3. COVID-19 Lockdowns and Exits in Asia: Some Lessons

This chapter uses new data and novel modeling techniques to examine the effect of containment and policy measures in affecting the health and economic consequences of the COVID-19 pandemic.

Lockdowns: The Importance of Acting Fast

The analysis quantifies the impact of COVID-19 containment measures on the number of infections and on economic activity using real-time containment measures implemented by 129 countries (Deb and others 2020a; 2020b). Daily data on the number of COVID-19 infections and fatalities are used, along with novel high-frequency indicators of economic activity, such as the level of nitrogen dioxide (NO_2) emissions. The results suggest that containment measures have been effective in flattening the pandemic curve. For example, the very stringent containment measures put in place in New Zealand (such as an international travel ban and early restrictions on gatherings and public events, followed quickly by school and workplace closures and stay-at-home orders) are likely to have reduced the number of infections by almost 90 percent relative to a baseline of no containment measures (Figure 3.1, panel 1). Containment measures have been associated with a strong decline in mobility and were more effective in halting the spread of the virus in countries where de facto mobility was curtailed the most, either because of compliance or greater voluntary social distancing stemming from fear of becoming infected (Figure 3.1, panel 2; October 2020 *World Economic Outlook*, Chapter 2). The flattening of the pandemic curve ensured that medical systems were not overwhelmed and reduced fatalities, laying the foundation for recovery (Figure 3.1, panel 3) and medium-term growth (Barro and others 2020).

While necessary to save lives and pave the way for recovery, containment measures resulted in large short-term economic losses. The analysis suggests that in countries where stringent measures were implemented, NO_2 emissions—a proxy for economic activity—cumulatively fell by almost 99 percent 30 days after their implementation, relative to the country-specific path without containment (Figure 3.1, panel 4). Translating this into economic terms, containment led to about a 12 percent decline (month-on-month) in industrial production, which is in line with the decline in industrial production observed in many Asian countries after lockdowns, including China (more than 10 percent) in January–February, Japan (10 percent), and Vietnam (15 percent) in April. The impact of containment has been adverse across all sectors, but tourism has been affected the most. This is particularly important for the Pacific island countries and other Asian economies that rely on tourism, such as Cambodia, New Zealand the Philippines, South Asia, and Thailand.

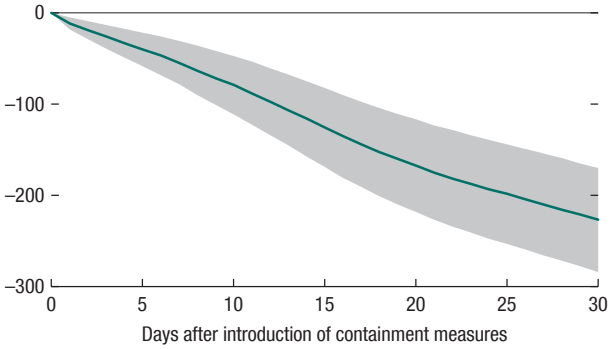
However, a look behind the *average effects* of containment measures shows that their impact varies significantly across countries, depending on local factors and characteristics. Containment measures were more effective in countries with a large share of elderly in the population, and where de facto mobility was curtailed. Other factors also affected the spread of COVID-19, such as population density and the strength of a country's health system. The latter implies that containment might be more challenging in some of the more densely populated Asian emerging markets with weaker health systems, such as India.

Speed of response is another critical factor. The analysis suggests that public health response time, measured as the number of days taken to implement containment measures after a significant outbreak (set at 100 cases, in line with the epidemiology literature such as Mishra and Mishra [2020]), played a significant role in flattening the curve. On this measure, Asia

Figure 3.1. Impact of Containment Measures

Containment measures reduced COVID-19 infections by an average of more than 90 percent in 30 days ...

