave in 2020, the projections of future GDP

[2] We use the WEO definition of Emerging Markets, excluding Developing Economies. Our sample of countries is smaller than full sample of EMs in the WEO due to data availability. The subsequent sections note the countries used in each exercise.

losses were successively revised up. By 2022 Q1, the level of GDP was around 3% below trend, more than 2pp stronger than where it was expected to be in the initial phase of the pandemic.

As the speed and extent of the recovery was stronger than expected, the medium-term level of scarring in the WEO and Consensus forecasts was gradually revised down over time. The initial estimate of scarring of 5% in the July WEO was successively revised to below 4% by Spring 2021, before becoming more stable and even increasingly slightly (**Figure 4**). Since January 2022, the estimates of GDP losses relative to the pre-pandemic trend have been compounded by the economic spillovers of Russia's war in Ukraine.

Figure 4: Estimated post-Covid medium-term scarring for 2024 over time



Source: Consensus, Haver, WEO and staff calculations
Note: Consensus sample includes Argentina, Brazil, Chile, China, Colombia, Hungary, India, Indonesia, Malaysia, Mexico, Peru, Philippines, Poland, Russia, Thailand, Turkey.

At first glance, the pattern of forecasts revisions suggests that forecasts of medium-term output losses responded intuitively to GDP outturns and news. A larger impact of Covid on current activity was expected to result in additional long-term damage to the economy. Higher firm bankruptcies reduced productivity and forecasts of the capital stock in the future, while a larger period of job losses raised the projected trend rate of unemployment. Likewise, as the economy recovered more swiftly than anticipated, long-term scarring via such channels was also expected to reduce. For instance, scenarios of alternative evolutions of the pandemic in the April 2020 and July 2020 WEOs indicate that a 1pp weaker (stronger) recovery in 2021 was projected to result in about 0.4pp greater (smaller) scarring among EMs.[3] However, views of medium-term economic losses have also become increasingly stable, despite ongoing positive news about the current state of the activity. We next assess whether this reflects the fact that the fact that news about the recovery has become smaller or whether it is more consistent with forecasters 'locking in' their estimate of Covid scarring effects.

[3] See the Scenario Boxes in the April and July 2020 World Economic Outlooks.

Bayesian model for forecast revisions

We propose a Bayesian model for forecast revisions. We assume scarring results in a permanent unknown percentage loss in GDP. Quarterly (log) GDP follows

$$y_t = \tau_t + c_t - s,$$

where τ_t is a determinist trend, c_t is a transitory cyclical component that is zero mean, and s captures the unknown extent of scarring. Solving for the cyclical component as a function of the extent of scarring gives

$$c_t(s) = y_t - \tau_t + s.$$

We assume that priors for the unknown extent of scarring follows a normal distribution with mean $\hat{s}$ and variance σ_s^2. Moreover, we assume that the cyclical component follows an autoregressive process with order 1. That is to say

$$c_t = \rho c_{t-1} + \varepsilon_t,$$

where $\rho < 1$ is the autoregressive coefficient and ε_t is white noise that follows a normal distribution with mean 0 and variance σ^2.

The forecast for GDP next quarter is given by

$$\hat{y}_{t+1|t} = \tau_{t+1} + \rho c_t(\hat{s}) - \hat{s},$$

where $\hat{s}$ is the estimated extent of scarring. Subtracting from the quarterly GDP equation, we obtain the following equation for the GDP data surprise[4]

$$\begin{aligned} y_{t+1} - \hat{y}_{t+1|t} &= c_{t+1} - \rho c_t(\hat{s}) + \hat{s} - s \\ &= \rho c_t(s) + \varepsilon_{t+1} - \rho c_t(\hat{s}) + \hat{s} - s \\ &= -(1-\rho)(s - \hat{s}) + \varepsilon_{t+1}. \end{aligned}$$

Therefore, the one-quarter-ahead forecast error for GDP is a combination of 1), the forecast error for the extent of scarring and 2), the innovation to the cyclical component.

We suppose that the forecaster updates their estimate for scarring by maximizing the likelihood of the forecast revision equation above. The Bayesian update is given by

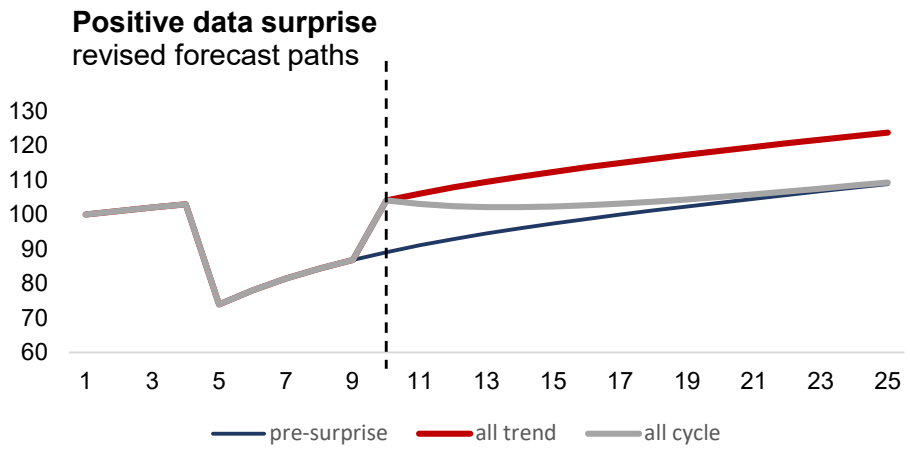
$$\hat{s}' - \hat{s} = -\frac{\sigma_s^2}{(\sigma^2 + \sigma_s^2)(1-\rho)}\left(y_{t+1} - \hat{y}_{t+1|t}\right),$$

[4] An alternative version of this equation may be derived where the cyclical component of GDP is positively related to inflation (relative to trend). In this case, the revising to scarring is a function of the GDP forecast error *and* the inflation forecast error. Positive surprises in inflation would partially offset any positive surprises in output.

where $\hat{s}'$ is the posterior estimate for the extent of scarring. This updating equation can alternatively be restated as a Kalman filtering problem, where the sensitivity of scarring revisions with respect to quarterly GDP surprise is the 'Kalman gain'.

The difference in scarring revision sensitivity is most evident over the longer horizon. **Figure 5** shows two potential forecast paths. The underlying trend growth rate is 1% per period, and in period 5 there is a large output contraction of 30% that is perceived to be 50% permanent and 50% cyclical (the cyclical component is assumed to have persistence 0.8). In period 10, there is a positive data surprise of 15% which leads to a revision in the path of forecasted output. The blue line is the period-9 forecast path (before the data surprise), the grey line corresponds to if the data surprise is perceived to be entirely cyclical, while the red line is if the data surprise is perceived to be entirely permanent.

