COVID-19 Lockdowns and Exits in Asia: Some Lessons

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Quantifying impact of containment measures

- Combine JHU's data on COVID-19 spread with daily containment measures available from Oxford University

- Novel high-frequency indicators of economic activity, such as level of nitrogen oxide emissions

- Assess impact at daily frequency without having to wait for lagged economic data such as GDP or IP

- Help with econometric identification

Local Projection methods by Jordà (2005)

$$\Delta I_{i,t+h} = u_i + \theta_h c_{i,t} + X'_{i,t}\Gamma_h + \sum_{\ell=1}^{\mathcal{L}} \psi_{h,\ell}\Delta I_{i,t-\ell} + \varepsilon_{i,t+h}$$

$\Delta I_{i,t+h} = I_{i,t+h} - I_{i,t+h-1}$ and $I_{i,t}$ is the log of the number of infections or economic indicator in country i at date t

$c_{i,t}$ denotes the Containment Stringency Index

X is a vector of control variables which includes daily temperature and humidity levels, in addition to country-specific linear, quadratic and cubic time trends

Impulse response functions computed using the estimated coefficient θ_h

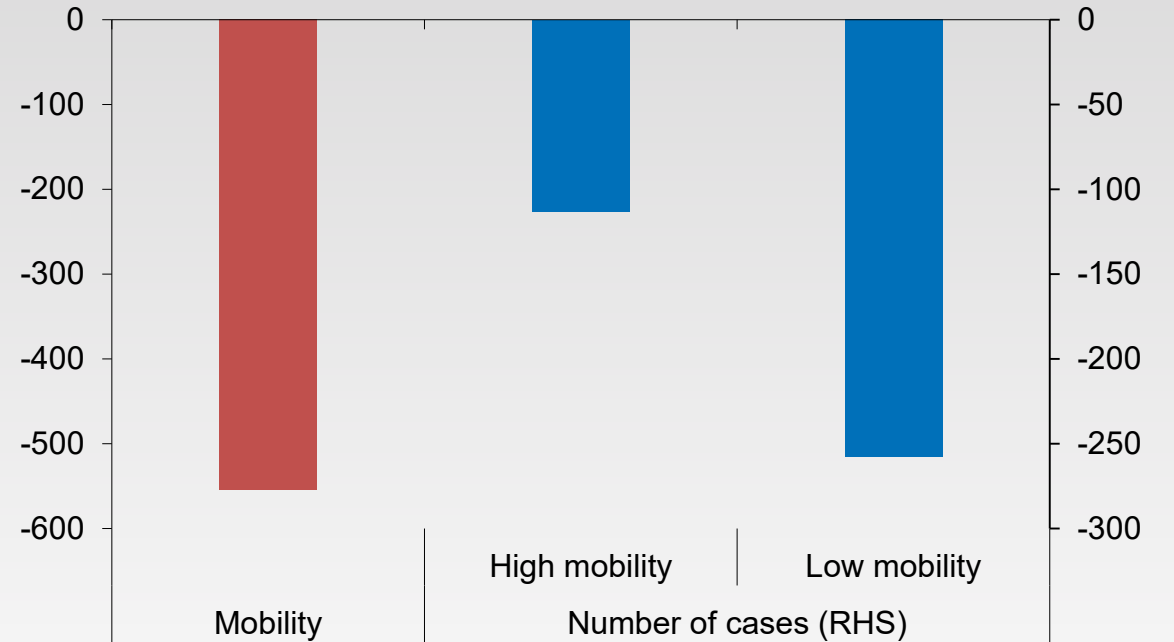# Containment measures have been effective…

Confirmed Cases, Deviation from Baseline
(Log percentage points)