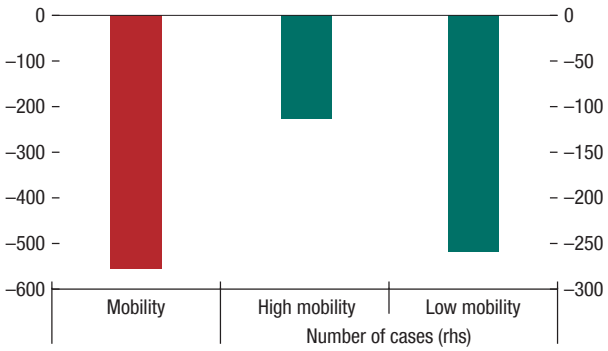
1. Confirmed Cases, Deviation from Baseline (Log percentage points)



Source: Deb and others (2020a).
Note: The graph shows the cumulative response and 95 percent confidence band on the number of COVID-19 infections over 30 days to a tightening of the containment measures index from 0 to 1 (referred to as a unitary tightening henceforth), relative to a baseline of no containment. The containment measures index is normalized to a range from 0 to 1. The figure is displayed in log percentage points, whereas the text translates these into percent changes.

... and were strongly associated with lower mobility, with a greater reduction in infections in countries with a larger de facto decline in mobility.

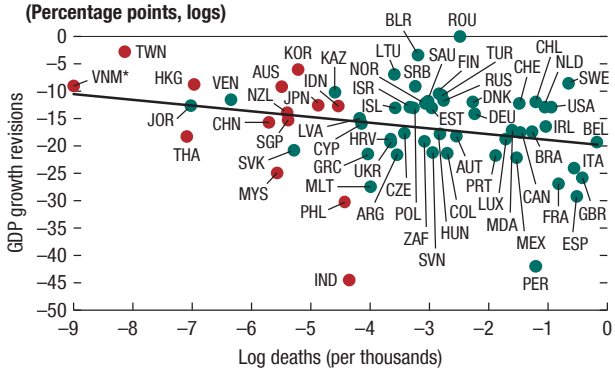
2. Impact of Containment Measures, Deviation from Baseline (Log percentage points; 30 days after a unitary tightening of containment measures)



Source: Deb and others (2020a).
Note: The red bar shows the cumulative impact of containment measures on retail mobility 30 days after a unitary tightening of containment measures. The green bars show the impact on COVID-19 infections when containment measures lead to a smaller decline in mobility (high mobility) relative to a larger decline (low mobility). rhs = right-hand scale.

This laid the foundation for a stronger recovery ...

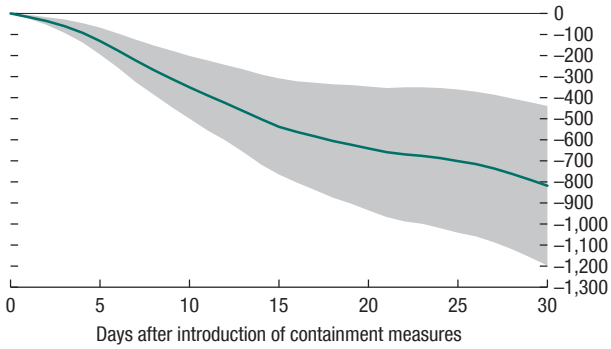
3. Growth Revisions and COVID-19 Deaths per Capita (Percentage points, logs)



Sources: Johns Hopkins University Coronavirus Research Center; and World Economic Outlook Database.
Note: The figure shows cumulative growth revisions over the first and second quarters of 2020 on the y-axis (outturns relative to January 2020 WEO forecast). There are no deaths recorded in Vietnam, making log deaths negative infinity on the x-axis. Country abbreviations are International Organization for Standardization country codes.

... but entailed short-term economic costs of about 12 percent monthly decline in industrial production.

