

A.2. Short-term fluctuations and implications for growth¹

The pandemic, and the lockdown measures and travel restrictions introduced globally to control the spread of the virus, caused a major shock to the global economic system that has no equivalent in modern history. Many businesses could not or chose not to operate, households could not purchase goods and services, and firms could not produce, sell, and export their products or import goods needed for production. Understanding disruptions in production, in conjunction with demand shifts as households lost income or increased precautionary savings, is critical for developing the optimal short-term and long-term policy response to the pandemic-induced shock (Box A.2.1).

Potential growth—the supply-side of an economy—is typically thought of as a smooth and slow-moving process. This would suggest that short-term fluctuations in output growth are driven by changes in demand. However, pandemics are associated with the underutilization of factors of production as labor reduces working hours, services cannot be offered, and production is disrupted.² This would, in turn, lower the effectiveness of an expansionary policy response since increased government spending cannot support selling products that were not produced or services that were not offered (Reinhart and Reinhart 2020).

The output gap—the demand-side of an economy—measures the difference between what an economy is producing and what can be efficiently produced at full capacity, generally referred to as potential output. This concept is synonymous with the business cycle—the ups and downs, expansions and contractions, or booms and busts that occur in the short to medium term. A negative output gap would suggest that demand remains suppressed and expansionary policy could help the recovery.

The pandemic has affected both the production and demand for goods and services. Supply disruptions were reflected in a sharp drop in industrial production in response to the outbreak and lockdown measures introduced to contain the spread of the virus in East Asia and the Pacific (EAP). Industrial production in China contracted by 13 percent, on a year-on-year basis, in January and February (Figure A.2.1). By April, however, production was almost back to its pre-COVID-19 level as disruptions to business operations receded, businesses opened, and workers were able to return to workplaces. In the region excluding China industrial production also declined sharply in March and April, and has been rebounding since across the region, but at very different speeds.³

In addition to these temporary supply disruptions, the EAP economies have also been negatively affected by falling demand, best demonstrated by contracting retail sales, which reflected the ability and desire of households to purchase goods and services. Rising uncertainty, income losses from retrenchment and reduced working hours, and shifts in expected income meant that households reduced their consumption and increased savings. In China, retail sales contracted for the first time on record in February. By August, retail sales were still around 13 percent below

¹ This analysis was conducted to inform the October 2020 East Asia and Pacific Economic Update.

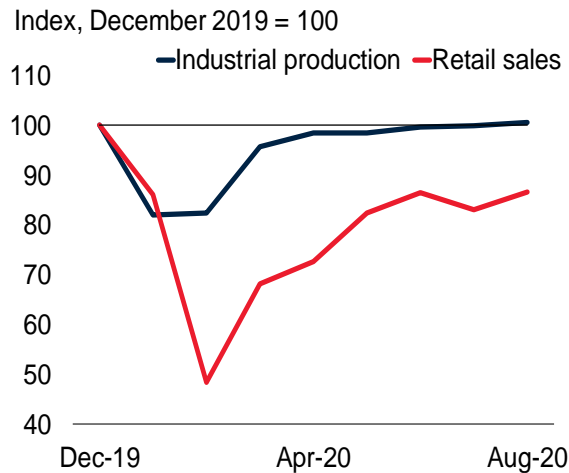
² Other temporary supply disruptions that are common in some emerging market and developing economies include drought, labor strikes, and oil production disruptions.

³ In May in the case of Thailand.

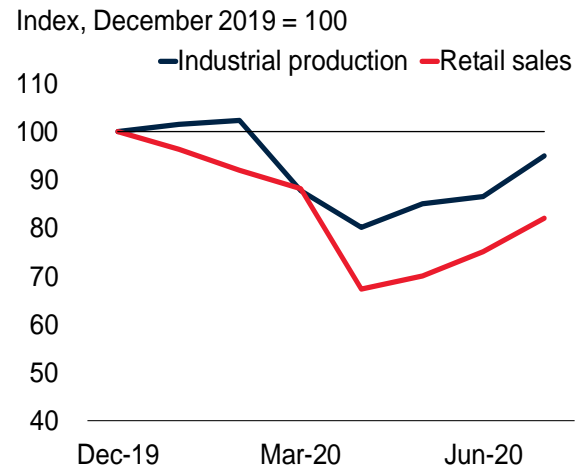
their pre-COVID-19 levels. In other regional economies, retail sales contracted in April and May, and remain well below their pre-pandemic levels, especially in Indonesia and the Philippines. There was similar weakness in broader measures of demand including private consumption, investment, and exports. Inflation also fell and remains subdued.

Figure A.2.1. Weakness in retail sales has been more persistent than losses in production.
COVID-19 is both a supply and demand shock Both domestic and external demand have weakened.

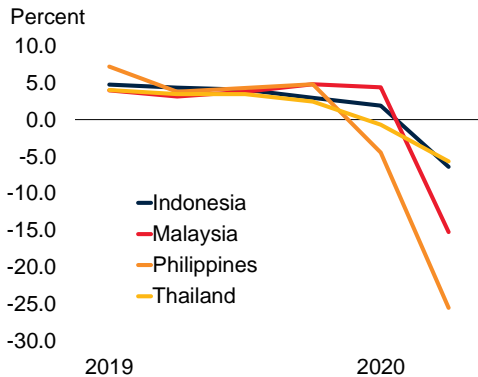
A. Production and retail sales, China



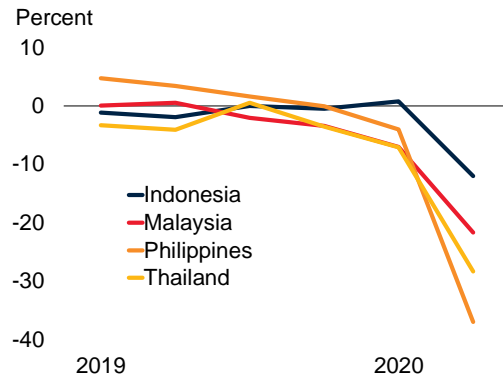
B. Production and retail sales, EAP ex China



C. Domestic demand



D. Export volumes



Source: Haver Analytics; World Bank.

Notes: B. EAP excluding China is weighted using 2019 GDP at 2010 prices and exchange rates. EAP excluding China includes Indonesia, Malaysia, Philippines, Thailand, and Vietnam. Retail sales is based on simple average of retail sales in Indonesia, Malaysia, Philippines, Thailand, and Vietnam. Industrial production for Indonesia and retail sales for the Philippines are staff estimates. C. Domestic demand is final consumption expenditure and gross capital formation. For Thailand investment excludes inventories. For Philippines, consumption excludes public sector. Year-on-year changes. D. Year-on-year changes.

Box A.2.1. Supply and demand in the literature.

In response to the pandemic, a subset of an exploding economic literature has focused on understanding the supply and demand dynamics of COVID-19 due to its relevance to an effective policy response. If the pandemic is mainly supply-related and linked to lockdowns that end, and fear of going to work that dissipates, then a strong countercyclical policy response may be inappropriate with an insurance type mechanism the right solution. However, if this is a large demand shock, and policymakers misdiagnose or do not respond appropriately in size and scope, then the economic losses can be severe. An alternative view is that supply and demand shocks are intertwined with what started as a supply shock—lockdowns, layoffs, and firm exit—leading to a demand shock as losses in income force a reduction in spending (Guerrieri et al 2020). At its extreme the interaction of demand and supply can become reinforcing where the initial supply shock depresses aggregate demand, which in turn induces firms to reassess investment and damages productivity, which further depresses demand (Fornaro and Wolf 2020). These dynamics highlight the importance of consumer and business expectations in driving demand (Lorenzoni 2009).

Recognizing the likely complicated nature of demand and supply shocks and differing sectoral impacts, a number of studies look at the sectoral dynamics and consequences of the shock. del Rio-Chanona et al (2020) show that for the US the dominance of supply and demand depend on the sector. In transport, demand likely dominates; in manufacturing, mining and services supply dominates; and entertainment, restaurants and tourism it is likely both. In Farhi and Baqaee (2020), a disaggregate macroeconomic model is used as different sectors may face different cyclical conditions. They find that in the United States the decline in real GDP is due to both demand and supply shocks and about equally distributed between them. They also warn that countercyclical policy is less effective than in typical recessions (at a third) with more targeted interventions required. Brinca, Duarte, and Faria-e-Castro (2020) also look at the sectoral impacts of COVID-19 on the United States finding that during the initial peak of the crisis, in March and April, two-thirds of the contraction in hours worked was due to supply shocks. Balleer et al (2020) study pricesetting behavior of firms in Germany during the COVID-19 recession and find that supply and demand responses are both present, but demand dominates in the short-run.