Figure 5: Stylized example of forecast revisions



By period 25, the cyclical component has mostly decayed to zero while the permanent part entirely remains. The sensitivity/Kalman gain corresponds to the proportion of the data surprise perceived as permanent. The grey and red paths represent extreme cases where the sensitivity is 0 and 1 respectively. If the data surprise is perceived to be a combination permanent and cyclical parts, then the forecasted path would be somewhere between.

Application to WEO and consensus professional forecasts

We measure scarring as the deviation in the projected level of 2024 GDP relative to pre-pandemic forecasts in January of 2020.[5] Data news is measured by the difference between Consensus professional forecasts and the quarterly GDP growth in the initial release. Consensus forecasts typically average projections from 18-24 professional forecasters and cover 17 EMs. We work only with Consensus data surprises as WEO forecasts are only available for annual GDP.

[5] Technically, we use deviations in the level of cumulative growth since 2019 between the two forecasts to remove the effects of revisions to back data before the pandemic.

Our Bayesian framework translates to a linear relationship between quarterly data surprises and revisions of scarring estimates. We consider the estimates of scarring based on WEO and Consensus forecasts for the same consistent sample of 17 EMs.[6] Furthermore, we divide our sample to the initial Covid period (corresponding to the April – October WEOs), the pre-war Covid recovery period (the January 2021 – January 2022 WEOs) and the post-war Covid recovery period. By default, we 'aggregate' across EMs using the median but we also report PPP-weighting for reference. Taking medians reduces the outsized influence of large EMs in PPP-weighting. Moreover, equal weighting (as in medians or means) minimizes the impact of idiosyncratic noise at the EM country level. This is a similar argument to rationale for equally weighted forecast combinations in Timmermann (2006).

Figure 6: GDP growth data surprises

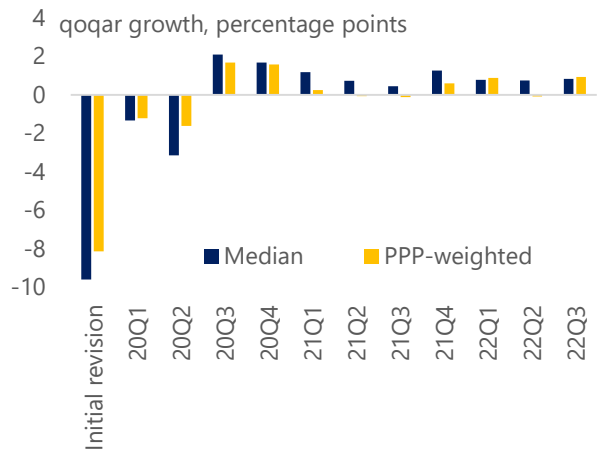
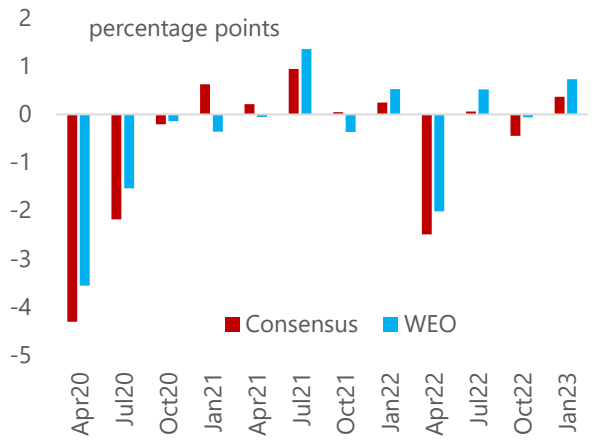


Figure 7: Revisions to scarring (median)



For the initial Covid period, scarring estimates from the WEO and Consensus forecasts were very responsive to data news. There were large negative data surprises in the first three quarters of 2020 due to the initial onset of Covid[7]. At the same time, the projections for the level of GDP in 2024 were sharply revised down. During the initial Covid period, the ratio between quarterly data surprise and scarring estimate revisions was measured at about ½ for all EM countries in our sample. For WEO forecasts, this translated to a median sensitivity of 0.38. For Consensus forecasts, the average sensitivity was 0.48. Cumulatively, the median data surprise was -13.8% of EM GDP, the median WEO scarring revision was -5.2% and the median Consensus scarring revision was -6.7%.[8]

In the subsequent pre-war recovery period, quarterly GDP consistently surprised to the upside. Consistent with our Bayesian model, estimates of 2024 GDP were revised up in response to these data releases. However, the relative intensity of these upward revisions was less than the response to the initial negative data surprises. The

[6] The sample includes Brazil, Mexico, Chile, Colombia, Peru, India, Indonesia, Malaysia, Philippines, Thailand, Turkey, Poland, Russia, Hungary, China, Argentina, Bulgaria.

[7] For data surprises in the spring and summer WEOs of 2020, data pertaining to the impact of Covid was not yet become available. Hence, we take the revisions to 2020 Q2 GDP as the magnitude of the data surprise, as this reflects the magnitude of the perceived near-term GDP impact.