4. NO_2 Emissions, Deviation from Baseline (Log percentage points)

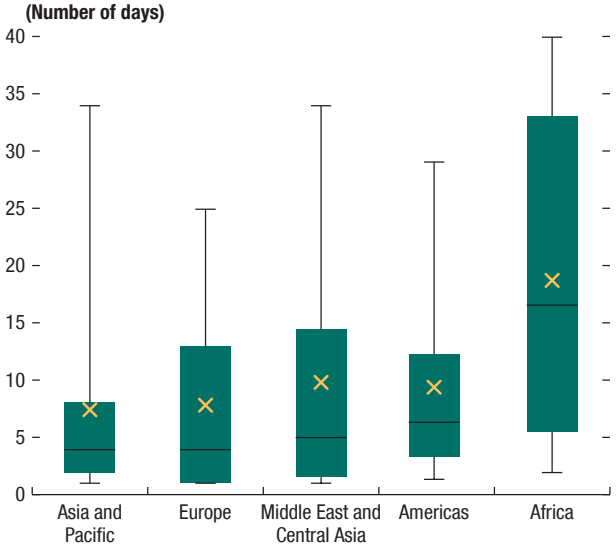


Source: Deb and others (2020b).
Note: The graph shows the cumulative response and 95 percent confidence band on NO_2 emissions over 30 days to a unitary tightening of the containment measures relative to a baseline of no containment. The decline in NO_2 emissions after 30 days of containment measures, of about –800 log percentage points, is translated into losses in industrial production using an estimated historical elasticity between NO_2 emissions and industrial productions of 0.015. The figure is displayed log percentage points, whereas the text translates these into percent changes.

Figure 3.2. Early Intervention Is Paramount

Asian countries responded faster on average ...

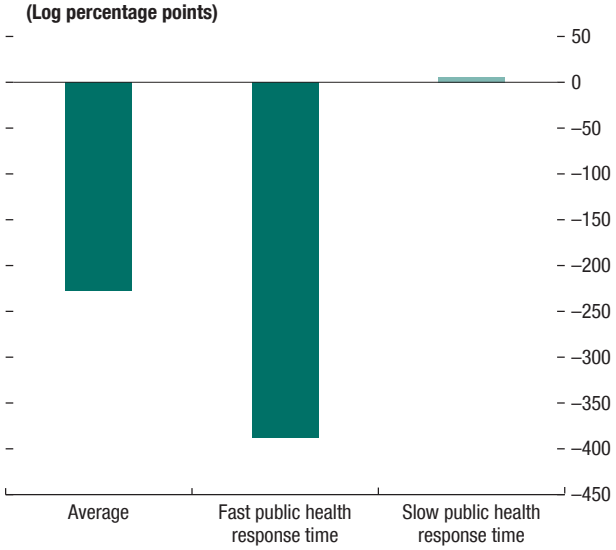
1. Public Health Response Time (Number of days)



Source: Deb and others (2020a).
Note: Public health response time is measured as the number of days it took a country to implement containment measures (excluding restrictions on international travel) after a significant outbreak. In line with epidemiology literature (Mishra and Mishra 2020), significant outbreak is set at after 100 cases. The horizontal line inside each box represents the median; the upper and lower edges of each box show the top and bottom quartiles, respectively; and the top and bottom markers denote the maximum and the minimum, respectively. X is the mean.

... resulting in more effective intervention.

2. Confirmed Cases, Deviation from Baseline (Log percentage points)



Source: Deb and others (2020a).
Note: The bars show the cumulative impact after 30 days on the number of coronavirus disease infections to a unitary tightening of containment measures relative to a baseline of no containment. The figure is displayed in log percentage points, whereas the text translates these into percent changes. The lighter shade indicates effects not statistically significant at the 95 percent level.

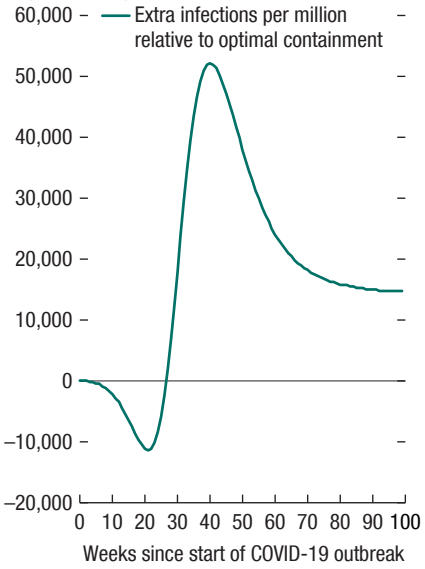
did relatively well compared with other regions, probably because of its experience with previous pandemics (Figure 3.2, panel 1). Countries such as Vietnam or the Pacific island countries, which put measures in place swiftly at the start of the pandemic, witnessed a reduction in infections by more than 95 percent relative to a baseline with no containment measures (Figure 3.2, panel 2).