Days after introduction of containment measures
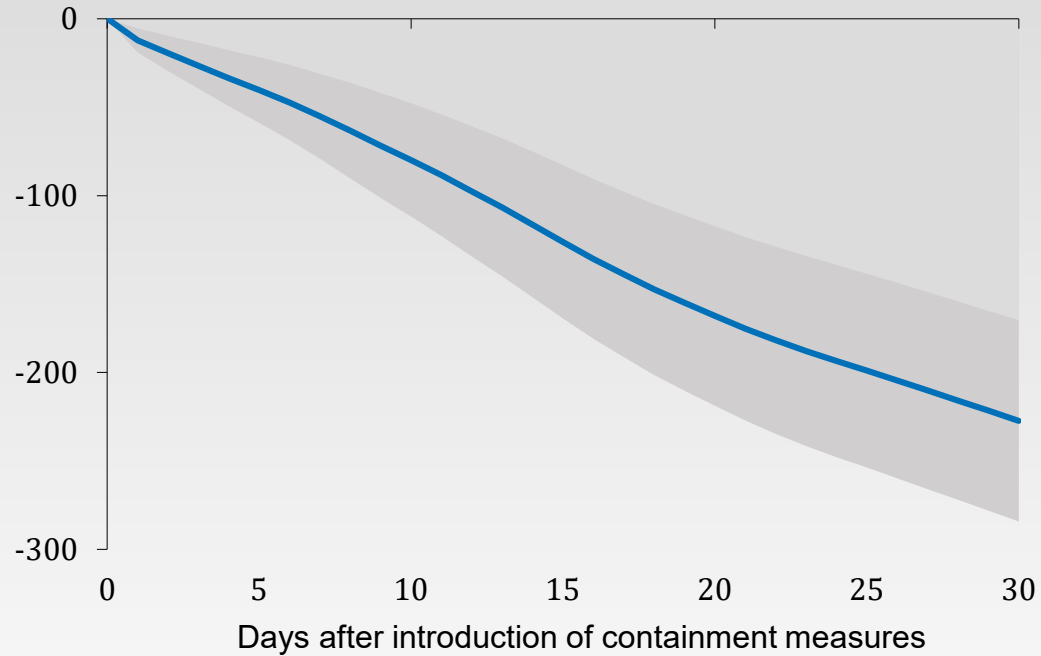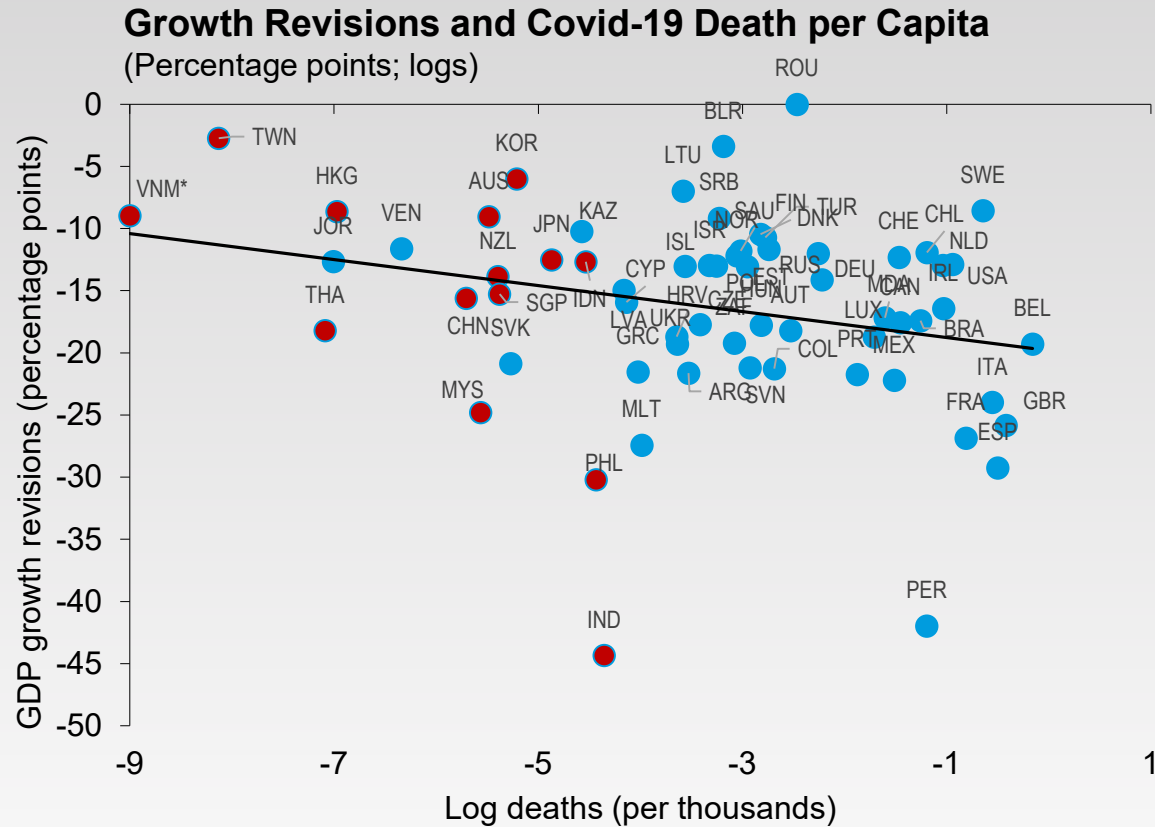
Source: Deb and others (2020a).

Impact of Containment Measures
(Log percentage points, deviation from baseline after 30 days)

Mobility

High mobility   Low mobility

Number of cases (RHS)

Source: Deb and others (2020a).

…but massive short-term economic costs…

Growth Revisions and Covid-19 Death per Capita
(Percentage points; logs)

NO2 emissions, Deviation from Baseline
(Log percentage points)

Source: IMF Asia Pacific Regional Economic Outlook (2020).
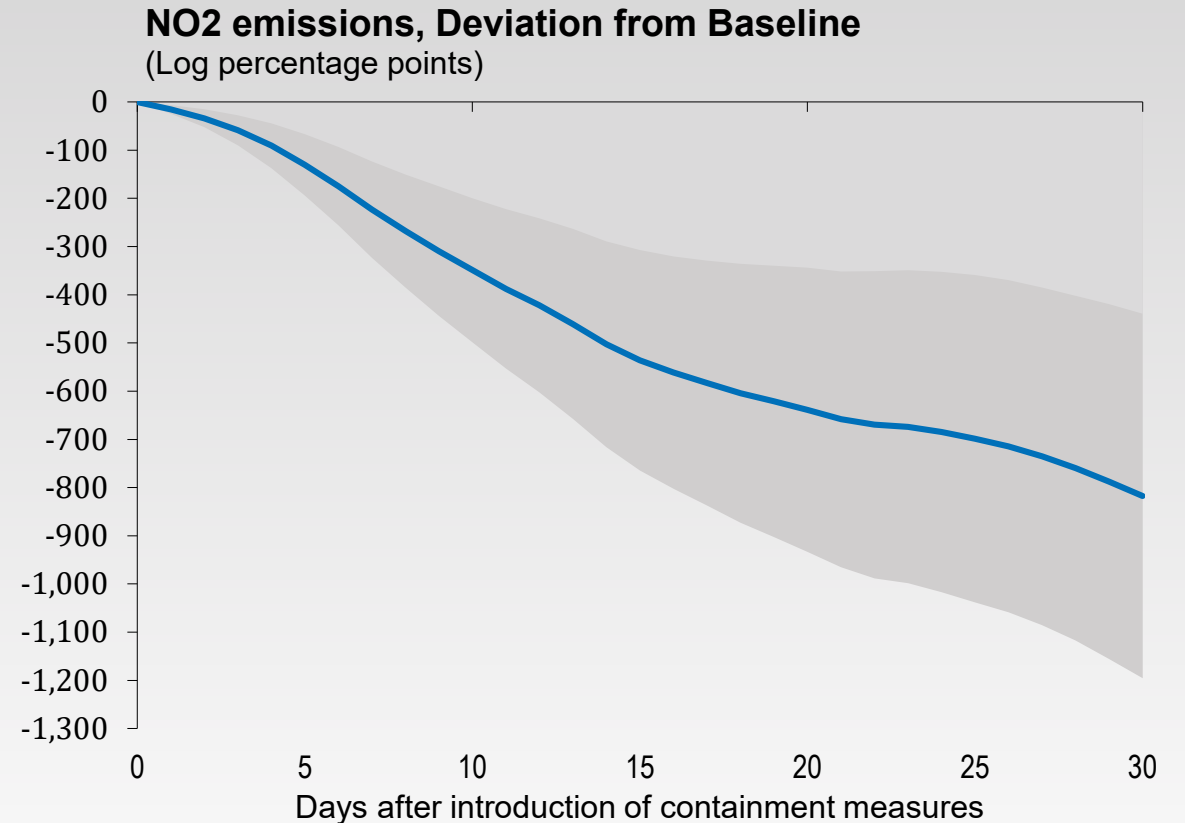
Source: Deb and others (2020a).