As this sectoral work highlights, the response of economies to the outbreak depend on their economic structure which in turn can aggravate the size and duration of the COVID-19 shock. The response of output and employment depend on the ability to work from home (Gottlieb et al 2020). In advanced economies about half of total employment can work from home whereas in poorer countries it is around one-third. Similarly, an economy's dependence on trade and location in global value chains may affect the relative importance of supply or demand shocks (Kirby and Maliszewska 2020). Supply shocks would likely dominate in economies that have greater backward linkages, i.e. those whose exports embody imported value-added. Demand shocks, however, would likely dominate in economies with greater forward linkages. Commodity-exporting economies who supply commodities into manufacturing are likely to see large demand shocks. Another important factor for emerging and developing economies (EMDEs) is the role of informality (Yu 2020). Informal workers have less access to social safety nets, limited access to financial and health services, and crowded living environments (Chodorow-Reich et al. 2020; Surico and Galeotti 2020; Loayza 2018). The greater the share of the informal economy, the likely larger share of labor-intensive output, and the greater the job losses that are likely to occur, magnifying supply and demand shocks.

The COVID-19 pandemic has also forced the reevaluation of macroeconomic models and the need to build in new features. Eichenbaum, Rebelo, and Trabandt (2020) extend a standard macroeconomic model to include epidemiological features to show how epidemics generate large and persistent recessions. The supply and demand outcomes are consequences of people reacting to the risk of infection by reducing labor supply and reducing consumption. A version of this model is implemented in Turkey by Çakmaklı et al (2020)—the only emerging market example—and finds that sectors with stronger international input-output linkages and higher external debt suffer greater losses. Alvarez, Argente, Lippi (2020) study optimal lockdown policy and find that it depends on the number of infected and the susceptibility of the population. Jones, Philippon and Venkateswaran (2020) implement a simple extension of a neoclassical model to show the health and economic costs from households that mitigate spread through reducing consumption and hours worked and increasing work from home; and a policymaker who implements frontloaded mitigation policies.

Decomposing supply and demand in EAP

To study the supply and demand dynamics in EAP, a Bayesian sign restricted vector autoregressive model is utilized (see Annex 1). The model uses the opposing behavior of output and prices to proxy for supply and demand shocks—supply shocks move prices and output in opposite directions whereas demand shocks move them in the same direction. The model can also distinguish between domestic and foreign demand/supply shocks—it traces the movement of prices and output in the four largest economies (China, the Euro Area, Japan and the United States) to proxy for foreign shocks.⁴

A number of stylized facts emerge from this analysis. First, the size of the supply shock is correlated with the length and severity of the lockdowns, and behavioral responses of producers, as reflected in the changes in average mobility around workspaces during 2020H1 (Figure A.2.2). Second, supply shocks play a larger role than demand in driving output contractions in EAP economies with longer and more stringent lockdowns (Philippines). Third, supply shocks are partly temporary in nature, driving output contractions at the start of the lockdowns, but reversing as control measures relax. Fourth, in much of the region, supply shocks also explain a larger part of output fluctuations than during the 2008-09 global financial crisis (GFC). Fifth, demand shocks are large in almost all economies and also larger than what occurred during the GFC. Sixth, demand shocks tend to dominate in those economies that were able to suppress the outbreak quickly and prevent a sustained plunge in exports (Vietnam). Finally, more open economies generally face larger spillovers from foreign shocks (Thailand, Malaysia), but export structure and adaptability, and nature of transmission channels also matter, with the exposure to tourism and services representing the largest vulnerability during the COVID-19 shock (Figure A.2.3).

China, Indonesia, and Vietnam saw the smallest output contractions, reflecting a combination of short duration of domestic outbreaks and less stringent restriction measures with resilient exports

⁴ To deal with the unprecedented nature of the COVID-19 shock, the variance of residuals is allowed to vary overtime (that is, stochastic volatility; see Annex 2).

and limited exposure to tourist inflows. China was the first country to implement strict lockdown and travel restriction measures in late January. Consequently, the country experienced a very sharp 36 percent output contraction on a quarterly annualized basis in the first quarter of 2020. The contraction reflected over two-thirds of 2020Q1 spent under mandatory workplace closures—the strictest lockdown implemented in the world during this time. The strict lockdowns helped contain the outbreak, allowing businesses to open and activity to rebound in the second quarter. Supply shocks explain about half of the contraction in the first quarter and over eight-tenths of the rebound in 2020Q2.

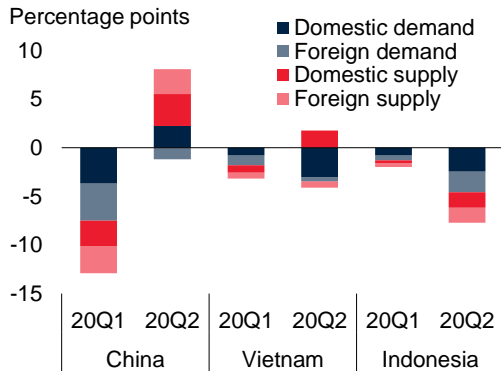
In Vietnam, output was only about 3 percent below its 2019 level by the second quarter of 2020 reflecting a relatively successful suppression of the virus with some of the least stringent lockdown measures. With only 26 days spent with mandatory workplace closings in place for all sectors, compared to an average of 64 days in other EAP economies, during the first half of the year and no average change in mobility measures around workplaces, most of the contraction (about two-thirds of contraction in 2020H1) was from falling domestic demand. In contrast, mobility around retail spaces remained subdued for much of 2020H1. By the end of the second quarter mobility hadn't recovered fully, reflecting changing consumer behavior weighing on domestic demand.

Demand factors also dominated in Indonesia, where despite a severe and durable COVID-19 outbreak, authorities opted for less stringent lockdown measures compared to those implemented in the rest of the region, explaining about two thirds of the 8 percent output contraction in the first half of the year. Mobility around work and retail spaces contracted by about one-fifth on average over 2020H1, with retail declining slightly more.

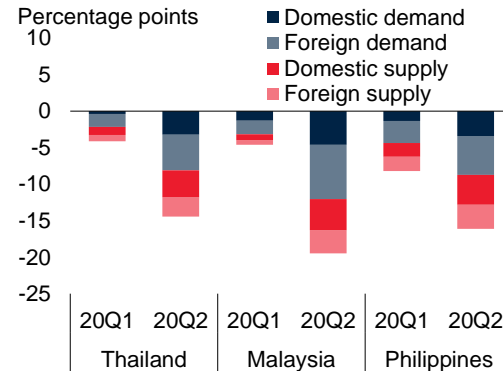
Malaysia, Thailand and the Philippines, three open regional economies with high global exposure, all implemented relatively extended periods of strict lockdown measures. This resulted in sharp output contraction in all three economies with a comparatively large contribution to the growth collapse from foreign sources. Malaysia saw one of the largest contractions in mobility around work and retail spaces, second only to Philippines, reflecting the collapse in both supply and demand. The collapse in demand dominated, however, and showed in the stronger response in mobility around retail rather than workspaces, and the more severe contraction and slower rebound in retail sales compared to industrial production. Malaysia's dependence on tourism and oil increased its vulnerability.

Figure A.2.2. Supply and demand dynamics in 2020H1
COVID-19 is both a supply and demand shock.