This empirical evidence is supported by model analysis—based on the Susceptible, Infected, Recovered, or Removed (SIR) macro model (Eichenbaum, Rebelo, and Trabandt 2020) with fiscal policy (Engler and others 2020)—and emphasizes the importance of early intervention. When containment measures are delayed, model simulations illustrate that the cumulative number of infections is significantly higher, and the depth of the economic contraction is more pronounced (Figure 3.3). The reason is that with raging infections, the negative externalities associated with economic activity are very large. Even if containment measures are eventually introduced, the delayed response still leads to higher fatalities and economic losses.

Figure 3.3. Results from an Extended Susceptible, Infected, Recovered, or Removed Macro Model

Delayed containment significantly increases the number of infected ...

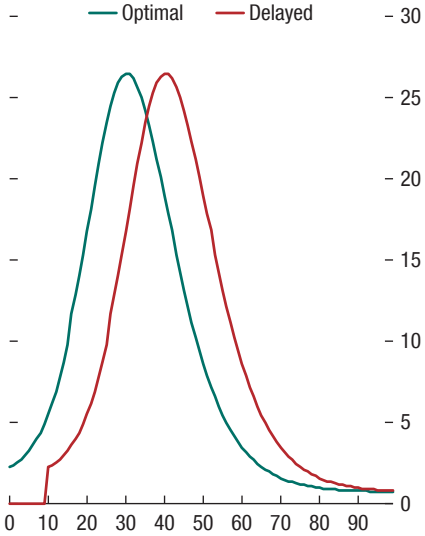
1. Confirmed Cases under Delayed Containment, Relative to Optimal Containment (Per million)



Source: Engler and others (2020).
Note: The chart shows additional weekly infections per million of population under the scenario with delayed containment relative to the optimal policy scenario.

... even with the same stringency of containment measures ...

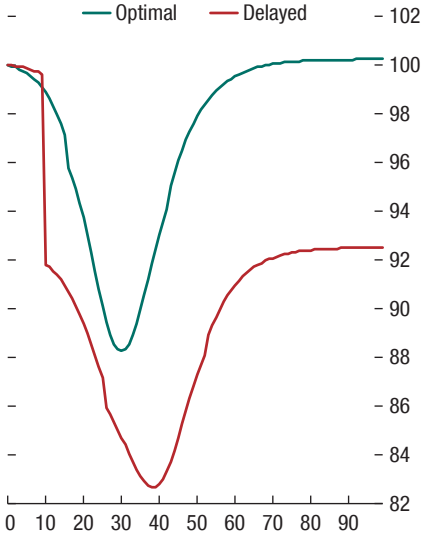
2. Containment (Percent)



Source: Engler and others (2020).
Note: The chart illustrates delayed containment by 10 weeks. Modeled as a Pigouvian consumption tax, other than the delayed start, the containment measures are identical under both scenarios.

... resulting in more pronounced economic contraction.

3. GDP (Percent of pre-pandemic level)



Source: Engler and others (2020).
Note: The chart shows the decline in GDP relative to its pre-pandemic level under the delayed containment and optimal policy scenarios.

Exit Strategies: Timing Is Key

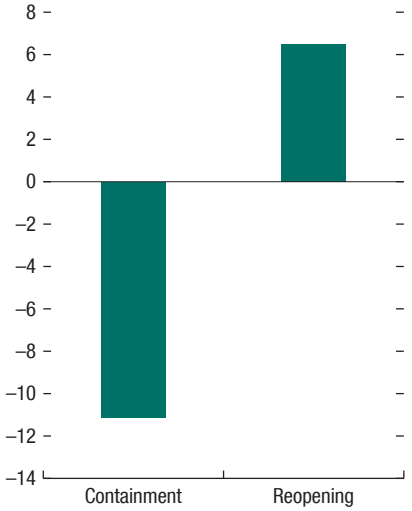
Several Asian economies began to ease lockdowns early, and as a result, many containment measures had already been lifted by July. Exit strategies vary across countries (Box 2.1), but in general, they have been accompanied by an improvement in economic activity (October 2020 *World Economic Outlook*, Chapter 2). However, because of changes in individual behavior associated with the fear of becoming infected and measures left in place to maintain social distancing and reduce contagion, the positive impact of exiting lockdowns on economic activity has been smaller in magnitude than the negative impact of lockdowns. The analysis shows that, on average, lockdowns led to a contraction in economic activity (as measured by industrial production) of about 12 percent a month, but an eventual full reversal of containment measures would increase economic activity by only about 6 percent (Figure 3.4, panel 1). In other words, scarring from the pandemic is already apparent in the weak recovery thus far.