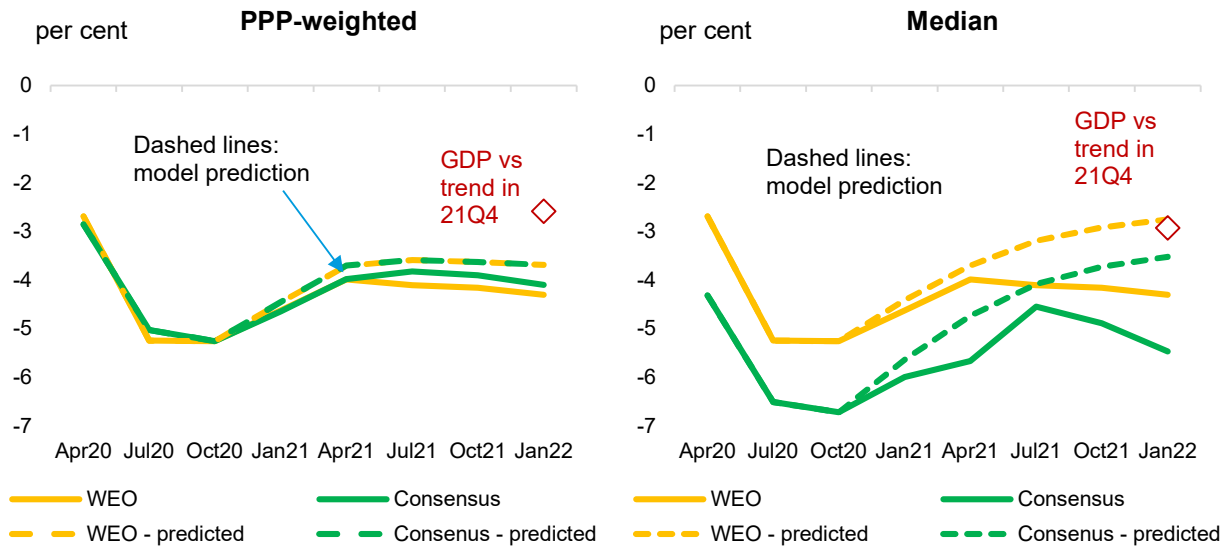
[8] On a PPP-weighted basis, the sensitivity was 0.48 for both Consensus and the WEO. The cumulative PPP-weighted data surprise was -10.9% with a median revision to Consensus and WEO scarring of -5.2%.

median sensitivity of scarring estimates with respect to data surprises in the pre-war recovery period was 0.18 for the WEO and 0.34 for the Consensus.[9] Therefore, both WEO and Consensus forecasts became less sensitive to upside data news than in the initial Covid period.

The high sensitivity of forecasters' medium-term projections during the initial phase of Covid reflected the fact that supply was unusually uncertain. When output is stable, it is more natural to treat data surprises as temporary around a relatively certain trend. During the pandemic, however, the trend level of GDP became highly uncertain and therefore forecasters placed a high weight on data news as a signal about the trend. In the recovery following the initial few quarters of the pandemic, the reduced sensitivity of medium-term projections to data surprises suggests that forecasters became more confident over time in the trend level of GDP. Given the uncertain nature of the Covid shock, however, it seems likely that data surprises continued to contain important signals about the trend level of output, particularly as data surprises were serially correlated.

As a counterfactual exercise, we calculate what the projected level of scarring would have been if these data surprises were regarded with the same sensitivity as in the initial Covid period. We take the initial estimate of scarring in October 2020 from WEO or Consensus forecasts and then update the scarring estimate using the sensitivity of each scarring forecast to data surprises in the initial Covid period of around a half. By the end of the pre-war recovery period, the predicted level of scarring is around 3½%, half a percentage point less than PPP-weighted WEO or Consensus forecasts. The median predicted level of scarring is -2.75 to -3.5%, around 1½-2pp less than the median WEO and Consensus forecasts (**Figure 8**). These scarring estimates are also closer to the actual data outturns, shown by the red diamonds. By 2021 Q4, the PPP-weighted deviation in GDP from trend was 2.6% and for the median economy was 2.9%.

Figure 8: WEO and Consensus scarring estimates



[9] On a PPP-weighted basis, the sensitivity to data surprises in the pre-war recovery period was 0.29 for the WEO and 0.33 for Consensus.

3. Accounting for Covid-Related Output Losses

Data and methodology

We next consider accounting for the realized and projected paths of output deviations relative to the pre-pandemic trend. Our analysis of scarring in EMs draws on the forecasts published in the International Monetary Fund's World Economic Outlook (WEO). Due to various data limitations, we use a smaller sample than the full set of EMs in the WEO and focus on 21 major EMs[10], which by weight account for 35% of world GDP (70% of the EMs group).[11]

We decompose output using a standard Cobb-Douglas production function given by

$$Y_t = A_t K_t^{(1-\alpha)} L_t^{\alpha}.$$

where Y is GDP, K is the stock of capital, L is labor input measured by the total number of people employed and A is a capture-all variable representing Total Factor Productivity (TFP). α is the labor share from the Penn World Table (PWT) 10.0 database and which averages 0.55 in our sample.[12] We further decompose labor input L into population (Pop), the unemployment rate (UE) and the labor force participation rate (LFPR):

$$Y_t = A_t K_t^{(1-\alpha)} (Pop_t (1 - UE_t) LFPR_t)^{\alpha}$$

Projections and data for GDP and the labor market are drawn from the WEO database. A direct projection for the capital stock is not included in the WEO and data is usually produced with a significant lag. We therefore take the initial pre-pandemic stock of capital in 2019 from the PWT and project the realized and forecasted stock of capital in time t using the perpetual inventory method:

$$K_t = K_{t-1}(1 - \delta_t) + I_t.$$

where δ_t is the rate of depreciation and I_t is the level of gross fixed capital formation at time t. Data on the rate of depreciation are drawn from the PWT and investment projections are taken from the WEO.

The initial lockdowns led to a sharp decline in the utilization of capital as many businesses were forced to close. This meant that temporarily the economic use of that capital was close to zero during that period. Without adjusting for this, the standard growth accounting framework would report a large fall in TFP because output

[10] This is, however, a larger sample than the revisions exercise, where 4 more countries were excluded due to data availability issues.

[11] The sample includes Turkiye, South Africa, Brazil, Chile, Colombia, Mexico, Peru, Indonesia, Malaysia, Philippines, Thailand, Beleraus, Kazakhstan, Russia, China, Serbia, Hungary, Croatia, Poland, Romania.

[12] This is somewhat lower than in Advanced Economies and the usual two-thirds rule of thumb used in many analyses. Measuring the labor share in EMs is particularly challenging due to the large share of self-employed workers and the informal sector. See Feenstra, Inklaar and Timmer (2015) and Karabarbounis and Neiman (2014) for a discussion.

would fall sharply even though the level of capital input has not changed. In our baseline assessment, we therefore assume that capital utilization falls in line with employment in 2020. Other studies adjust for capitalization using data on average hours worked (Martin and Jones, 2022). Data on average hours are less reliable than those for employment in EMs, but as a cross-check we also estimate the change in capital utilization using the change in average hours from the International Labor Organization (ILO).

$$Y_t = A_t(K_t * (1 + utilization_t))^{(1-\alpha)}(Pop_t(1 - UE)_t LFPR_t)^{\alpha}$$