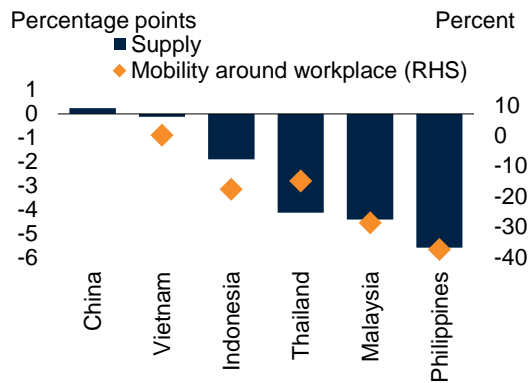
A. Output growth decomposition



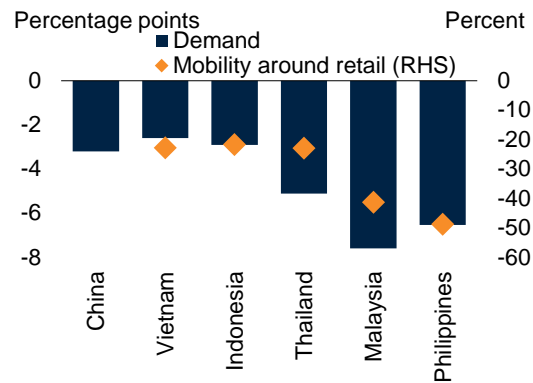
B. Output growth decomposition



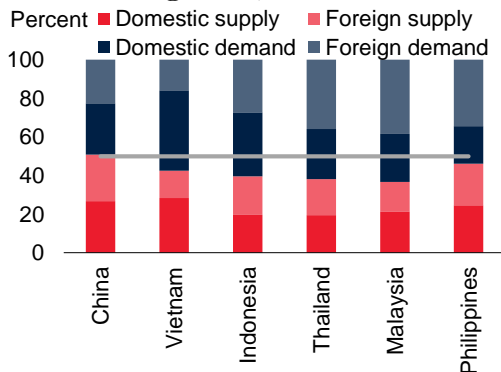
C. Supply and lockdowns, 2020H1



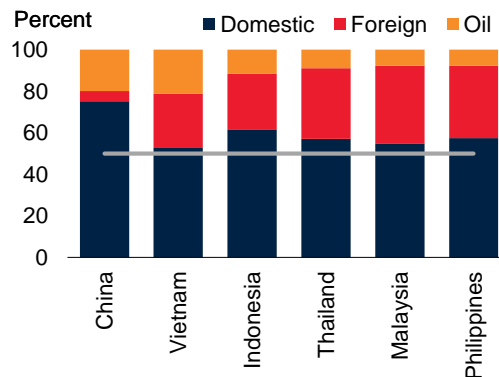
D. Demand and lockdowns, 2020H1



E. Sources of growth, 2020H1



F. Sources of growth, 2020H1



Source: Google; Haver Analytics; World Bank.

Note: Historical decomposition from a sign restricted Bayesian vector autoregressive model. Output is standardized. See Annex 1.

C. “Mobility around workplace” reflects the average deviation from baseline during the first half of 2020 in trends for places of work. Supply shock is the average annualized change in 2020H1.

D. “Mobility around retail” reflects the average deviation from baseline during 2020H1 in trends around places like restaurants, cafes, shopping centers, theme parks, museums, libraries, and movie theaters. Demand shock is the average annualized change in 2020H1.

E. Calculated using the sum of absolute values of the demand and supply shocks over 2020H1.

F. Foreign shocks include those from G4 output and inflation (G3 in the case of China). Domestic shocks are those from domestic output, inflation, monetary policy and exchange rate. See Annex 1.

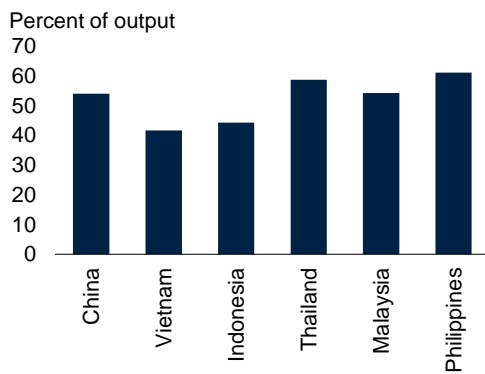
Thailand saw its economy shrink by 13 percent in the first half of 2020 compared to pre-crisis levels. The contraction was dominated by demand shocks, given a relatively less stringent lockdown imposed with only 30 days spent with mandatory workplace closings. Demand accounted for over 60 percent of the outcome reflecting Thailand’s dependence on tourism, at over 12 percent of output, and its highly open economy.

In the Philippines, output was almost 20 percent below its pre-crisis level. By mid-March, Philippines had the strictest lockdown measures in place with a stringency index of 100. The strict lockdown and outbreak saw severe mobility responses with mobility around retail contracting by half and around workplaces by more than a third. Consequently, the economy saw both supply and demand shocks explain the growth decline with demand playing a slightly larger role.

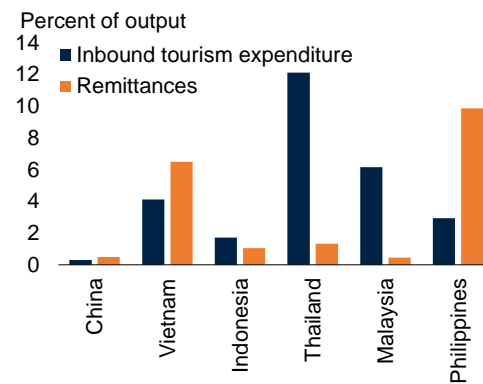
Figure A.2.3. Economic structure and COVID-19

Some EAP economies are heavily reliant on trade, services, tourism and remittances which are directly affected by COVID-19. Outbreaks are most severe in Philippines and Indonesia.

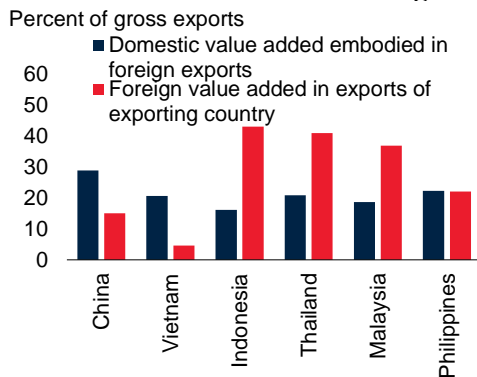
A. Services



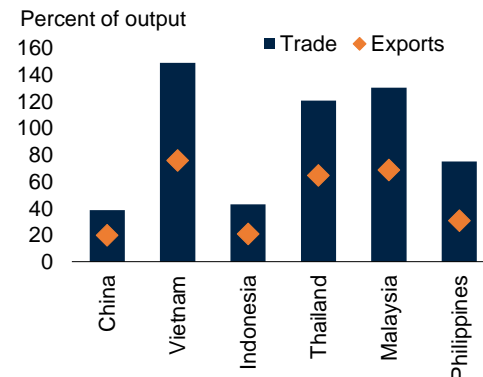
B. Tourism and remittances



C. Forward and backward linkages

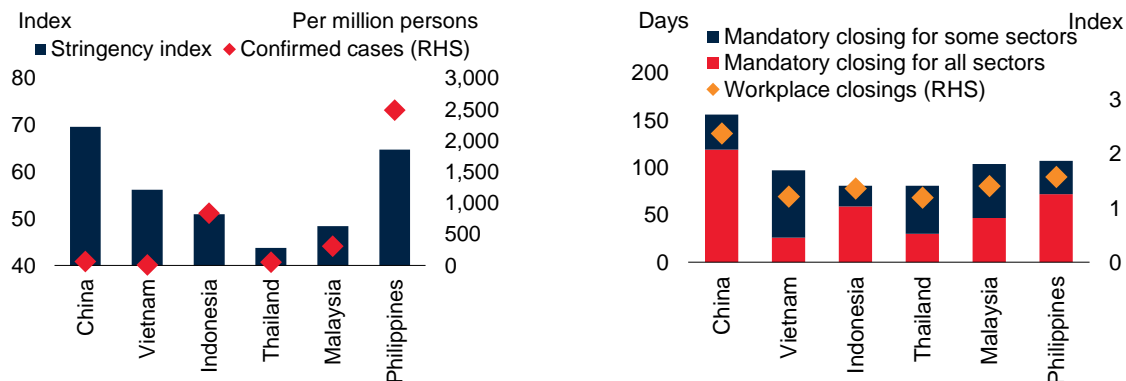


D. Trade



E. Stringency and cases

F. Workplace lockdowns



Source: Johns Hopkins University; Organisation for Economic Co-operation and Development; Oxford COVID-19 Government Response Tracker; University of Oxford; World Bank; World Tourism Organization.

A.B. Data for 2019.

C. Data for 2015.

D. Data for 2018.

E. Last observation is 17 September, 2020.

F. The index for workplace closing is an average over 2020H1 which ranges from 0-3 with 0 showing no closures and 3 showing closures (or work from home) for all-but-essential workplaces. Average for 2020H1.