...equivalent to 12 percent loss in Industrial Production.

- NO_2 emissions are strongly associated with level of economic activity

- Total man-made emissions of nitrogen oxides over the long term (1990-2018) are strongly correlated with conventional measures of economic activity such as GDP growth, manufacturing VA and IP (see annex slide)

- At higher-frequency, over the period covered in the analysis of containment measures, estimated relationship between NO_2 and IP statistically significant

- This suggests a 12 percent loss in IP due to containment measures

NO_2 Emissions and Industrial Production

Variables	Industrial Production (percent)	NO_2 emissions (percent)
NO_2 emissions (percent)	0.015** (0.006)	
Industrial Production (percent)		0.27* (0.151)
Constant	0.004*** (0.0003)	0.023*** (0.001)
Observations	421	421
R-Squared	0.016	0.005
Number of countries	38	38

Source: Deb and others (2020b).
NO2 emissions and Industrial Production
Standard errors clustered at the country level in parentheses.
*** ρ<0.01, ** ρ<0.05, *** ρ<0.1.*

What are the lessons from Asia?

- The rest of the presentation will focus on experience of Asian countries

- They were first to be hit and many of them locked down their economies to halt the spread of the virus.

- Their quick and decisive action allowed some of them to gradually reopen economic activity.

- What lessons can we draw from their experience?

Add interactions to allow response to vary

$$\Delta I_{i,t+h} = u_i + \theta_h^L F(z_{i,t}) c_{i,t} + \theta_h^H (1 - F(z_{i,t})) c_{i,t} + X'_{i,t} \Gamma_h +$$

$$\sum_{\ell=1}^{\mathcal{L}} F(z_{i,t}) \psi_{h,\ell} \Delta I_{i,t-\ell} + \sum_{\ell=1}^{\mathcal{L}} (1 - F(z_{i,t})) \psi_{h,\ell} \Delta I_{i,t-\ell} + \varepsilon_{i,t+h}$$

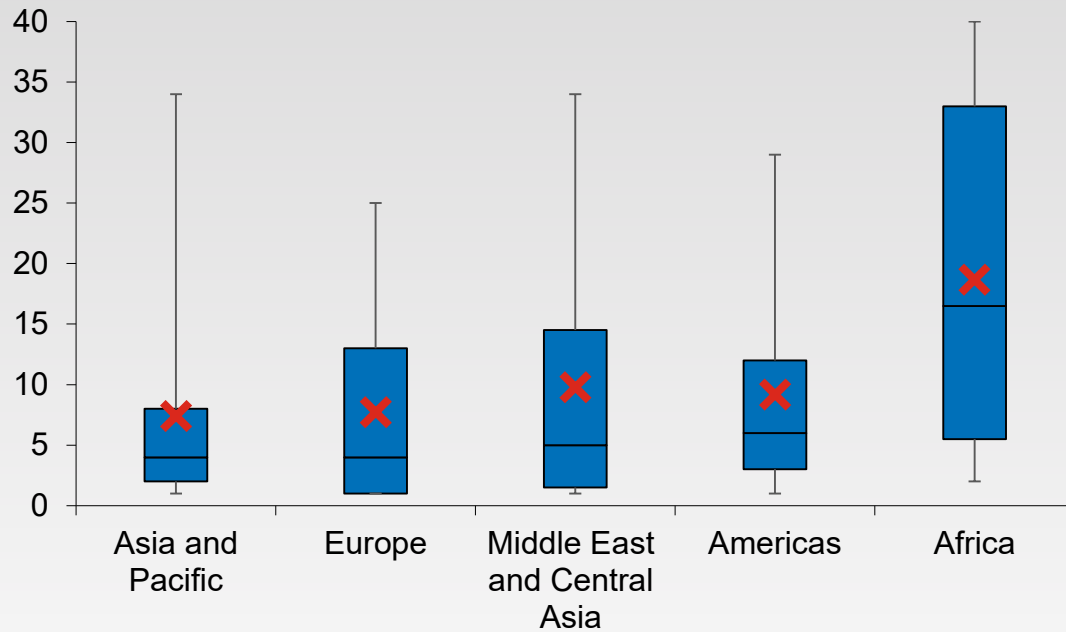with $F(z_{it}) = exp^{-\gamma z_{it}} / (1 - exp^{-\gamma z_{it}}), \quad \gamma > 0$

where z is a country-specific characteristic normalized to have zero mean and a unit variance.