We then measure output losses as the difference between realized outturns and the projection outcomes in the pre-pandemic January 2020 WEO. Projected trend output is a function of projected trend inputs:

$$Y_{p,t} = A_{p,t}K_{p,t}^{(1-\alpha)}L_{p,t}^{\alpha}.$$

Dividing these two production functions, we obtain the following equation for *deviations* relative to trend

$$Y_{d,t} = A_{d,t}K_{d,t}^{(1-\alpha)}L_{d,t}^{\alpha}.$$

Taking logs of the equation above and first differencing, we obtain the following equation for changes

$$\Delta y_t = \Delta a_t + (1 - \alpha)\Delta k_t + \alpha\Delta l_t,$$

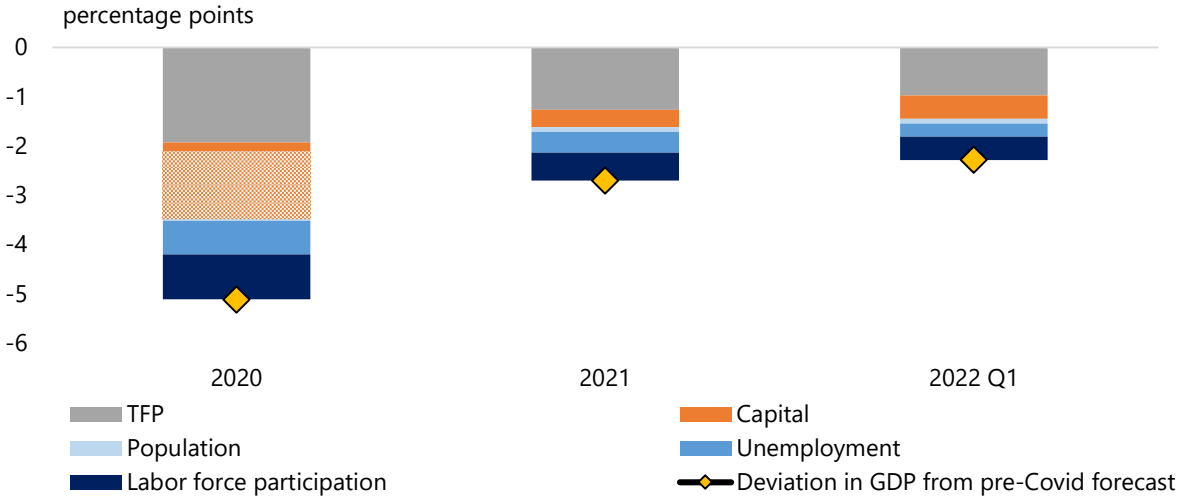
where lower-case variables represent the log transformation of the upper-case variables, and the d subscript to represent deviations is suppressed for ease of notation.

Results

Figure 10 shows the decomposition deviations in realized output relative to the pre-pandemic trend into contributions from changes in labor, capital and TFP. Just under a third of the PPP-weighted average EM GDP loss in 2020 was accounted for by lower employment. This is driven not just by higher unemployment but also lower labor force participation. The initial contribution from capital was small. While investment fell sharply, this represented a small portion of the capital stock. We do, however, estimate that the contribution from lower *effective* capital was much larger during the initial lockdown due to lower capital utilization. We estimate lower utilization both by assuming that capital utilization fell in line with employment in **Figure 9** and using ILO data on average hours in **Figure 10**. Both methodologies point to a sharp reduction in capital utilization in 2020, but we use the former as our baseline given the experimental nature of the ILO hours data. Interestingly, though, the hours data suggests that much of the persistent shortfall in TFP really reflects lower hours worked rather than lower productivity. Finally, TFP accounts for just two fifths of the remaining output losses – though, as the decomposition based on average hours suggests, some of this is due to lower hours worked per employee.

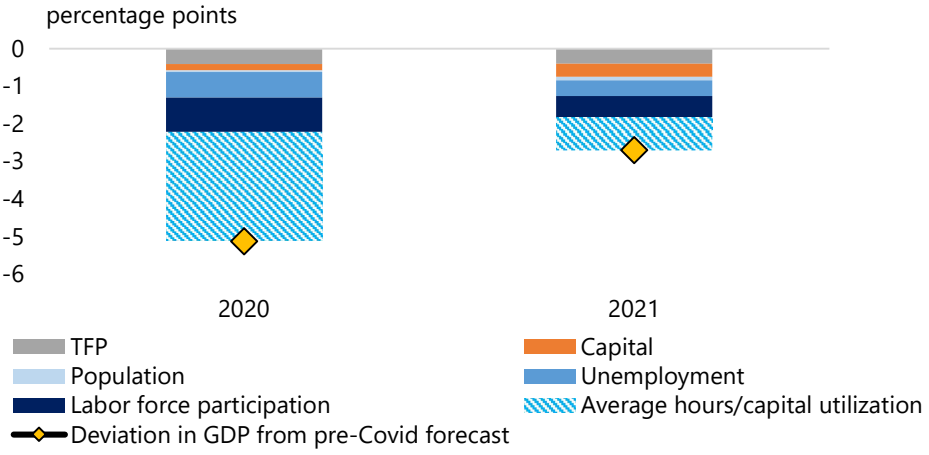
As the recovery has progressed, the relative contributions from factors of production to changes in output has been similar to the initial shock. In 2022 Q1 we estimate that the contribution from lower employment remained around a third. Although we no longer adjust for reduced capital utilization given the lower incidence of lockdowns, the contribution of capital due to lower investment has built over time to a fifth of output losses in 2022 Q1. TFP accounts for about 40% of the remaining losses.

Figure 9: Decomposition of realized output losses relative to pre-pandemic trend



Sources: Penn World Table 10.0, IMF and staff calculations. Barrett and others (2021), 'After-effects of the COVID-19 pandemic: prospects for medium term economic damage'.
Note: The shaded orange bar represents capital that became temporarily redundant during Covid lockdowns, equivalent to the fall in employment.

