The COVID19-Pandemic in the EU: Macroeconomic Transmission and Economic Policy Response

MMCN Webinar Series on "Macroeconomic Modelling and Pandemics"

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The views expressed in this presentation are those of the authors and not necessarily those of the EU Commission.
Covid-19 is the dominant economic shock which will shape economic activities in 2020 and beyond.

Nearly all forecasts published in Spring project the deepest recession in the post war era.

Governments have announced massive stabilisation efforts.

Besides automatic stabilizers, short time work allowances (STW) and liquidity support (LIQS) in the form of government guarantees are the dominant instruments.
Structure of presentation

This presentation adapts the Commission’s Macroeconomic model QUEST III to

- Look at the various transmission channels of the shock.
- Quantify their respective impact on depth and duration of the recession.
- Present some analysis on the effects of short time work allowances and liquidity support.
Two region QUEST Model: EU - RoW

Frictions:

• Nominal price rigidity: Price Phillips curve.
• Nominal and real wage rigidity: Wage Phillips curve
• Employment adjustment costs.

• A share of households is liquidity constrained.
• But: Habit persistence has been turned off: consumers exit consumption lockdown quickly.
• Investment adjustment costs.

• Restricted monetary policy: limited interest rate response.
• Automatic fiscal stabilisation via tax revenues, constant spending in real terms and unemployment insurance.

Transmission channels

We quantify different economic transmission channels of the pandemic:

i. Supply shocks through containment measures.
ii. Shortfalls in consumer demand.
iii. Liquidity constraints for firms.
iv. Policy supports demand and cushions liquidity shortfalls.

Supply and demand shock (see Jonung and Roeger, 2006)

Related work published in DG ECFIN’s spring forecast considers additional channels (e.g. uncertainty, longer targeted containment) and a larger model
Demand lockdown

• **Self-imposed:** Households avoid certain consumption activities. Reduced marginal utility of consumption in period t.

• **Government imposed:** Households are prevented from undertaking certain consumption activities.

• Because of externalities, the analysis of Eichenbaum, Rebelo and Trabandt (2020) suggests that government imposed constraints are more relevant during lockdown.
Consumption Shock: unconstrained HH

Intertemporal utility function

$$E_0 \sum_{t=0}^{\infty} \beta^t \left[ \left( \frac{1}{1 + \mu_t} \right) \log(C_t^U) - \chi \frac{N_{t+1}^\kappa}{\kappa + 1} \right]$$

$$\left( \frac{1}{1 + \mu_t} \right) < 1: \text{Self imposed demand constraint in } t$$

$$C_t^U \leq \bar{C}^U: \text{Regulatory constraint on consumption (binding in } t, \phi^C_t > 0)$$

$$\frac{C_{t+1}}{C_t} = \beta (1 + r_t)(1 + \mu_t)(1 + \phi^C_t)$$

Both reduce consumption in t, but they have different policy implications.

The latter prevents fiscal policy measures from increasing $C_t$. 
Consumption Shock: constrained HH

Are affected similarly.

Self imposed consumption constraint

\[ w_t N_t + TR_t > C_t^C \]

Regulatory constraint

\[ w_t N_t + TR_t > \bar{C}^C \]

Forced savings

\[ \Delta B_t^C = C_t^C - w_t N_t - TR_t + T_t \]

And dissaving in periods following the lockdown

\[ C_{t+i}^C = w_{t+i} N_{t+i} + sB_{t+i-1}^C \]
Governments impose restrictions on labour input to avoid infections.

Decision problem of entrepreneur:

\[ E_0 \sum_{t=0}^{\infty} \beta^t \left[ \frac{1}{1 + \mu_t} \log(C_t) \right] \]

\[ L_t = (1 + r_{t-1})L_{t-1} + C_t + I_t - (Y_t - W_tN_t) \]

Labor adjustment costs

\[ Adj(N_t) = \theta^N \left( \frac{N_t}{N_{t-1}} - 1 \right)^2 \]

Labor input constraint:

\[ N_t \leq \bar{N}_t \]
Labour input constraint

Labor input constraint:

\[ N_t \leq \bar{N}_t \]

Shifts down the labour demand schedule.

\[ \frac{\partial Y}{\partial N_t} = W_t + \phi_t^N \quad \text{with} \quad \phi_t^N > 0 \quad \text{if} \quad N_t = \bar{N}_t \]
Liquidity constraints

Demand and supply lockdown reduces GOS of firms \( (GOS = Y - \text{wage bill}) \)

\( \Delta: \) difference between the pandemic and non-pandemic scenario

\[ \Delta I_t = \Delta L_t + \Delta GOS_t \]

When banks tighten credit supply investment declines more than GOS.