The coefficients θ_h^L and θ_h^H capture the impact of containment measures at each horizon h in cases of very low and very high levels of z.
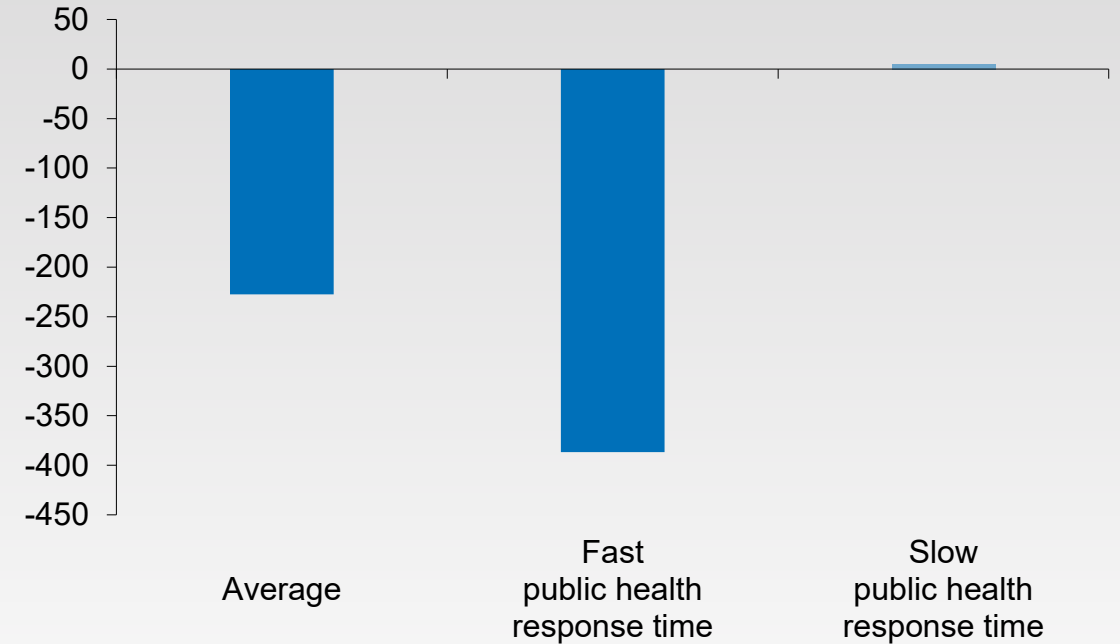
Lesson 1: Act fast

Public Health Response Time
(Number of days)

Source: Deb and others (2020b).

Confirmed Cases, Deviation from Baseline
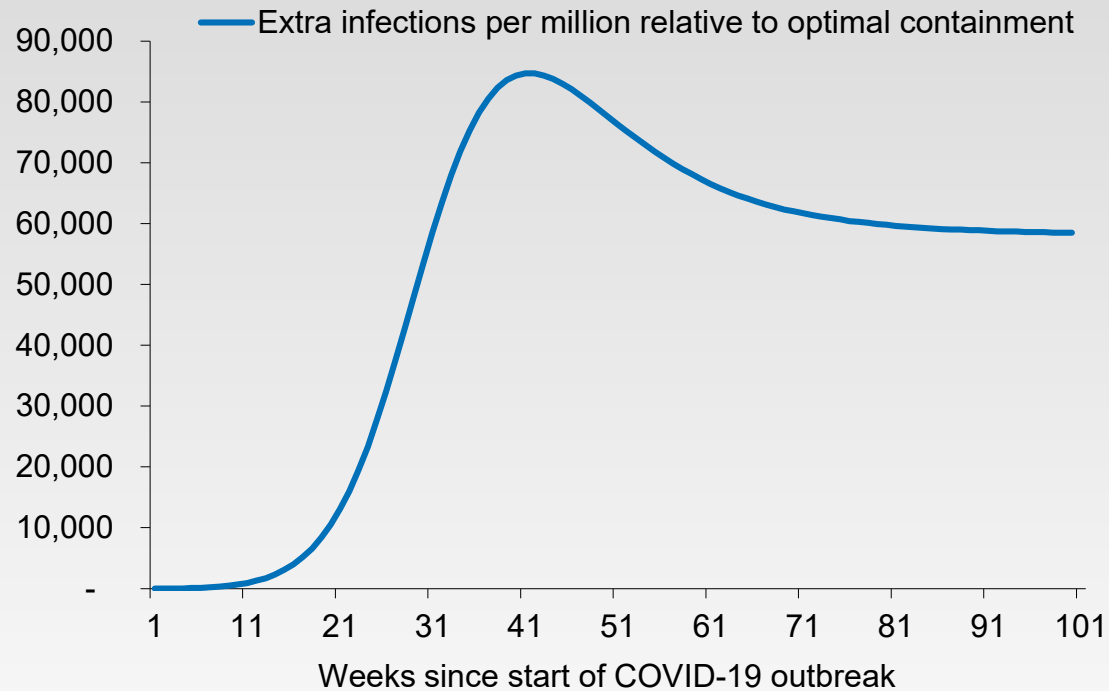(Log percentage points)

Source: Deb and others (2020b).