Figure 10: Decomposition of realized output losses relative to pre-pandemic trend using average hours

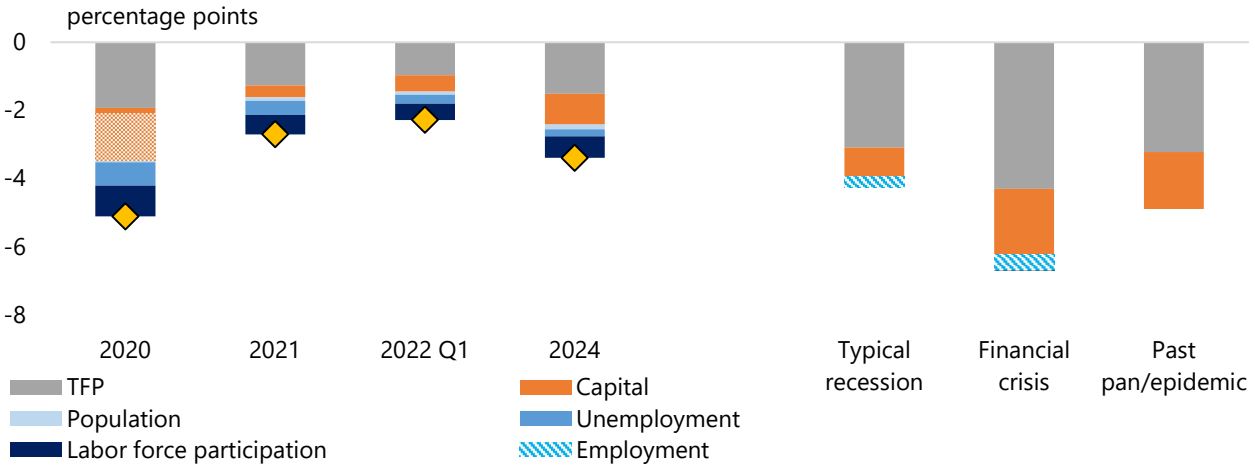


Sources: ILO, Penn World Table 10.0, IMF and staff calculations.

The nature of Covid output losses is unusual relative to other past large shocks. Persistent losses five years after past shocks have largely been driven by weak productivity and TFP, while losses from employment tend to be relatively modest. Output losses from Covid, however, are more evenly accounted for across labor, capital and TFP. While the impact on employment has been slightly larger than in the past, the more even accounting for GDP losses primarily reflects the fact that the persistent negative impact on TFP has been much smaller than in past episodes, reducing the overall level of scarring.

Figure 11 examines the decomposition of realized *and* projected deviations from the January 2022 WEO. The January 2022 WEO projected scarring by 2024 to be -4%. This deterioration is driven by weaker capital accumulation and, most notably, a large decline in TFP. This composition of projected scarring is similar to that of past large shocks – where long-term economic damage comes from primarily from weaker TFP.

Figure 11: Decomposition of Covid-related output losses and other past shocks



Sources: Penn World Table 10.0, IMF and staff calculations. Barrett and others (2021), 'After-effects of the COVID-19 pandemic: prospects for medium-term economic damage'.

4. Implications for the Medium Term

Section 2 highlighted that recent forecasts have taken a smaller signal from upside data surprises about the degree of scarring. Taking a larger signal from these surprises would suggest less scarring than recent forecasts. In addition, the composition of Covid-related output losses may be reassuring in that past scarring was mostly driven by TFP and the TFP shortfall has been moderate after Covid so far. We therefore consider a bottom-up projection of scarring over the next few years using the growth accounting decomposition from the previous section.

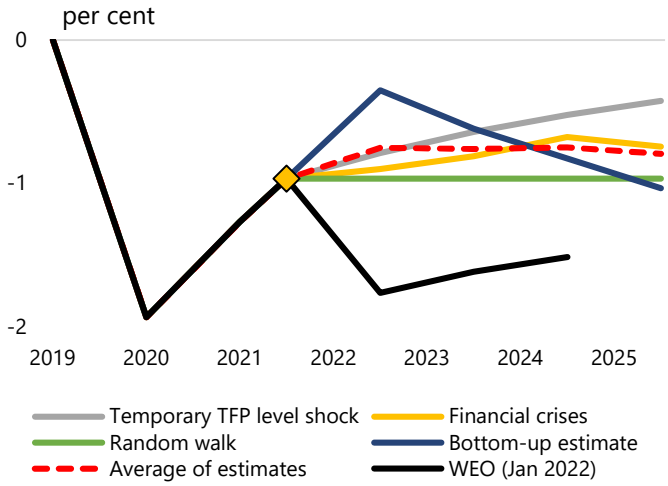
The outlook for TFP

We first consider the outlook for TFP. Past episodes suggest that shocks to TFP are persistent in EMs but do not tend to worsen over time. Barrett et al (2021) find that initial shocks to the level of TFP are highly persistent but do not deteriorate. Aguiar and Gopinath (2007) examine shocks to productivity growth of two types: 1) a transitory shock around the existing trend for productivity and 2) a permanent shock to the level of productivity. They document evidence that shocks to EM productivity tend to be of the latter type, which implies a larger medium-term impact on output. Nonetheless, one should not expect shocks to EM productivity that lower the slope for *trend* growth.

From the perspective of past large macroeconomic shocks, we therefore might expect the recent hit to TFP to be persistent but not to worsen. **Figure 12** projects forward the loss in GDP using the multipliers from past episodes in Barrett and others (2021) and a temporary TFP shock in Aguiar and Gopinath (2007). We also include a simple random walk.

The Covid shock differs, however, from past macroeconomic shocks like financial crises. On the one hand, the economic shock was truly exogenous and short-lived. This may impart lower persistence as there may be fewer macroeconomic imbalances that take time to unwind. On the other hand, the unique nature of the shock may mean that there are additional channels to lower TFP. The build-up of public and private debt in response to the crisis may also have implications for future activity and risks.

Figure 12: Alternative paths for the deviation in the level of TFP from trend



Source: IMF staff calculations

We therefore also consider a bottom-up estimate of the medium-term impact of Covid on TFP. We first consider spillovers from the period of weak employment to the level of TFP. A range of studies suggest that a period of unemployment lowers wages for affected workers. In AEs, Arulampalam et al (2001) and Gregory and Jukes (2001) find that a spell of unemployment initially reduced subsequent wages in the UK by 6-14% and 10%, respectively, but these effects fade over time. At the lower end, Buhai et al (2014) estimate that a year's experience on the job is worth 1-3% in terms of wages. In emerging economies, Pritadrajati, Kusuma and Saxena (2021) estimate that in Indonesia a spell of unemployment has a negative but statistically insignificant effect on wages, except for older workers, but a year spent in unemployment reduced subsequent earnings by 3.5%. Given its relevance for emerging markets, we use this latter multiplier to calculate the TFP loss from the reduction in employment.

As unemployment recovered partially relatively quickly in most EMs, the projected medium-term impact on TFP from the period of elevated unemployment is only -0.1% on average. When we include time out of the labor force, the medium-term impact on labor via wages and productivity rises to -0.2%.

The second feature of our bottom-up estimate is a unique feature of the Covid shock: the severe disruption to education. Several studies have documented that the loss in skills is likely to be a sustained drag on productivity in the future. The impact in the near to medium term is less clear, however, as the effect will take time to build as affected students enter the workforce. Younger workers also enter the workforce with lower wages and productivity than later in their careers.