The *average effect* of exits on economic activity also masks significant heterogeneity across countries. Strong testing and tracing policies, implemented in Korea for instance, along with targeted lockdowns, appear crucial for avoiding a spike in infections when containment is eased (Figure 3.4, panel 2). To minimize the risk of a second wave, health considerations suggest that without herd immunity, reliable vaccines, or effective treatment, the rollback of strict containment should begin only when there are clear signs that new infections are declining (WHO 2020). Many Asian economies seem to be following this strategy. Testing and tracing policies at the time of exit were

Figure 3.4. Easing of Containment Measures Has Asymmetric Effects, Depending on the Strength of Testing and Tracing Policies

Easing of containment measures has led to a pickup in economic activity, but this effect is less pronounced ...

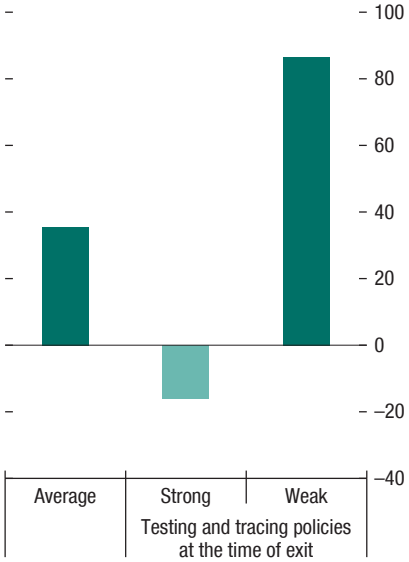
1. Industrial Production, Deviation from Baseline (Percent, implied impact on industrial production 30 days after containment/ reopening)



Source: Deb and others (2020b).
Note: The bars show the impact after 30 days on industrial production (implied by changes in NO_2 emissions) to a unitary change (tightening during containment and easing during reopening) in the containment measures relative to a baseline of no change. Changes in NO_2 emissions are translated into industrial production using estimated historical elasticity of 0.015.

... and is associated with a larger increase in the number of COVID-19 infections in countries with weaker testing and tracing policies at the time of exit.

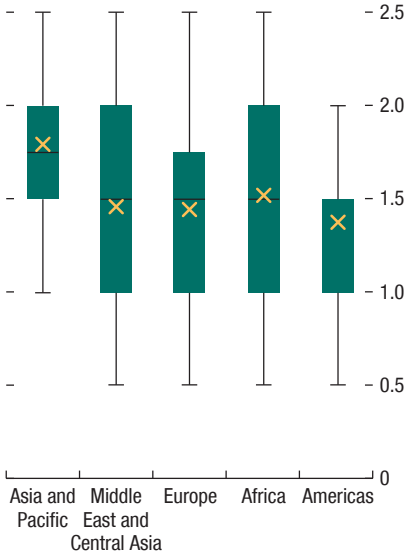
2. Confirmed Cases, Deviation from Baseline (Log percentage points, 30 days after relaxation of containment measures)



Source: Deb and others (2020b).
Note: The bars show the impact after 30 days on the number of coronavirus disease infections to a unitary easing in the containment measures relative to a baseline of no change. The first bar shows the average effect, and the other two bars highlight the impact under strong and weak testing and tracing policies at the time of easing of lockdowns. The figure is displayed in log percentage points. The lighter shade indicates effects not statistically significant at the 95 percent level.

Asian countries had relatively strong testing and tracing policies at the time they eased lockdowns.