Lesson 1: Delays can significant increase costs

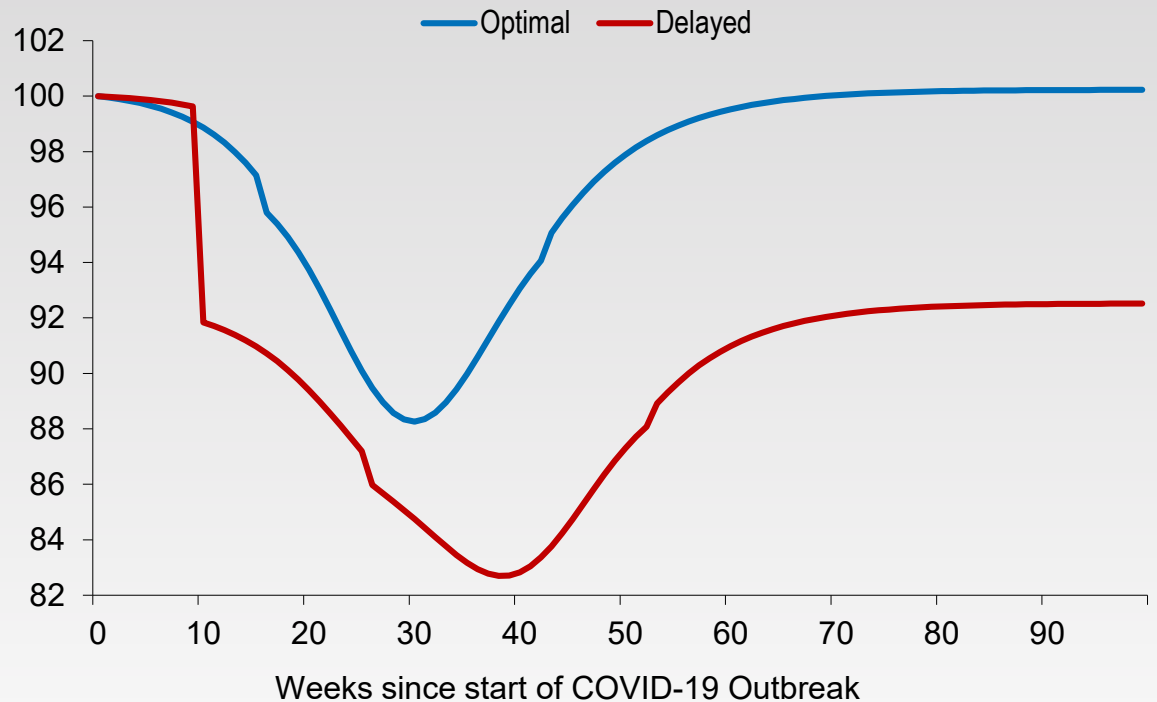## Confirmed Cases without Transfers, Relative to Optimal Containment
(Per million)

— Extra infections per million relative to optimal containment

Weeks since start of COVID-19 outbreak

Source: Engler and others (2020).

GDP
(percent of pre-pandemic level)

— Optimal   — Delayed

Weeks since start of COVID-19 Outbreak

Source: Engler and others (2020).

Lesson 2: Put in place strong testing and tracing policies to avoid a second wave

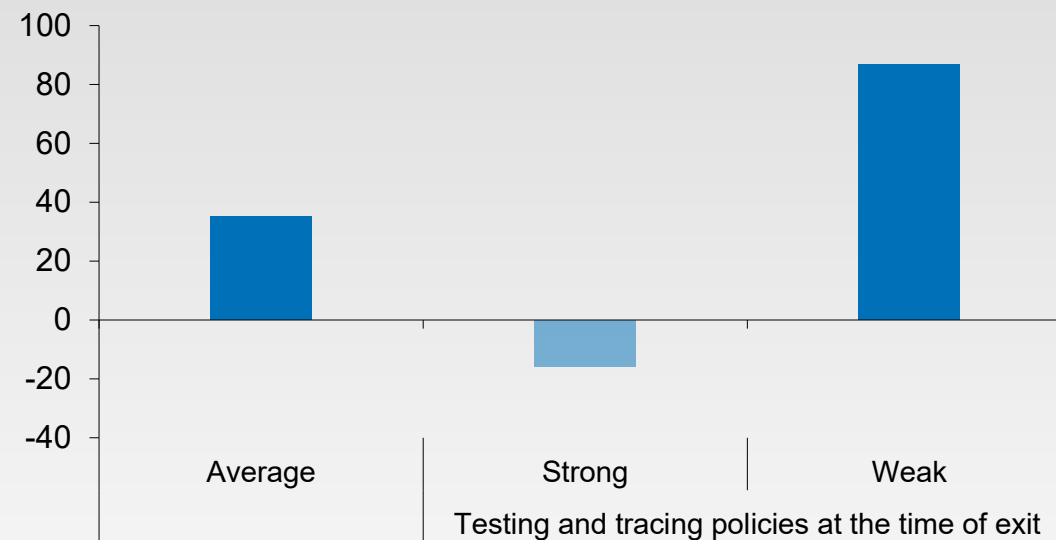**Testing and Tracing Policies at Time of Exit**
(Index, 7-day moving average)