We provide a straightforward calculation of the impact over the next few years:

- We first use UNESCO data to calculate the loss in schooling years due to school closures, assuming that a day of partial closure is equivalent to half a day of full closure. This produces a weighted average total loss of 90% of a school year in our sample, or 8.5 months of schooling.
- Next, we use United Nations data on school cohorts and WEO projections for the size of the workforce to estimate how quickly affected students enter the workforce. We estimate that the peak proportion of the workforce affected by education disruption is close to 40% reached by 2031. By 2025, around half of the affected students have entered the workforce.
- We use estimates from Psacharopoulos and Patrinos (2018) on the private rate of return to schooling by region to estimate the impact of lost years of schooling on wages. On average, one year's lost schooling reduces wages by 9%. Assuming a production function of the form $Y_t = A_t H_t^{1-\alpha} K_t^{\alpha} L_t^{1-\alpha}$ a 1% reduction in wages translates into a 1% fall in GDP. Estimates of the return from lost schooling are contentious and risks are two-sided. Estimates based on Mincerian earnings functions may be biased upwards if it omits students' ability (Patrinos, 2016) or if the earnings premium attached to education reflects in partly reflects credential effects. At the same time, Buffie et al (2022) argue that short-term learning losses compound into larger losses in later years, so standard rates of returns may understate the losses from Covid.
- Finally, we take account of the fact that young workers may enter the workforce with lower earnings than the average worker due to lower productivity or lower chances of being employed. Due to data limitations, we rely on Indonesian data on the distribution of earnings by age which indicate that the earnings of workers aged 20-24 are around a quarter below the average before Covid, partly due to working fewer hours on average. We therefore assume that the average earnings of those entering the workforce are three quarters that of the average worker.

These calculations suggest a peak impact on GDP of -2½% by the 2030s. These lie within the range of estimate of the long-run impact, slightly smaller than the -3-4% estimated by Buffie et al (2022) but close to the estimates of Psacharopoulos and others (2020) once scaled up for the higher realized rates of lost schooling.[13] Importantly, it takes time for the impact on GDP to build as affected students enter the workforce and as their age-adjusted earnings grow. We estimate the impact by 2025 builds to -1%, under a half of the long-run effect of 2½%, with the peak impact achieved during the early 2030s.

Combining the productivity effects of time out of work and lost education produces a small GDP impact in the near term which builds gradually. For 2022, we estimate the effect to be just under –½% but it builds to -1% by 2025. In contrast to the top-down estimates, this would suggest that TFP ought to improve in the near term as the cyclical effects of the pandemic fade, but then gradually build over time as the share of students whose education has been disrupted enter the workforce. Averaging over various estimates points to a reduction in TFP relative to trend of just under 1% in 2025 (**Figure 12**).

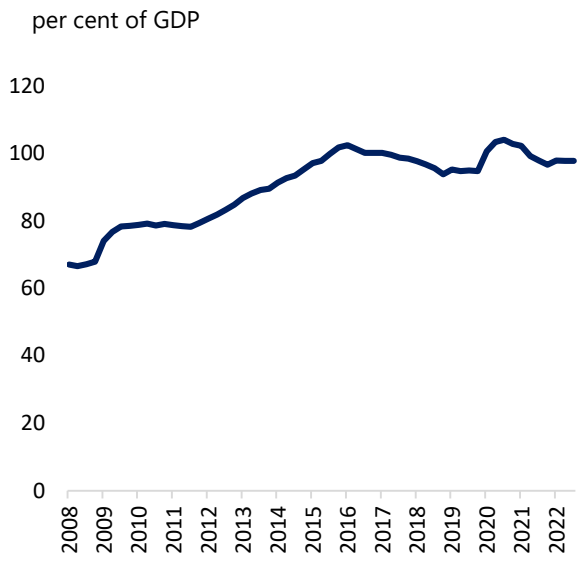
The outlook for capital

We next consider the impact of Covid on the capital stock in the medium term. Our estimate is comprised of three factors. First, the lost capital so far from the reduction in investment relative to trend. Second, the

[13] The sample includes Turkey, South Africa, Argentina, Brazil, Chile, Colombia, Mexico, Peru, India, Indonesia, Malaysia, Philippines, Thailand, Belarus, Kazakhstan, Russia, China, Serbia, Hungary, Croatia, Poland, Romania.

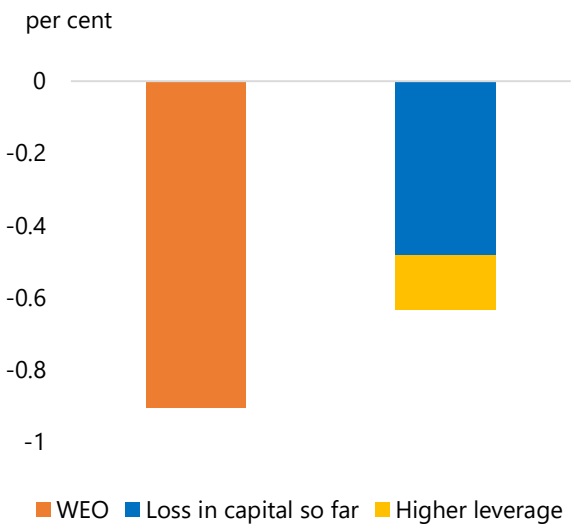
reduction in TFP lowers the marginal return on capital and the optimal level of capital stock – as it turns out, the reduction in the optimal level of capital is very similar to the lost capital so far. Finally, increases in corporate leverage have been associated with reductions in investment in past crises. IMF (2022) find that a 1 percentage point increase in three-year average of non-financial corporate credit-to-GDP ratio has a peak impact on the level of investment of -2%. Using Bank for International Settlements data up 2022 Q3, we estimate that there has been a 1pp increase in the corporate credit-to-GDP ratio relative to the pre-Covid average (**Figure 13**). This has a peak impact of -2% on investment per year and a cumulative impact of 4.5% after four years (**Figure 14**).