Investment rule (augmented Q-equation):

\[ \left( \frac{I_t}{K_{t-1}} - \delta \right) = (1 - s^{li}_t)Qadj_t + s^{li}_t \left( \frac{GOS_t}{K_{t-1}} - \delta - \alpha \right) \]

Share of liq. constrained investment: \( s^{li}_t = 0.3 \)
Shock assumptions

• All shocks are global.

• Absence of workforce (containment) active in March till June with a peak early in Q2 -> affects 40% of the work force

  • Difficult distinction between supply and demand:

    • Supply constraints are only one factor behind the closure of shops and factories.

    • Supply shocks can have “Keynesian” features (Guerrieri, Lorenzoni, Straub, Werning, 2020)

• Sectoral demand shortfalls are based on detailed assumptions.

  • Particularly strong declines in air transport, accommodations, restaurants, tourism etc.

  • The shock extends into Q3 and Q4 for some sectors.
Assumed sectoral declines

<table>
<thead>
<tr>
<th>NACE_R2/geo</th>
<th>% of VA</th>
<th>Reduction 2020Q1(%)</th>
<th>Reduction 2020Q2(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hours</td>
<td>work</td>
<td>Demand</td>
</tr>
<tr>
<td>Agriculture, forestry and fishing</td>
<td>1.8</td>
<td>-1.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Mining and quarrying</td>
<td>0.4</td>
<td>-1.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>17.2</td>
<td>-1.0</td>
<td>-2.0</td>
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<tr>
<td>Electricity, gas, steam and air conditioning supply</td>
<td>1.8</td>
<td>-1.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Water supply; sewerage, waste management and</td>
<td>0.9</td>
<td>-1.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Construction</td>
<td>5.2</td>
<td>-1.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Wholesale and retail trade and repair of motor vehicles</td>
<td>1.3</td>
<td>-1.0</td>
<td>-10.0</td>
</tr>
<tr>
<td>Wholesale trade, except of motor vehicles and</td>
<td>5.3</td>
<td>-1.0</td>
<td>-10.0</td>
</tr>
<tr>
<td>Retail trade, except of motor vehicles and</td>
<td>4.3</td>
<td>-1.0</td>
<td>-10.0</td>
</tr>
<tr>
<td>Land transport and transport via pipelines</td>
<td>2.3</td>
<td>-1.0</td>
<td>-8.0</td>
</tr>
<tr>
<td>Water transport</td>
<td>0.2</td>
<td>-1.0</td>
<td>-8.0</td>
</tr>
<tr>
<td>Air transport</td>
<td>0.3</td>
<td>-1.0</td>
<td>-25.0</td>
</tr>
<tr>
<td>Warehousing and support activities for transport</td>
<td>1.8</td>
<td>-1.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Postal and courier activities</td>
<td>0.4</td>
<td>-1.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Accommodation and food service activities</td>
<td>2.9</td>
<td>-1.0</td>
<td>-25.0</td>
</tr>
<tr>
<td>Information and communication</td>
<td>4.8</td>
<td>-1.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Financial and insurance activities</td>
<td>4.6</td>
<td>-1.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Real estate activities</td>
<td>10.3</td>
<td>-1.0</td>
<td>-5.0</td>
</tr>
<tr>
<td>Professional, scientific and technical activities</td>
<td>6.2</td>
<td>-1.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Administrative and support service activities</td>
<td>4.6</td>
<td>-1.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Public administration and defence; compulsory social security</td>
<td>6.3</td>
<td>-1.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Education</td>
<td>4.9</td>
<td>-1.0</td>
<td>-5.0</td>
</tr>
<tr>
<td>Human health and social work activities</td>
<td>7.4</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Arts, entertainment and recreation</td>
<td>1.3</td>
<td>-1.0</td>
<td>-20.0</td>
</tr>
<tr>
<td>Other service activities</td>
<td>1.3</td>
<td>-1.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Activities of households as employers; household</td>
<td>0.4</td>
<td>-1.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Total - all NACE activities</td>
<td>100</td>
<td>-0.9</td>
<td>-3.5</td>
</tr>
</tbody>
</table>
Supply and demand, without liquidity problem

V shaped recession in Q1 and Q2

Delayed N response, partly offset by UCAP

Strong decline of C

Small decline of I: temp. S+D shocks cannot explain fall of I

Strong decline of GOS =>liquidity problems

Note: Wage share and government balance over GDP (all other variables) are expressed in percentage point deviation (percent deviation) from a pre-COVID-19 baseline Pandemic shock is an index..
Impact of liquidity constraints

Liquidity channel can generate a decline of I.