3. Testing and Tracing Policies at Time of Exit (Index, 7-day moving average)



Source: Deb and others (2020b).
Note: The index was calculated as the simple average of testing and contact tracing policies available from the Oxford Coronavirus Government Response Tracker. The horizontal line inside each box represents the median; the upper and lower edges of each box show the top and bottom quartiles, respectively; and the top and bottom markers denote the maximum and the minimum, respectively. X is the mean.

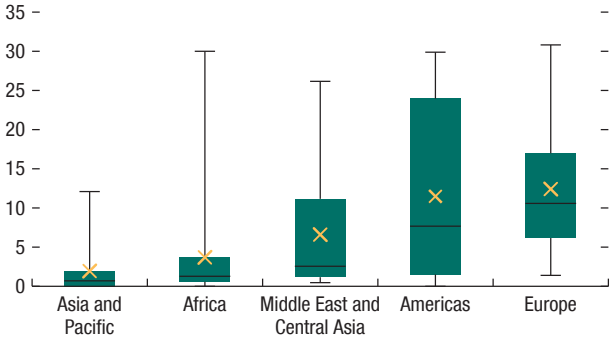
relatively high in Asia (Figure 3.4, panel 3), and the median seven-day average of new cases was less than 1 per million people—among the lowest across all regions (Figure 3.5, panel 1).

The analysis indicates that appropriately timing the exit from lockdowns is key to limiting the risk of a new wave of infections, restoring confidence, boosting economic activity, limiting scarring effects, and laying the foundation for a stronger recovery. Empirical results show that in countries that eased lockdowns when new infections were very low, exits have been associated with a significant increase in mobility (which proxies individual behavior in relation to the fear of becoming infected) and economic activity. By contrast, in countries that started reopening when the number of new infections was still high and increasing, mobility did not increase significantly (Figure 3.5, panel 2), and neither did economic activity (Figure 3.5, panel 3). Model simulations also illustrate another dire consequence of exiting too early and before the pandemic peaks: early exits lead to a significantly higher number of infections and fatalities, which can plunge the

Figure 3.5. The Importance of Getting the Timing Right

Asian countries eased lockdowns when the average number of cases was lower ...

1. New Cases at Time of Exit
(Per million people, 7-day moving average)



Source: Deb and others (2020b).
Note: The horizontal line inside each box represents the median; the upper and lower edges of each box show the top and bottom quartiles, respectively; and the top and bottom markers denote the maximum and the minimum, respectively. X is the mean.

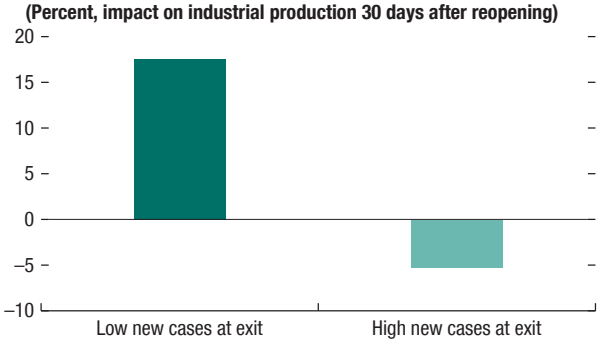
... which helped to restore confidence ...

2. Transit Mobility, Deviation from Baseline
(Percentage points)

Source: Deb and others (2020b).
Note: The bars show the impact after 30 days on transit mobility to a unitary easing of containment measures relative to a baseline of no change. The lighter shade indicates effects not statistically significant at the 95 percent level.

... and boost activity after the release from lockdowns ...

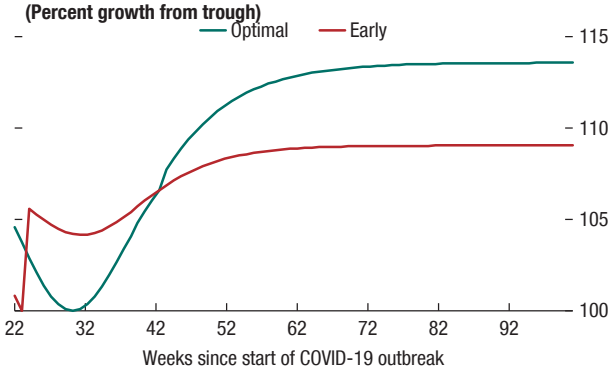
3. Industrial Production, Deviation from Baseline
(Percent, impact on industrial production 30 days after reopening)



Source: Deb and others (2020b).
Note: The bars show the impact after 30 days on industrial production (implied by changes in NO_2 emissions) to a unitary easing of containment measures relative to a baseline of no change. Changes in NO_2 emissions are translated into industrial production using estimated historical elasticity of 0.015. The lighter shade indicates effects not statistically significant at the 95 percent level.