Figure 13: Total credit to EM non-financial corporations



Source: BIS
Note: PPP-weighted average of ARG, BRA, CHL, CHN, COL, HUN, IND, IDN, MYS, MEX, RUS, ZAR, THL, TUR

Figure 14: Estimated impact of lower capital on GDP



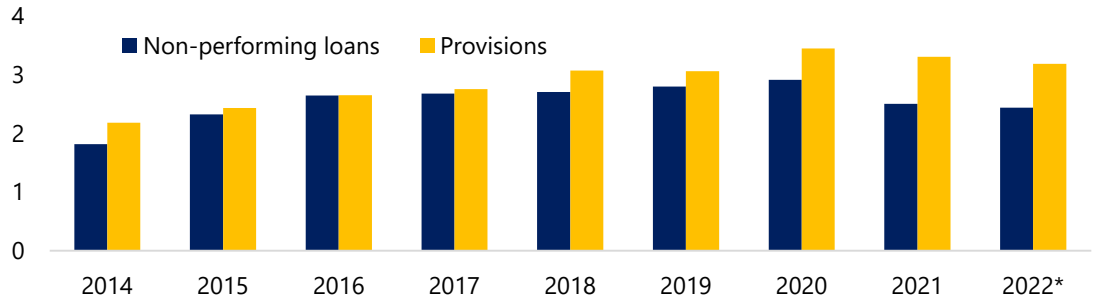
Source: WEO; IMF staff calculations

Combining these produces a reduction in the level of capital of -1.4%, which in turn reduces potential GDP by 0.6%. Around one quarter comes from higher corporate leverage and the remainder from the existing reduction in the capital stock relative to trend due to weak investment in the first couple of years of the pandemic.

Estimating the capital stock using the perpetual inventories method potentially underestimates the hit to capital during Covid if there have been large-scale bankruptcies which have left existing capital redundant. One proxy for this is whether there has been a material change in the proportion of non-performing loans during Covid. A sharp rising in non-performing loans or provisions would be symptomatic of widespread realized or expected corporate bankruptcies. **Figure 15** shows, however, that the ratio of provisions to nominal GDP has risen but only slightly by 0.1pp since the start of Covid while ratio of non-performing loans has fallen. This suggests that, at least as of the latest data, our estimates of the capital shortfall are unlikely to be affected by the omission of scrapped or redundant capital from bankrupt businesses.

Figure 15: Non-performing loans and provisions

per cent of nominal GDP



Source: IMF Financial Stability Indicators and staff calculations

The outlook for employment

Employment in EMs recovered has quickly compared to past shocks but not fully. After a sharp rise in 2020, unemployment recovered to pre-Covid levels by the end of 2022 (**Figure 16**). This suggests that there has been no persistent increase in the trend unemployment rate as had initially been feared. The level of employment, however, remained around 1% below its pre-Covid trend in 2022 (**Figure 17**), mostly driven by a drop in the labor force participation rate. This is likely to reflect several factors across different economies, including shifts out of the formal to the informal sector (World Bank, 2022; IMF, 2022) and less generous job retention schemes relative to AEs such that workers have been less likely to remain attached to the labor market during Covid lockdowns (IMF, 2022). Internal migration also disrupted established employment and migration patterns (ILO 2023; De Roy and Bose, 2021).

Figure 16: Unemployment rate

change vs 2019, percentage points

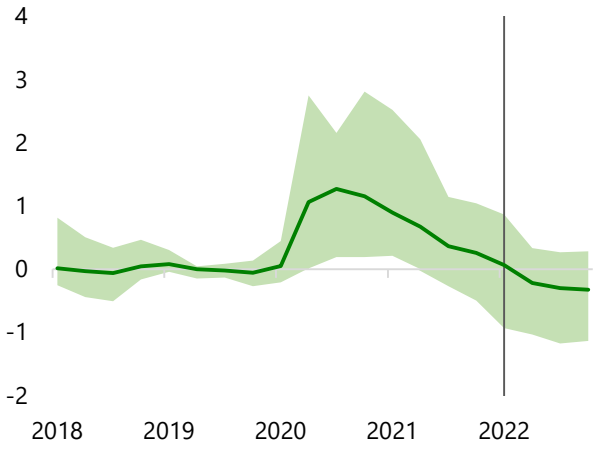
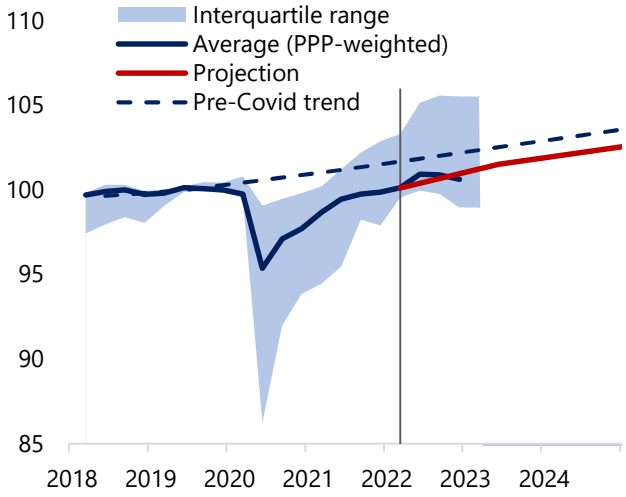


Figure 17: Level of employment

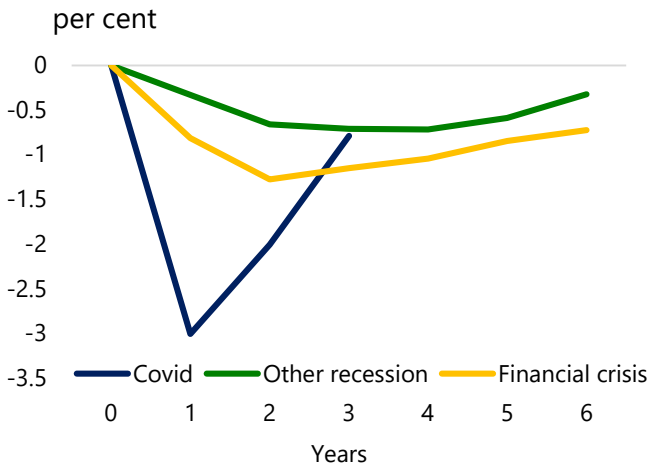
2019 = 100



Source: Haver, WEO and IMF staff calculations

Although incomplete, the recovery in employment has been swifter than in past episodes. Following financial crises, the peak shortfall in employment only recovered by around a third after five years and only a tenth following other recessions. In contrast. In contrast, by 2022 employment had recovered about two thirds of the peak shortfall in 2020 from Covid (**Figure 18**). As contact-intensive services continue to normalize, including tourism, there may be scope for further gains. But future gains are likely to be harder won. First, while the initial recovery in employment was quick recent improvements have been more sluggish. Second, labor supply shortages continue to beset several AEs despite having progressed further in their recoveries in output. We are therefore cautious in projecting a limited further catch-up in employment. Our bottom-up estimates assume that there is no change in trend unemployment given current rates are mostly back to pre-Covid levels, but that lower labor participation rates drag by 1% on employment and 0.5% on output (**Figure 17**).