Confirmed Cases, Deviation from Baseline
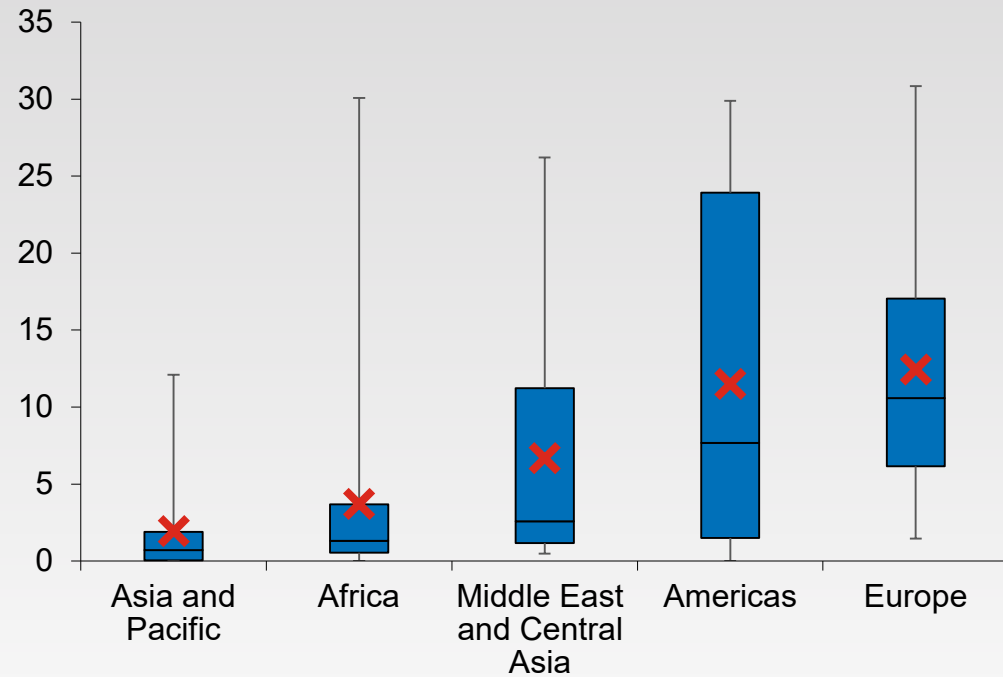(Log percentage points, 30 days after relaxation of containment measures)
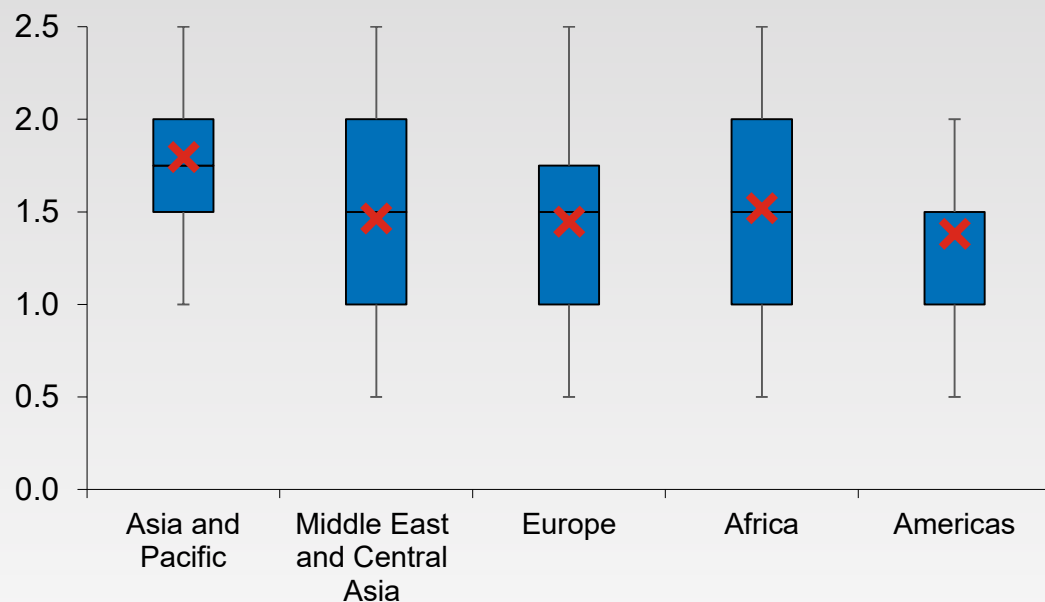
Source: Deb and others (2020b).

Note: Median and 75th percentile overlaps for Americas

Source: Deb and others (2020b).
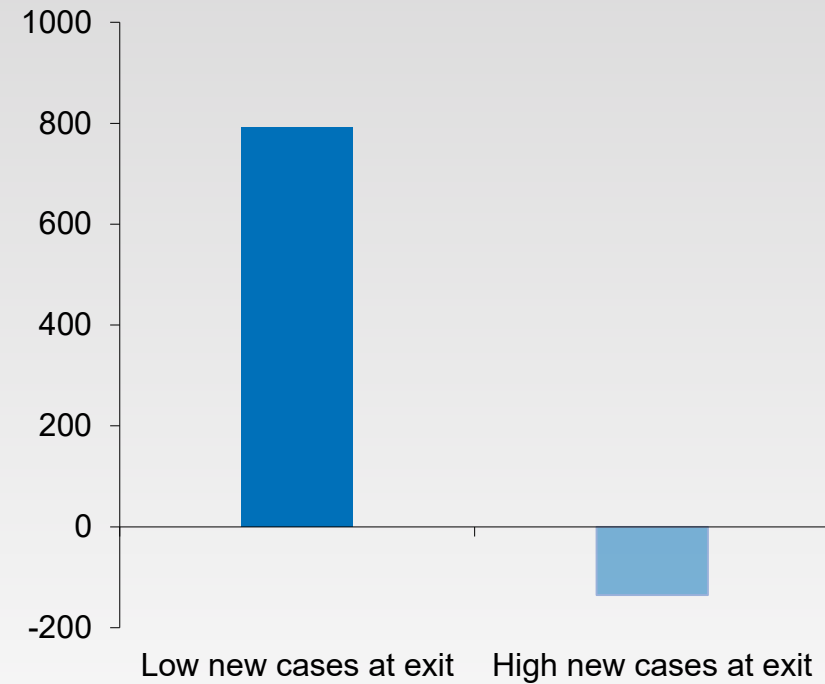
Lesson 3: Get the timing of exit right