Looking forward, in China, the economy is expected to continue to rebound in the second half of the year helped by policy stimulus, and offset part of the losses incurred during the first quarter (Figure A.2.4). Large domestic and global demand shocks, however, will mean that growth in 2020 will be significantly lower than its historical performance.⁵ The 2020 outcome is also mainly driven by domestic shocks, with foreign shocks explaining about one-fifth of the outcome, compared to closer to one-third in other EAP economies.

The growth outlook for the rest of East Asia is mixed. Vietnam will be able to achieve positive growth in 2020, with growth expected to be only about 4 percentage points below its previous growth record. The limited impact of COVID-19 on domestic production means that two-thirds of growth in 2020 will be demand-driven. In Indonesia, growth this year is expected to be about 7 percentage points below previous growth outcomes with both supply and demand contributing to the contraction.

In Malaysia, the economy is expected to experience a sharp rebound in the second half of the year, although this is not expected to fully unwind the damage to demand done in the first half. Growth is expected to contract by 5.1 percent this year, 10 percentage points below its longer-run growth performance and with a large role for domestic and foreign demand. Being a highly open economy, foreign sources of growth play a comparatively larger role in Malaysia's output contraction. In Thailand, growth is expected to be close to 13 percentage points below its previous growth record. Its recovery in the second half of 2020 is likely to be slow given its reliance on tourism, large services sector and open economy. The Philippines is expected to be the worst affected by the COVID-19 shock—contracting by about 7 percent this year—over 13 percentage points lower than its previous growth outcomes. This outcome reflects the long duration of the outbreak and stringent lockdown measures, a collapse in remittances, and the

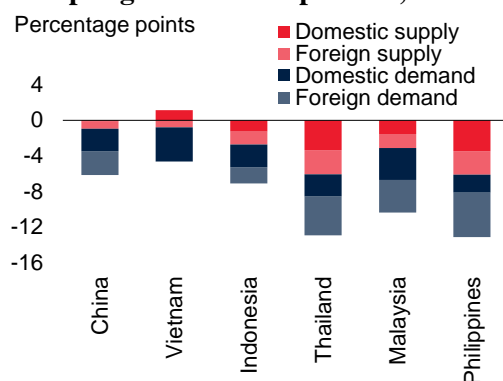
⁵ Model outcomes reflect deviations from a longer-term average.

economies dependence on services (the largest services sector among the ASEAN-5 at 61 percent of output).

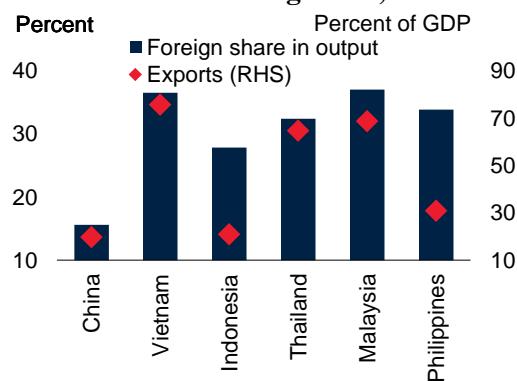
Figure A.2.4. Supply and demand dynamics for 2020

Growth outcomes in 2020 reflect broad-based weakness with spillovers to open economies aggravating domestic outbreaks.

A. Output growth decomposition, 2020



B. External sources of growth, 2020



Source: Haver Analytics; World Bank.

Note: Historical decomposition from a sign restricted Bayesian vector autoregressive model. See Annex 1.

A. Shocks scaled to the size of the output growth contraction in 2020. Output is standardized.

B. Foreign shocks include those from G4 (G3 in the case of China) output and inflation. Calculated using the sum of absolute values of all shocks in the model.

Deficient demand

The combination of supply and demand shocks mean that 2020 should see wider output gaps (driven by demand shocks) and lower utilization of factors of production (driven by supply shocks). The temporary supply shocks mean that only part of the virus-induced contraction will go into the output gap, dependent on the share of demand in the shock.

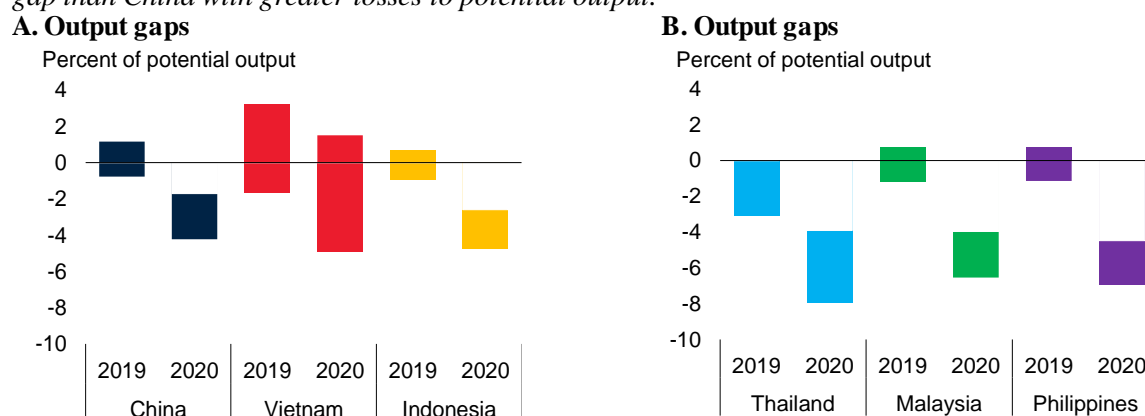
While the output gap was effectively zero for most of the last three years in China, it widened significantly in the first quarter of 2020 (Figure A.2.5). The second quarter rebound has made up some of these losses but the output gap for 2020 is still expected to average around -3 percent of potential output, and narrow but remain negative in 2021. This is significantly worse than the output gap registered during the GFC and implies that demand is the main constraint to output recovery in the short run. In Vietnam, the smaller contraction means that the output gap is expected to widen to around -1.5 percent. In Indonesia, the output gap is expected to widen well above -3 percent in 2020 reflecting prevalence of demand factors in output contraction and the lingering impacts of the outbreak.

Large pandemic-induced demand shocks in Malaysia, Thailand, and the Philippines coupled with already weak starting points for the former two economies mean that output gaps are expected to be negative and large, at over 5 percent for 2020. For Malaysia and Thailand, these output gaps are be about twice as large now than what is considered to be its size during the GFC while for the Philippines this is almost six times larger.

The output gap is expected to narrow in 2021 but remain negative across the region. In China, the output gap is projected to narrow to around -1 percent. In EAP excluding China, the output gap narrows to around -3 percent. The output gap is projected to remain wide in Thailand, which faces one of the largest demand-driven output contractions and prospects of slow recovery, and Philippines, the economy hardest hit by the outbreak. In Vietnam, the output gap will be negative but small relative to other economies.

Figure A.2.5. Coronavirus impact on output gap and potential growth

Temporary supply shocks should lead to temporarily lower utilization of factors of production. Demand shocks should widen the output gap. EAP ex China will likely have a more negative and persistent output gap than China with greater losses to potential output.



Source: Haver Analytics; World Bank.

Note: Based on estimates from a modified multivariate filter model of World Bank (2018). Error bands reflect 95 percent confidence intervals. Data available to 2020Q2.

Fiscal and monetary policy response

To counter the short- and long-term consequences of COVID-19, policy responses need to be comprehensive and customized to country-specific circumstances. In addition to COVID-19-related factors, including, the duration and severity of outbreak, policy makers would also need to carefully consider economic structure, dependence on foreign demand, as well as behavioral responses of households and firms to the economic shock.

In economies with large demand shocks, traditional monetary and fiscal policy actions, calibrated to the size of the shock, can support income and consumption (Figure A.2.6). Additional spending and revenue measures have been sizable in EAP, averaging 5 percent of output. More spending, however, may be required in economies hardest hit by the current outbreak (Malaysia, Philippines, Thailand) or if conditions worsen further in future. The fiscal response should consider fiscal sustainability and financial stability objectives to avoid costly sovereign debt and financial crises over the medium term. Calibrating the appropriate response is challenging given the significant fiscal demands for meeting health, education, and nutritional needs and reforms needed for boosting potential growth, which has also been weakened by the pandemic.