... confirming model results that premature exits can make the situation worse.

4. GDP Recovery from Trough
(Percent growth from trough)



Source: Engler and others (2020).
Note: The chart compares the behavior of GDP under the early exit versus optimal policy scenario, in percent of the GDP. Early exit leads to a second wave of infections, hampering the recovery.

economy into a second recession and weaken the medium-term recovery (Figure 3.5, panel 4).

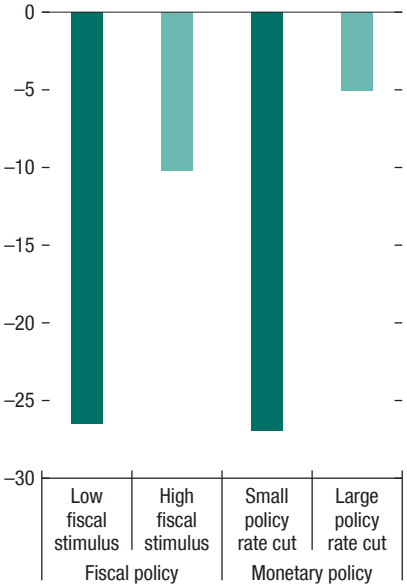
Macroeconomic Policies Can Mitigate Economic Costs and Support Recovery

Supportive policies can mitigate the economic costs of containment measures. Using aggregate data provided by the IMF Policy Tracker on discretionary fiscal and monetary measures implemented and announced in response to the COVID-19 pandemic, empirical analysis confirms that such policy measures have been effective in mitigating the economic costs associated with containment measures. Such measures had a much larger impact on economic activity—equivalent to a 22 percent decline in industrial production—in countries with relatively small

Figure 3.6. Policies Can Cushion Economic Impact of Containment Measures

Macro policies were effective in mitigating some of the costs associated with containment measures ...

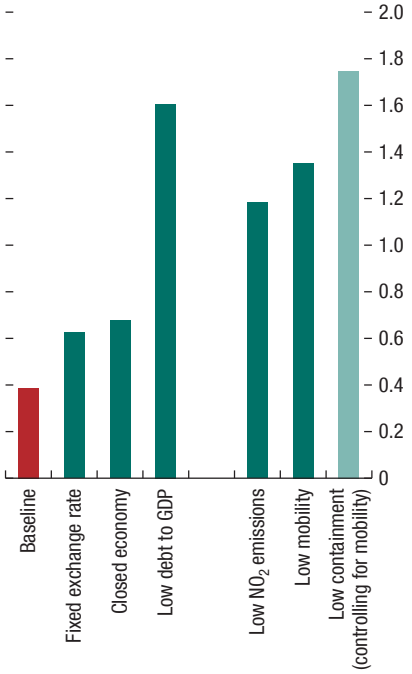
1. Industrial Production, Deviation from Baseline
(Percent, implied impact on industrial production after 30 days)



Source: Deb and others 2020a.
Note: The bars show the impact after 30 days on industrial production (implied by changes in NO_2 emissions) to a unitary tightening of containment measures relative to a baseline of no change. Changes in NO_2 emissions are translated into industrial production using estimated historical elasticity of 0.015. The lighter shade indicates effects not statistically significant at the 95 percent level.

... though there are significant heterogeneities in the fiscal multipliers based on country characteristics and the stage of the pandemic.