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

Transit Mobility, Deviation from Baseline
(Percent points)
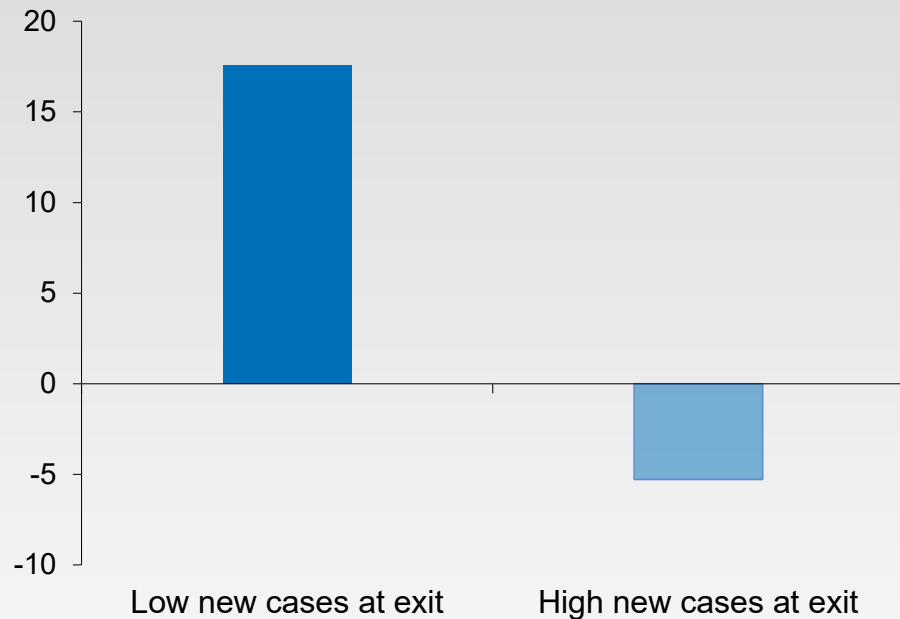
Source: Deb and others (2020a).

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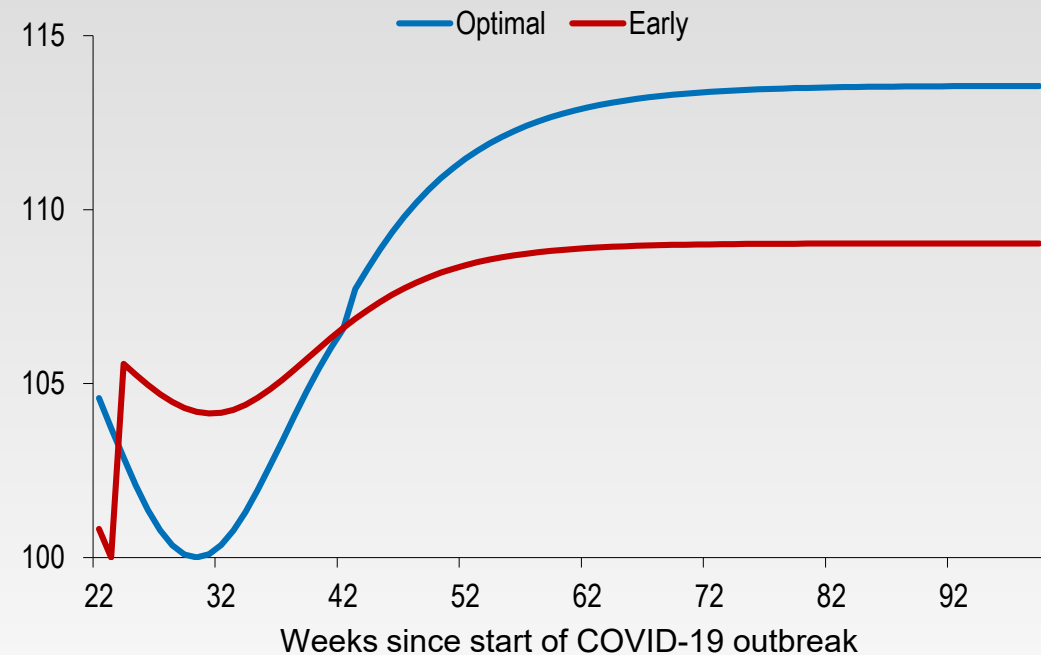# Lesson 3: Premature exits can make the situation worse

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

Source: Deb and others (2020a).

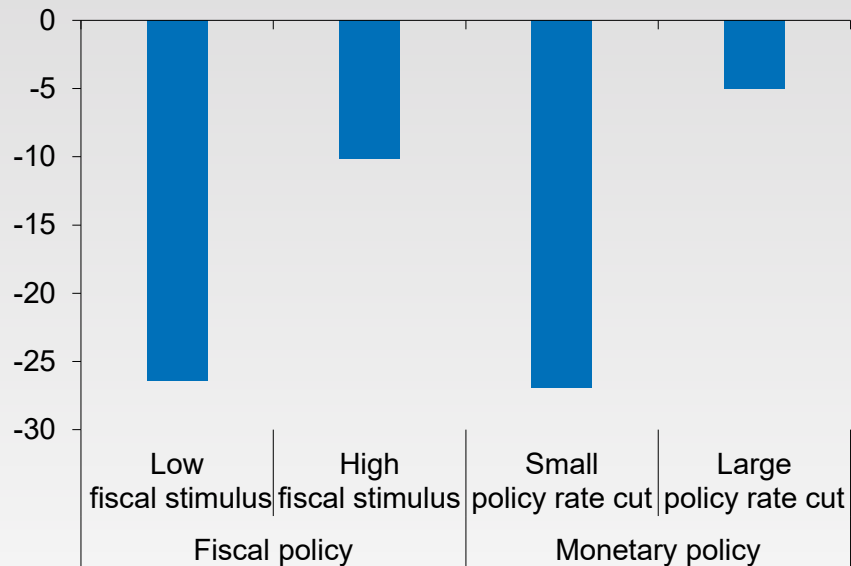**GDP Recovery from Trough**
(Percent growth from trough)

Weeks since start of COVID-19 outbreak

Source: Engler and others (2020).