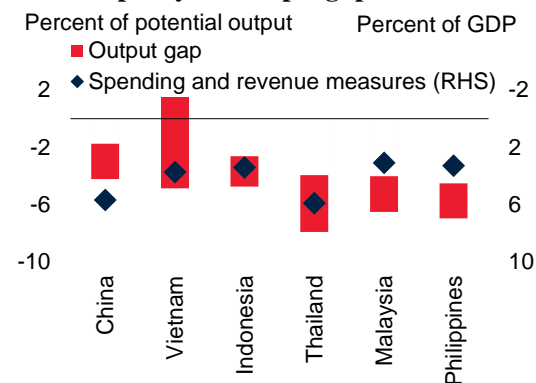
Monetary policy across the region has reacted aggressively to counter falling demand and acute stress in financial markets. Reflecting the shift in policy rates, real interest rates fell by about 2

percentage points on average. While policy rates in Thailand are close to the zero-lower bound, in other economies there remains room to shift rates lower. With the expected size of deficient demand and likely low inflation over the next two years, further interest rates cuts may be necessary especially in economies hard hit by the outbreak (Philippines). Acute pressures in some segments of financial markets (including government bonds) may require further direct intervention.

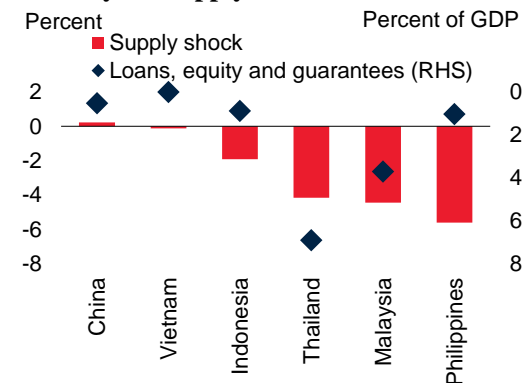
Figure A.2.6. Policy response

Policy responses should be calibrated to the size of the shock, supporting demand and liquidity provision in the short-run without undermining longer-run debt sustainability objectives.

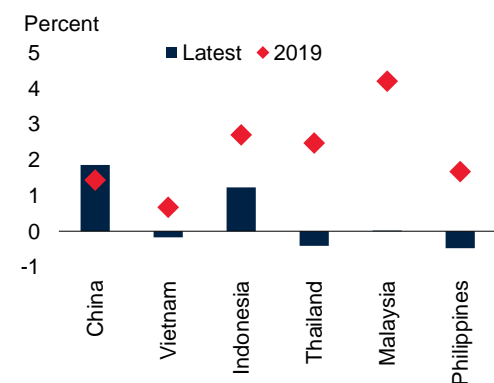
A. Fiscal policy and output gaps



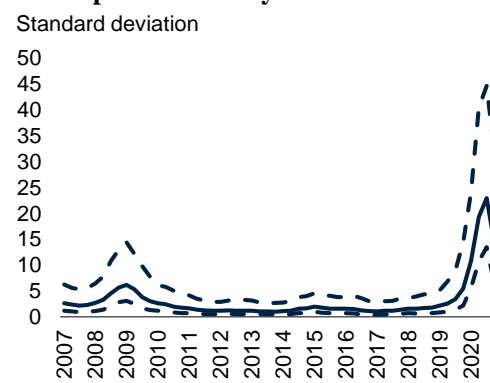
B. Policy and supply shocks



C. Real interest rates



D. Output uncertainty



Source: Consensus Economics; Haver Analytics; International Monetary Fund; World Bank.

A. Based on estimates from a modified multivariate filter model of World Bank (2018). Error bands reflect 95 percent confidence intervals.

B. Historical decomposition from a sign restricted Bayesian vector autoregressive model. See Annex 1.

C. Real interest rates are calculated as the policy rate less expected inflation. Inflation expectations based on August 2020 consensus forecasts for consumer price inflation. 2019 reflects policy rate at the end of year.

D. Stochastic volatility estimates from a Bayesian vector autoregressive model weighted using 2019 GDP at 2010 prices and market exchange rates for China, Indonesia, Malaysia, Philippines, and Thailand. See Annex 1.

In economies with large supply shocks, social safety nets, liquidity support, guarantees, and other insurance mechanisms can offset losses incurred until production normalizes. Loans, equity, and guarantees have averaged over 2 percent of output with Thailand providing the largest support to its economy in the region. Additional measures may be required in economies whose production was hardest hit by the pandemic to ensure that viable firms do not fail due to lack of funding (Philippines). To address the impact of the pandemic-induced shock on the long-

term drivers of potential growth these policies would, however, need to be supplemented by additional policy actions focusing on structural reforms.

More broadly, policy needs to counter the unprecedented uncertainty that has been created by COVID-19. This uncertainty is generated by the future path of the outbreak, the timing and availability of a vaccine, policy, consumer and firm behavioral responses, and fragility in some EMDEs. Uncertainty is a powerful incentive for private firms to stop investing and for consumers to stop spending leading to slow and low growth and possible permanent damage to an economy. Based on estimates from the Bayesian VARs, volatility, one measure of this uncertainty, is more than three times as large as that generated during the GFC and almost nine times its size in normal times. To counter uncertainty, fiscal policy should look to ramp up public investment and minimize uncertainty related to policy implementation.

Longer-run damage to productive capacity

Despite some normalization in economic activity, the recovery may be protracted in some economies. The economic consequences of this pandemic are unlikely to be only short-term in nature.⁶ COVID-19 represents the largest contraction in global output in post-war history, and recessions of this nature and this scale are associated with persistent and in some cases permanent losses in output (World Bank 2020). The pandemic-related fallout will also likely be the most synchronized slowdown in economic history, with more than 90 percent of economies experiencing a recession, which implies that global trade is expected to remain depressed for an extended period and will weigh on regional exports.

It is well documented that recessions in general lead to long-term losses to potential output (World Bank 2020). For EMDEs, the output loss is estimated at almost 7 percent cumulatively in the five years following the recession. Long-term output losses when these recessions are accompanied by a financial crisis are larger and are estimated at almost 8 percent in the five years following the recessions. Epidemics also are likely to create lasting damage to potential output in affected countries by lowering investment by about 11 percent and labor productivity by 6 percent after five years (Dieppe 2020; Kilic Celik, Kose and Ohnsorge 2020). Output losses following the pandemics, when economic fallouts are synchronized, are thought to be larger than the impacts of localized epidemics (Ludvigson, Ma, and Ng 2020).

In the current context, the pandemic is likely to dampen capital accumulation as expected returns on investment decline due to a higher uncertainty, lower expected growth, and weaker business confidence. Households facing rising uncertainty are likely to increase precautionary savings and change their spending behavior. Productivity is also expected to suffer as weak investment will weigh on innovation and human capital. There is a risk that human capital will be eroded because of long and significant disruptions in education, lengthy periods outside the job market, and reduced job-search activity. Shifts in global supply chains, which have served as important engines of growth over the previous few decades, may go through costly reconfigurations as investors and producers deal with the risks associated with the design of global supply chains highlighted by the pandemic.

⁶ Evidence of the long-term economic consequences of pandemics is limited (McKibbin and Fernando 2020). The economic consequences of recessions and crises provide some guide for the future (World Bank 2020).

Potential growth in EAP region has been adversely affected by the GFC in 2008-09 and China's policy-driven rebalancing away from investment. The potential growth in the region, which is estimated using production function approach, declined since the GFC from 9 percent in 2009 to 6 percent in 2019 (Figure A.2.7; Annex A.2.1). This reflected diverging growth trends in China and in the rest of the region. In China, the potential growth had peaked at little over 10 percent in 2009-10 and declined to 6.2 percent in 2019. In the rest of the region, potential growth, declined sharply in the aftermath of the Asian crisis, but gradually recovered thereafter and peaked at 5.3 percent in 2016, before moderating slightly to 5 percent in 2019.

The decline of the EAP potential growth since the GFC was driven by China and was broad-based reflecting the deceleration of each underlying component of potential growth (capital stock, labor and TFP). In the rest of the region, capital stock has slightly recovered over the last decade, while TFP stayed around 1 percent. On the other hand, contribution from labor eased gradually.

Capital stock. In EAP, the contribution of capital stock to potential output growth surged to its pre-Asian crisis levels (4.3 percent) during 2010-12. It dropped to 3.2 percentage point on average in 2016-19 reflecting policy-induced normalization of investment growth in China. Capital stock contribution in China accelerated since the Asian financial crisis and peaked at 4.7 percentage points on average in 2010-12 before decelerating to 3.1 percentage points in 2016-19. In the rest of the region, capital stock contribution was rising after the Asian financial crisis reaching its peak of 3.5 percent in the last three years.