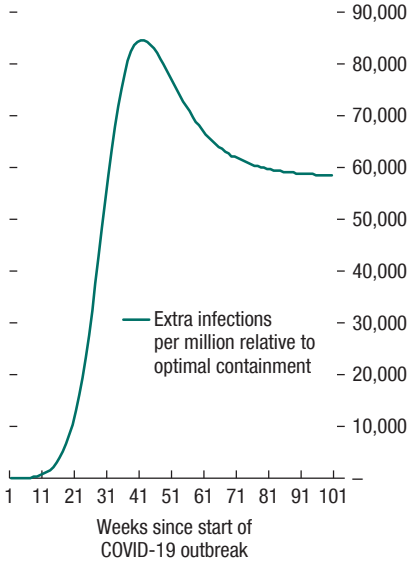
2. Impact of Fiscal Shocks on Industrial Production
(Betas, percent)



Source: Deb and others 2020.
Note: The bars denote the impact (coefficients) of fiscal shocks on industrial production obtained from a panel regression of 39 countries from January 2020 to July 2020.

Targeted fiscal transfers can reduce the number of infections.

3. Confirmed Cases without Transfers, Relative to Optimal Containment
(Per million)



Source: Engler and others 2020.
Note: The chart shows additional weekly infections per million under the scenario with no transfers relative to the optimal policy scenario. Positive difference indicates higher cumulative cases.

fiscal packages. Likewise, some of the adverse impact of containment measures was mitigated in countries with larger cuts in policy rates (Figure 3.6, panel 1).

To shed more light on the effectiveness of fiscal measures, a daily database of new announced fiscal plans—encompassing direct fiscal measures as well as guarantees and loans to households and firms—was constructed for a sample of 39 advanced and emerging market economies, based on narrative information in the IMF Policy Tracker and newspaper reports (Deb and others, forthcoming). Using high-frequency identification—that is, purging the fiscal news by daily indicators of economic activity (NO_2 emissions, mobility)—the analysis provides evidence that fiscal announcements had significant effects on economic activity. Estimates suggest that fiscal announcements of 1 percent of GDP increased year-on-year industrial production by about 0.4 percent— equivalent to a fiscal multiplier of about 0.2–0.3. Consistent with Ilzetzki, Mendoza, and Végh (2013), multipliers are higher in economies operating under fixed exchange rates in more closed economies, and where debt-to-GDP ratios are relatively low (Figure 3.6, panel 2). The

analysis also finds that multipliers were higher during months of larger losses in economic activity (proxied by mobility indices and NO_2 emissions) with fiscal announcements of 1 percent of GDP leading to about a 1.2–1.4 percent increase in industrial production (corresponding to a fiscal multiplier of 0.6–1). It was also found that, generally, fiscal announcements have larger effects when containment measures are more stringent, as periods of lockdowns also correspond to periods of weak economic activity. However, when controlling for the effect of fiscal announcements during months of weaker economic activity, the analysis found evidence of a bigger impact of fiscal news when containment measures are lower—that is, when supply-side restrictions from lockdowns are smaller (Figure 3.6, panel 2).

Finally, model simulations show that fiscal measures targeted to the most vulnerable households (such as consumption coupons in Korea and cash transfers to casual workers in Australia) also helped reinforce greater social distancing and reduce the number of infections (Figure 3.6, panel 3) and fatalities.

Conclusions

Countries in Asia have taken significant measures to contain the COVID-19 pandemic while aiming to limit its economics costs. In the absence of a vaccine or effective treatment, several Asian countries locked down their economies quickly and decisively to stabilize the spread of the virus and enable them to gradually reopen economic activity. The early implementation of containment measures proved crucial in flattening the pandemic curve and avoiding a deeper and more protracted recession. Meanwhile, the rollback of containment measures only after the stabilization of outbreaks and with strong testing and tracing regimes led to a stronger rebound in economic activity and better health outcomes. The substantial macroeconomic policies implemented and announced helped reduce the economic costs of containment and sustain the recovery while limiting scarring. Targeted fiscal announcements were essential for protecting the most vulnerable, stimulating economic activity, and helping contain the spread of the pandemic, and thus should not be withdrawn prematurely.

Several economies in Asia have handled the pandemic well so far, but some have yet to bring the outbreak under control. These countries need to contain the virus while balancing the short-term economic costs. The challenges are ongoing and large, including the ever-present risk of a second wave of infections that could put more lives at risk, mandate other lockdowns, and damage economies further.