Figure 18: Impact of crises on the level of employment



Source: WEO, Barrett and others (2021) and IMF staff calculations

Summing up

Taken together, these bottom-up estimates suggest that scarring related to Covid may reach 2-2½% in the next few years. (**Table 1**). This represents a significant drag on economic activity if sustained – but at the same time would be less than the average financial crises or other recessions. In part, this may reflect the more temporary nature of the initial shock to activity compared to financial and other crises. It is also somewhat more optimistic than the degree of scarring embodied in other forecasts. It is worth noting that this estimate represents only a small improvement in activity relative to the level of GDP in 2022 Q1: our scarring estimate projects only a 0.3pp improvement from the -2.3% deviation in GDP from trend at the start of 2022. This is a modest improvement given the short time that has elapsed since the start of the pandemic and the potential for further normalization in contact-intensive sectors. Alternative estimates, however, project GDP to deteriorate relative to trend.

Table 1: Medium-term estimates of scarring

	WEO	Consensus	Bottom-up estimate	Memo: 22 Q1 GDP vs trend
GDP	-3.4	-3.1	-2.0	-2.3
o/w TFP	-1.5		-0.8	-1.0
o/w capital	-0.9		-0.6	-0.5
o/w labor	-1.0		-0.5	-0.8

Uncertainties around both the degree and timing of the recovery from Covid are plenty, however. While recent positive data surprises point to a more robust recovery from Covid than initially feared, many economies

around the world have seen activity run up against significant supply constraints, resulting in rising inflation. To the extent that any weakness in supply persists, the recent resilience in emerging market activity may, therefore, not be sustainable. While education-related losses are likely to drag on GDP in the long term, how long these take to affect productivity is particularly uncertain. Identifying the recovery from Covid is also further complicated by compounding shocks to global activity from Russia's war in Ukraine. Finally, the data themselves are subject to uncertainty – particularly given the significant changes to activity and production processes brought by the pandemic – and indeed are likely to be subject to much revision in the future.

5. Conclusion

The Covid pandemic was an unprecedented shock to EM economies, the impact of which is still felt three years since the onset. The latest data suggest that Covid has had a persistent and material impact on economic activity in EMs, and to a greater extent than in AEs. However, the impact has also been smaller expected, and smaller than other large economic shocks. We find that forecasts of scarring have increasingly treated positive data surprises as transitory rather than as a signal about the extent of scarring. The composition of output losses to date is also different from past crises. The shortfall in productivity has been significantly smaller and lower labor supply explains a larger proportion of the persistent GDP losses when compared to other past shocks. These findings suggest that scarring, while substantial, may be ultimately less severe than initially feared and less severe than was projected shortly before the outbreak of the war in Ukraine. Understanding the nature of these persistent losses will be important for tailoring the most effect policies for mitigating the long-term impact of the pandemic on economies. Uncertainty around the future direction of these losses is high and compounded by additional shocks from the war in Ukraine.

References

Aguiar, M., G. Gopinath, 2007, "Emerging Market Business Cycles: The Cycle is the Trend", Journal of Political Economy, 115(1), pp.69-102

Arulampalam, W., 2001, "Is Unemployment Really Scarring? Effects of Unemployment Experiences on Wages", The Economic Journal 111(475), pp.585-606

Barrett, P., S. Das, G. Magistretti, E. Pugacheva, P. Wingender, 2021, "After-Effects of the COVID-19 Pandemic: Prospects for Medium-term Economic Damage", IMF Working Paper, WP/21/2023, International Monetary Fund

Buffie, E.F., C. Adam, L-F. Zanna, K. Kpodar, 2022, "Loss-of-Learning and the Post-Covid Recovery in Low-Income Countries", IMF Working Paper, WP/22/25, International Monetary Fund

Buhai, P., P. Skedinger, R. Uusitalo, 2018, "Seniority rules, worker mobility and wages: Evidence from multi-country linked employer-employee data", Labor Economics 41, pp.48-62

Feenstra, R.C., R. Inklaar, M.P. Timmer, 2015, "The Next Generation of the Penn World Table", American Economic Review, 105(10), pp.3150-82

Gregory, M., R. Jukes, 2001, "Unemployment and Subsequent Earnings: Estimating Scarring Among British Men 1984-94", The Economic Journal 111(475), pp.585-606

International Labor Organization, 2023, World Employment and Social Outlook: Trends 2023

International Monetary Fund, 2020, World Economic Outlook (April)

International Monetary Fund, 2020, World Economic Outlook (July)

International Monetary Fund, 2021, World Economic Outlook (April)

International Monetary Fund, 2022, G-20 Background Note on Minimizing Scarring From the Pandemic

International Monetary Fund, 2022, Regional Economic Outlook for Western Hemisphere (October)

International Monetary Fund, 2022, Regional Economic Outlook for Asia and Pacific Hemisphere (October)

Karabarbounis, L., B. Neiman, 2013, "The Global Decline of the Labor Share", The Quarterly Journal of Economics, 129(1), pp.61-103

Martin, J., K. Jones, 2022, "An Occupation and Asset Driven Approach to Capital Utilization Adjustment in Productivity Statistics", ESCoE Discussion Paper 2022-11

Pritadrajati, D., C. Anggita, S. Saxena, 2021, "Scarred for Life: Lasting Consequences of Unemployment and Unformal Self-Employment", Economic Analysis and Policy, 70, pp.206-219

Psacharopoulos, G., 2020, "Lost Wages: The COVID-19 Cost of School Closures", IZA Discussion Paper No. 13641

Psacharopoulos, G., H.A. Patrinos, 2018, “Returns to Investment in Education: A Decennial Review of the Global Literature”, World Bank Policy Research Working Paper 8402, World Bank

Suphaphiphat, N., Y. Shi, 2022, “Economic Scarring Channels: Channels and Policy Implications”, IMF Working Paper, WP/22/248, International Monetary Fund

Timmermann, Allan. "Forecast combinations." Handbook of economic forecasting 1 (2006): 135-196.

World Bank, 2020, Global Economic Prospects (2020), “Lasting Scars of the COVID-19 Pandemic”

World Bank, 2022, South Asia Economic Focus (Fall)

PUBLICATIONS

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