Labor. In the region, demographic dividends have been gradually declining. The contribution of labor to potential output in the region decreased to 0.2 percentage point on average in 2016-19 from 0.8 percentage point on average in 1995-98. The trends observed in potential labor in the region mirror the trends observed in China. In China, the potential labor contribution dropped to almost nil in 2019 from 0.8 percentage point on average in 1995-97. The rest of the region still enjoys demographic dividends even if less than before. Potential labor contribution decreased to 0.7 percentage point on average in 2016-19 from 1 percentage point in 1995-97.

TFP. TFP growth in EAP declined since the GFC from about 3.8 percent on average in 2010-12 to 3 percent on average in 2016-19. China demonstrated similar trend with TFP growth easing to 3.6 percent on average in 2016-19 from its peak of 4.7 percent on average in 2004-06. In the rest of the region, the contribution of TFP is much smaller but follows the same trend. TFP growth in EAP excluding China declined to 0.8 percent on average in 2016-19 from its peak of 1.4 percent on average in 2004-06.

Potential growth prospects. Under the baseline scenario, which assumes that each underlying component of potential growth (investment, human capital, and labor force participation rate) follows its historical trend, in the next decade, EAP potential growth is expected to decline by 2 percentage point from 7.7 percent on average in 2010-19 to 5.7 percent on average in 2020-2030 regardless of the effects of COVID-19.

Under a more pessimistic scenario, which reflects the negative impact of COVID-19 on investment, productivity, and labor participation, the potential growth is expected to decline more sharply to 4.4 percent on average in 2020-30.

The pessimistic scenario assumes that from 2020, investment growth declines to 2 percent—growth rate based on the Consensus Forecasts’ 10-year ahead expectations. This scenario assumes that investment growth stays at this subdued growth rate for a decade as opposed to the baseline scenario where investment growth is projected to grow at its longer-term average (2000-2019) rate for the next decade.⁷ For China, the pessimistic scenario projects investment growth at around 1.3 percent on average over the next decade, which is the lowest in the region.

Education in this study is measured as secondary education completion ratio. Under the baseline scenario, it is assumed to improve following its historical trend. For instance, in Indonesia, secondary school completion rate is assumed to increase to almost 40 percent on average in the next decade (2020-30) from 24.4 percent on average in the last decade (2010-19). Under the pessimistic scenario, education is projected to be stalled and stay at the level of 2019.

LFPR under the baseline scenario is assumed to repeat its post historical improvements. Social distancing measures as a response to COVID-19 have hit—predominantly services—sectors with high female employment shares particularly hard (Alon 2020). Under the pessimistic scenario, women are assumed to not be able to return to work after being out of the job market due to COVID-19. Therefore, female LFPR in each age group is assumed to drop by 10 percentage points for the next decade (2020-30). Under this pessimistic scenario, in China female LFPR declines to 51 percent from 61 percent under the baseline scenario, which has already declined from the rate (64 percent) in the last decade (2010-19) mostly due to ageing in population.

In China, under the baseline scenario, the potential growth declines to 6 percent on average over the next decade from 8.3 percent on average over the last decade. Under the pessimistic scenario, potential output decelerates further to 4.5 percent due to worsening of all underlying drivers of potential output growth. Under the pessimistic scenario, capital growth contribution decreases by 0.5 percentage point due to low investment rates, and the burden from potential labor is projected to be heavier due to significant decline in female LFPR.

In the rest of the region, under the baseline scenario, potential growth is projected to stay constant at around 4.8 percent over the next decade. Under the pessimistic scenario, potential growth drops to 3.9 percent on average. Labor is expected to be the largest contributor to decline in potential growth expected to drop by 0.3 percentage point under the pessimistic scenario.

There is a room for policy. The effect of COVID on potential growth can be softened if right policy actions are implemented to promote higher investment, better education and health, and increased female LFPR to close the gap between male and female LFPRs. Under this optimistic scenario, in the next decade, the average potential growth in EAP, China, and EAP excluding China, could increase by 1.1, 1, and 1.6 percentage point respectively (Figure A.2.8).

⁷ For China, under the baseline scenario, the investment growth rate over the next decade is equal to the average of last 5 years instead of 10 years due to the recent policy-driven rebalancing away from investment.

Under this optimistic scenario, each country is assumed to accelerate its investment growth over the next decade as much as its largest increase over any historical ten-year interval. In Indonesia, for instance, investment growth is projected to increase to 11.5 percent on average over the next decade from 6.1 percent on average over the last decade.

Secondary school completion rate is also assumed to improve as much as its largest increase over any historical ten-year interval. For example, China, secondary school completion rate is assumed to reach over 25 percent on average over the next decade from 19.5 percent on average over the last decade.

Under the optimistic scenario female LFPR is assumed to gradually pick up starting from the year 2020 and gradually close the gap at the end of next decade in 2030. In Malaysia, female LFPR is assumed to reach 65.5 percent on average over the next decade from 48 percent on average over the last decade instead of a modest increase to 51 percent under the baseline assumption.

Conclusion. COVID-19 represents the largest shock experienced by the global economy in modern times as unprecedented lockdown measures worldwide have delayed the production and consumption of goods and services. The dynamics of the shock mean that 2020 will see both lower potential growth and the widest output gaps in decades. Unfortunately, the damage caused by the pandemic will likely not be limited to the short-term in contrast to some earlier recessions. History shows that epidemics could cause long-term losses to productivity, investment, and output.

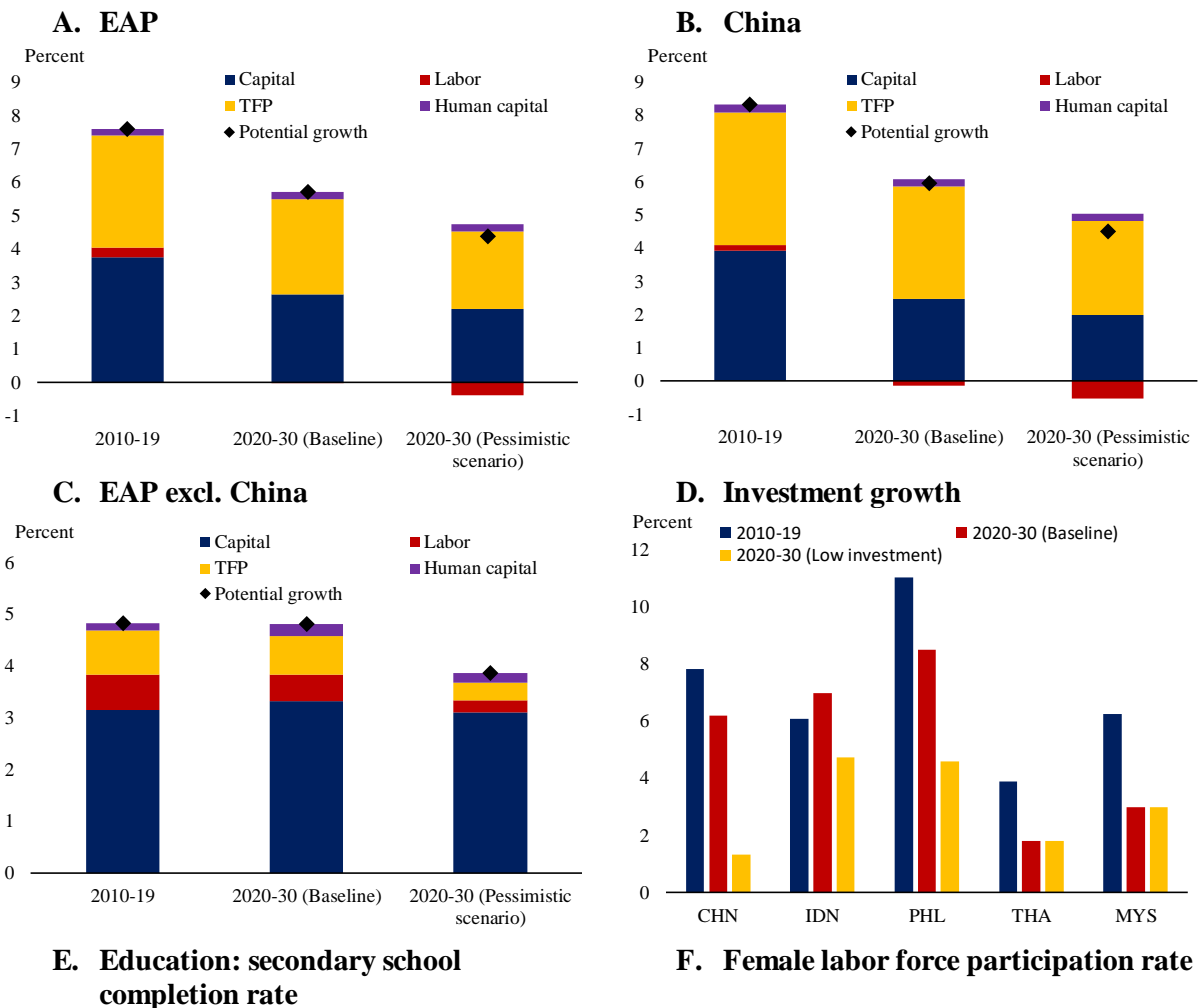
In East Asia and the Pacific, COVID-19 has induced both supply and demand shocks. Supply shocks are large in most economies with the size of the shock reflecting the length and severity of the lockdown measures. In contrast to the GFC and reflecting the unique nature of the shock, supply plays a much larger role during COVID-19-related fallout in most EAP economies. In economies with longer and more stringent lockdowns (Philippines) supply plays a larger role in output contraction, even if demand factors are also present. In countries, which were able to suppress the outbreak relatively quickly (Vietnam) output contraction was relatively limited, activity rebounded quickly, and demand factors dominate as consumer behaviors change. More open economies also face greater spillovers from the rest of the world. Part of the supply shock is temporary in nature leading to a lower utilization of the factors of production initially but reversing as the recovery ensues.