Persistence because of I adjc

N more persistent

Y more U shaped.
Announced fiscal measures

<table>
<thead>
<tr>
<th>Category</th>
<th>EUR</th>
<th>% of GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Measures with a direct budgetary impact</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expenditure</td>
<td>368</td>
<td>2.8</td>
</tr>
<tr>
<td>2. Liquidity measures without budgetary impact</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Tax delays</td>
<td>248</td>
<td>1.9</td>
</tr>
<tr>
<td>b. Public guarantees</td>
<td>2301</td>
<td>17.6</td>
</tr>
<tr>
<td>c. Others</td>
<td>334</td>
<td>2.6</td>
</tr>
<tr>
<td><strong>Total liquidity support</strong></td>
<td><strong>2882</strong></td>
<td><strong>22.1</strong></td>
</tr>
</tbody>
</table>
STW-Short time work allowances

Comparison with unemployment benefits:

STW reduces employment adjustment costs

STW is more generous
Effects of STW: employment adjustment

STW allow firms to adjust labor input more in Q2.

This stabilizes GOS of firms

Less firms become liquidity constrained

I declines less

N recovers more strongly.
Effects of STW + Transfers (liq. constr. HH)

The 2.8% discretionary measures are spend as transfers to HH.

Transfers paid/spend in Q3 and Q4 can facilitate exit.

Boost to employment (STW: more flexibility)

Improves risk sharing among households: Consumption of constrained households declines a lot because of higher U and ST-work.
Assumptions on liquidity support

LIQS - **liquidity support**: Max 22% of GDP

Goal: Stabilise investment of liquidity constrained firms.

Take up rate difficult to measure. We can nevertheless say something about the 'guarantee multiplier'.

To a first approximation (assuming GOS not much affected by LIQS) the investment multiplier to a loan increase is 1

\[ I_t^G - I_t^C = \Delta L_t^G - \Delta L_t^C \]

\[ \Delta L_t^G - \Delta L_t^C \] fully guaranteed by the government.

Assuming a loss rate of ca. 20% yields multiplier

\[ m^G = \frac{Y_t^G - Y_t^C}{0.2 \times (\Delta L_t^G - \Delta L_t^C)} \]
Effects of guarantees

If losses from LIQS are restricted to new loans (and do not cover losses from existing loans), the guarantee multiplier is large (ca. 5).

LIQS primarily target the liquidity channel, but cannot offset direct effects from the lockdown.
Longer Pandemic

Duration of pandemic is crucial for the length of the economic downturn.
## Overview results

<table>
<thead>
<tr>
<th>Scenario</th>
<th>No liq. constr.</th>
<th>Liq. constraints</th>
<th>STW</th>
<th>Guarantees</th>
<th>Adverse (no policy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>-6.7</td>
<td>-1.4</td>
<td>-10.8</td>
<td>-4.6</td>
<td>-8.6</td>
</tr>
<tr>
<td>Consumption</td>
<td>-10.8</td>
<td>-1.8</td>
<td>-12.2</td>
<td>-3.9</td>
<td>-8.9</td>
</tr>
<tr>
<td>Investment</td>
<td>-0.5</td>
<td>-0.7</td>
<td>-18.5</td>
<td>-11.9</td>
<td>-14.7</td>
</tr>
<tr>
<td>Labor input</td>
<td>-4.3</td>
<td>-1.2</td>
<td>-7.0</td>
<td>-4.2</td>
<td>-5.1</td>
</tr>
<tr>
<td>GOS</td>
<td>-4.4</td>
<td>2.7</td>
<td>-9.9</td>
<td>-3.2</td>
<td>-2.8</td>
</tr>
<tr>
<td>Wage share</td>
<td>0.2</td>
<td>-1.2</td>
<td>2.2</td>
<td>-0.5</td>
<td>0.3</td>
</tr>
<tr>
<td>Gov. balance/GDP</td>
<td>-4.7</td>
<td>-1.1</td>
<td>-6.6</td>
<td>-3.2</td>
<td>-8.0</td>
</tr>
</tbody>
</table>
Recession:

Temporary demand and supply shocks lead to V shaped recessions in a standard New Keynesian Model.

However, one feature of a lockdown, namely a strong decline of GOS can induce liquidity constraints on firms. This generates persistence.

Policy:

Given that lock downs cannot be stabilised when they are present, policies should target a rapid exit, once the lockdown is lifted.

STW: desirable policy, apart from reducing stress for employees associated job loss, it allows more labour input flexibility, reduces liquidity constraints of firms and fosters exit from the lockdown.

LIQS targets investment and employment which supports exit from the lockdown as well.
Reserve Slides
STW (robustness)