Lesson 4: Use macroeconomic policies as cushion

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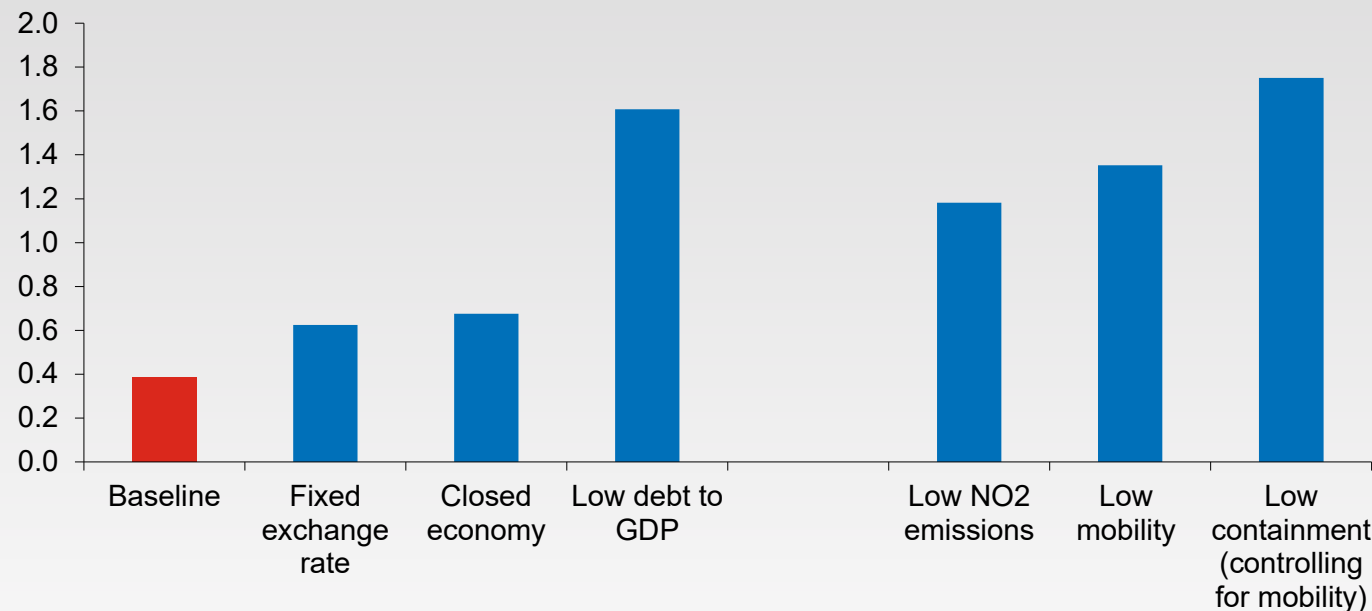(Percent, implied impact on industrial production after 30 days)

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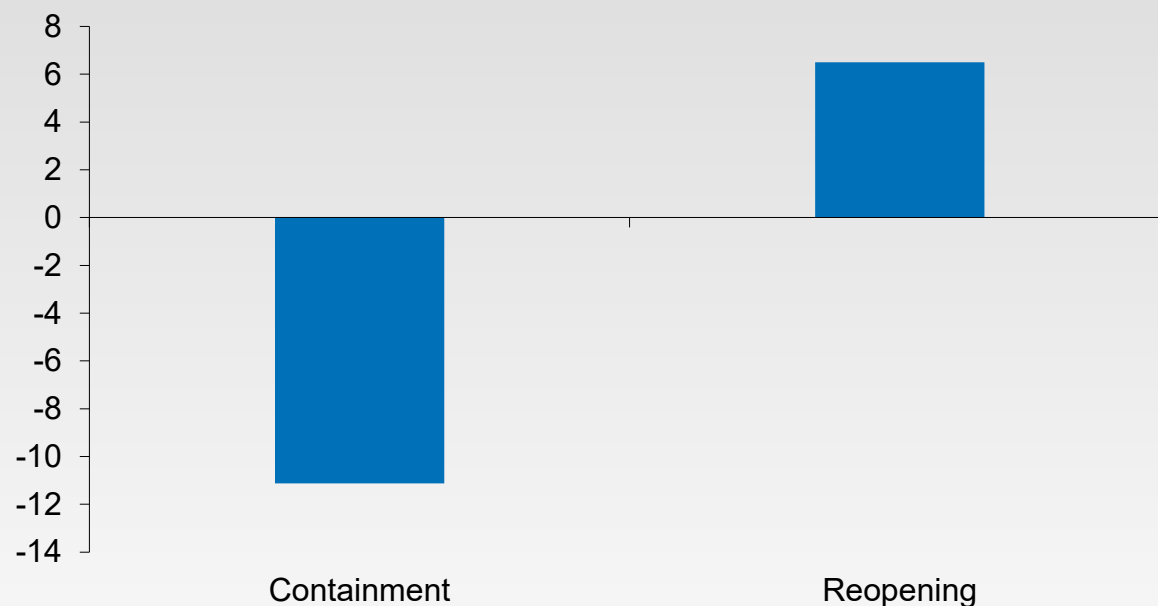(Betas, percent)

Source: Deb and others (2020a).

Source: Deb and others (2020).

Limit the scarring and lay the foundation for a stronger recovery

Industrial Production, Deviation from Baseline

(Percent, implied impact on industrial production 30 days after containment/reopening)

Containment | Reopening

Source: Deb and others (2020a).

Lessons Learnt from Asia

- Lesson 1: Act fast.

- Lesson 2: Put in place strong testing and tracing policies.

- Lesson 3: Get the timing of exit right.

- Lesson 4: Use macroeconomic policies as cushion

Thank you