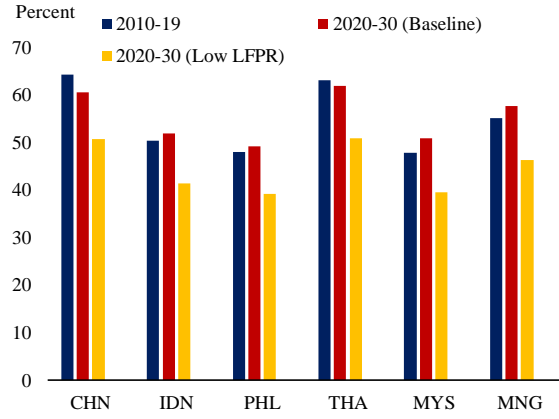
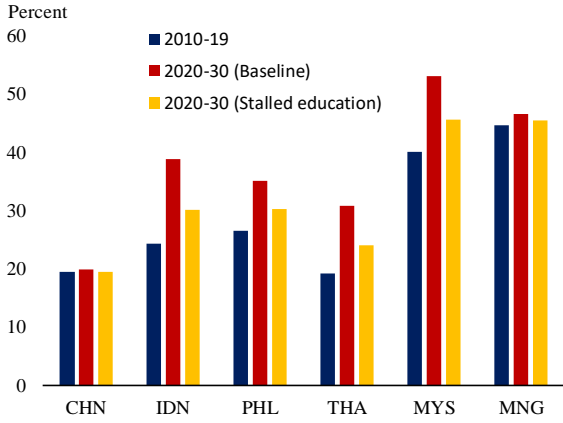
The demand part of the COVID-19 shock generates large and persistent negative output gaps in much of the region. In China, the output gap will likely be around -3 percent of potential output; significantly worse than the estimated output gap during the GFC. EAP excluding China will see an even larger and more persistent output gap, above -4 percent. Output gaps are projected to be widest in Malaysia and Thailand, two economies that were already slowing prior to the pandemic, and the Philippines—the worst hit economy among its peers. In contrast, output gap is expected to be narrowest in Vietnam—thanks to so far successful containment of the virus and despite a recent resurgence.

The pandemic is likely to cause longer-term losses with potential output remaining permanently below pre-crisis trend. Under a more pessimistic scenario, potential growth in EAP could decline by more than 3 percentage point over the next decade compared to the last decade. Effective and forward-looking policy actions, which promote higher investment, better education and health, and increased female LFPR to close the gap between male and female LFPRs, could potentially offset some damage caused by the pandemic. Under an optimistic scenario, potential growth in the region may increase as much as 1 percentage point on average over the next decade.

Figure A.2.7. Potential growth going forward: pessimistic scenario

Under the baseline scenario, which assumes that each underlying component of potential growth (investment, human capital, and labor force participation rate) follows its historical trend, in the next decade, EAP potential growth is expected to decline by almost 2 percentage point from 7.6 percent on average in 2010-19 to 5.7 percent in 2020-2030 regardless of the pandemic-related fallout. Under pessimistic scenario, which projects the negative impact of COVID-19 on investment, productivity, and labor participation, the potential growth is expected to decline more sharply to 4.6 percent on average over the next decade (2020-30).



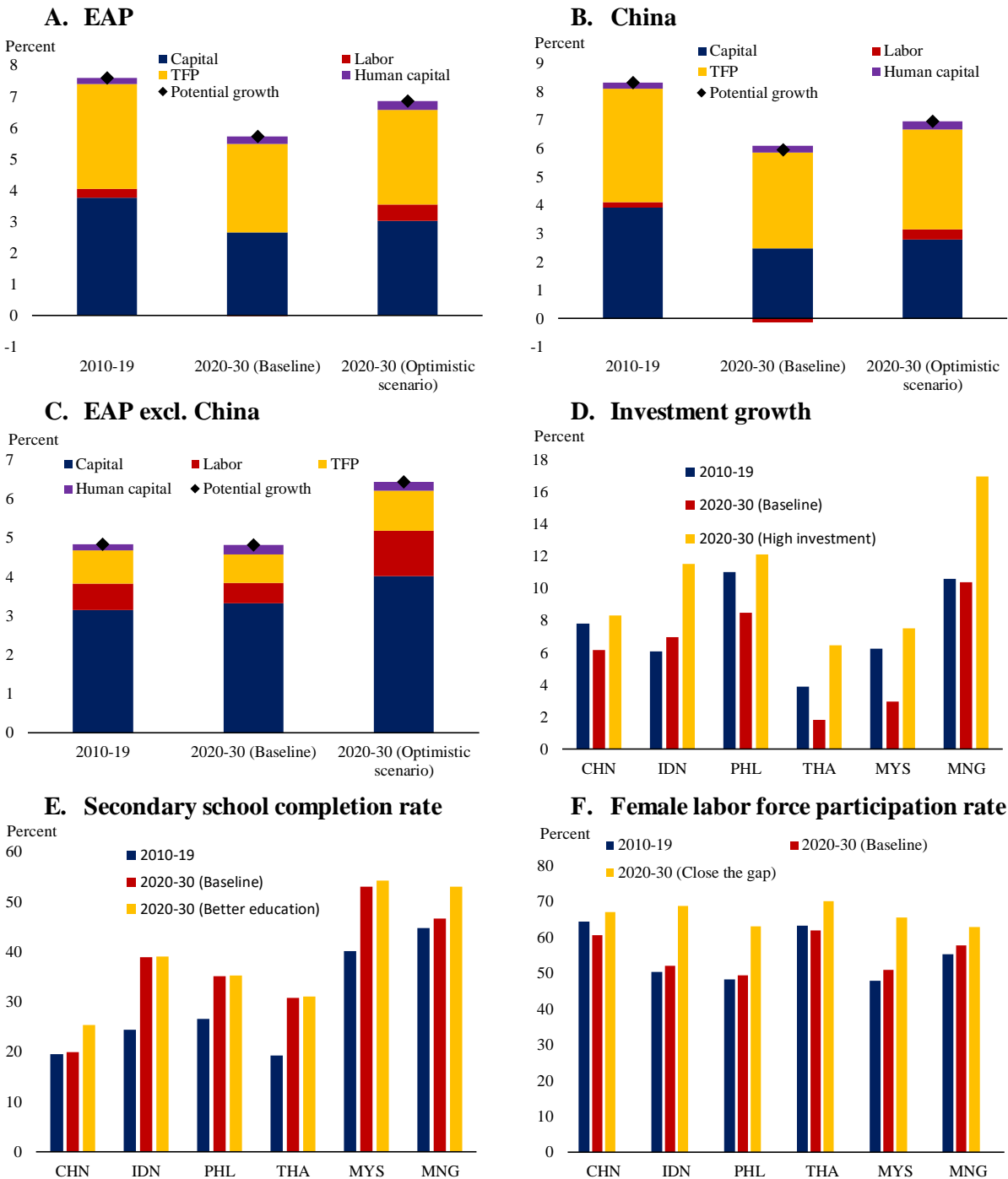


Source: Penn World Table; World Bank staff estimations

Notes: GDP-weighted averages of production function-based potential growth. TFP is total factor productivity growth

Figure A.2.8. Potential growth going forward: optimistic scenario

The effect of COVID on potential growth can be softened if right policy actions are implemented to promote higher investment, better education and health, and increased female LFPR to close the gap between male and female LFPRs. Under this optimistic scenario, the average potential growth in EAP, China, and EAP excluding China could increase by 1.1, 1, and 1.6 percentage point respectively in the next decade.



Source: Penn World Table; World Bank staff estimations

Notes: GDP-weighted averages of production function-based potential growth. TFP is total factor productivity growth

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Annex A.2.1. Decomposing supply and demand dynamics

This section uses two approaches to decompose the supply and demand dynamics of COVID-19 including a sign-restricted Bayesian vector autoregressive (VAR) model and a multivariate filter model of the output gap.⁸ The models are complimentary with the decomposition from the VAR model informing the multivariate filter. The production function approach is used to model longer-run potential growth dynamics.

VAR model

To decompose output growth into supply and demand, a Bayesian structural vector autoregressive model is used following Ha et al. (2019). The model includes a foreign block with three variables: Group of four (G4) output, oil (crude) prices, and G4 inflation. G4 economies include China, the euro area, Japan, and the United States. There is also a domestic block including the EAP economy's output, inflation, policy rates and the real exchange rate. The domestic block is assumed to not affect the foreign block using block exogeneity zero restrictions. When modeling China, the Group of three (G3) is used as the foreign block and the assumptions of no feedback to the foreign block is relaxed on output and inflation.

To identify foreign and domestic supply shocks, the following sign restrictions are imposed:

$$\begin{bmatrix} \mu_t^{Y,G4} \\ \mu_t^{Oil} \\ \mu_t^{\pi,G4} \\ \mu_t^{Y,EAP} \\ \mu_t^{\pi,EAP} \\ \mu_t^{i,EAP} \\ \mu_t^{RER,EAP} \end{bmatrix} = \begin{bmatrix} + & - & + & 0 & 0 & 0 & 0 \\ + & + & + & 0 & 0 & 0 & 0 \\ + & + & + & 0 & 0 & 0 & 0 \\ * & * & * & + & + & - & * \\ * & * & * & + & - & - & * \\ * & * & * & * & * & + & * \\ * & * & * & * & * & + & + \end{bmatrix} \begin{bmatrix} \varepsilon_t^{GlobalDemand} \\ \varepsilon_t^{Oil} \\ \varepsilon_t^{GlobalSupply} \\ \varepsilon_t^{DomesticDemand} \\ \varepsilon_t^{DomesticSupply} \\ \varepsilon_t^{MP} \\ \varepsilon_t^{ER} \end{bmatrix}$$

where a structural supply shock (ε) is defined as that which moves output and inflation in opposite directions and a demand shock moves them in the same direction. In the global case these positive supply and demand shocks also increase oil prices. A positive monetary policy shock decreases inflation and output and appreciates the exchange rate. Domestic structural shocks have no impact on global variables. The zero restrictions indicate the block exogeneity assumption.

All variables, except interest rates, are transformed to q/q seasonally adjusted annualized growth rates. Output data is real GDP in local currency units and seasonally adjusted by source or Haver Analytics, inflation data is headline consumer inflation except for in Malaysia and Thailand where sufficient core inflation data is available. The models are run from 2000Q1 to 2021Q4. For Malaysia, the sample starts in 2004Q2 while for Vietnam and Philippines it starts in 2005Q1. The last available observation is 2020Q2. The model is estimated using Bayesian priors with

⁸ Bayesian VAR models are estimated in BEAR (Dieppe, Legrand, and Van Roye 2016).

2000 draws and 1000 burn-in observations. The Minnesota prior is used. The model is estimated with four lags. Stochastic volatility is used in the residual term to address the changes in uncertainty generated during the GFC and the COVID-19 pandemic.⁹

Multivariate filter model

To construct the output gap and potential growth a modified version of the multivariate filter model in World Bank (2018) is used. The model uses multiple indicators to identify the output gap including house prices, credit extension, commodity prices, capacity utilization, the unemployment rate, interest rates and inflation. The model uses switches to add or remove certain variables depending on country-specific availability.

To introduce transitory supply shocks to the model, let output be decomposed into a trend and cyclical component such that:

$$Y_t = \bar{Y}_t + YGAP_t$$

Where Y_t is the log level of real gross domestic product, \bar{Y}_t is potential output, and $YGAP_t$ is the output gap. The log level of potential output is then defined as:

$$\bar{Y}_t = \bar{Y}_{t-1} + G_t + \epsilon_t^{\bar{Y}}$$

It evolves following an autoregressive process which grows by growth rate G_t . However, to introduce transitory supply shocks there is also a level shock, $\epsilon_t^{\bar{Y}}$, which allows potential output to deviate from the smooth potential growth process (G_t). These shocks can be considered events such as droughts, labor strikes, oil production disruptions, and COVID-19. The smooth potential growth series follows an autoregressive process which deviates from a longer run steady state value. For more details see World Bank (2018) and Botha, Ruch and Steinbach (2018).

The model also includes a Phillips curve where domestic inflation is driven by inflation expectations, habit formation, and imported inflation; an Okun's law equation where the unemployment rate is explained by its non-accelerating inflation rate of unemployment (NAIRU), as well as outcomes in the output gap; and an output gap equation where the output gap is explained by credit extension, export-weighted real commodity prices, and house prices.

The model is extended to include a monetary policy rule in economies where policy rate data is available. The Taylor Rule is specified as follows:

$$i_t = \tau i_{t-1} + (1 - \tau)(r_t^* + \pi_t^* + \gamma_\pi(\pi_{t+4} - \pi_t^*) + \gamma_{YGAP} YGAP_t + \epsilon_t^i)$$

⁹ For Vietnam, since the economic impact of COVID-19 is limited the model is simplified and excludes stochastic volatility.

Where i_t is the nominal policy interest rate which responds to forecast inflation from its target (π_t^*) and the output gap. The neutral real interest rate is modelled as in Laubach and Williams (2003).

Production function approach

Potential growth using the production approach follows the methodology of Kilic Celik, Kose, and Ohnsorge (2020). The approach represents potential output as a Cobb-Douglas production function of the amount of full capacity of capital and labor, as well as technology and efficiency of factor allocation that drive total factor productivity (TFP). Potential TFP growth is estimated as the predicted value of a parsimonious panel regression of five-year averages of trend TFP growth on lagged per capita income relative to advanced economies (to proxy for convergence-related productivity catchup), education, demographics, and trend investment. Potential labor supply is estimated as the population-weighted aggregate of predicted values of age and gender-specific labor force participation rates from regressions on policy outcomes and cohort characteristics, business cycles, and country effects. The potential capital stock is assumed to match the actual capital stock.

Annex A.2.2: Modeling an unprecedented shock

The unprecedented nature and size of the COVID-19 shock presents possible challenges to the effective modeling of the pandemic, especially for the historical decomposition of the VAR model. The decomposition relies on the independently and identically distributed errors assumption. Due to the short time period related to the pandemic it is not possible to determine ex ante if this represents a structural break or some other nonlinearity that could invalidate this assumption. However, in order to deal with the significant change in volatility, the VAR model includes stochastic volatility in the error structure (this is a generic version of what is suggested in Lenza and Primiceri (2020)).

In the case of the multivariate filter, the model is estimated with data up to 2019Q4 excluding the COVID-19 period. An underlying assumption is therefore that the relationships in an economy remain similar in most respects during the COVID-19 pandemic; a useful assumption given the inability to determine whether relationships have changed. As a robustness check the models were estimated including the first two quarters of 2020 and resulted in 50 percent higher uncertainty estimates around the output gap while the historical behavior of the output gap didn't change substantially in the sample economies.