DO GROWTH EXPECTATIONS MATCH UP WITH FISCAL BAILOUT AND CONTAINMENT MEASURES IN THE TIME OF COVID-19?

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Abstract

In this work, I run cross-country regression to estimate the impact of the expected fiscal bailout cost (in 2020) and effectiveness of the containment measures (applied in the first half of 2020) on the gap between economic growth forecasts prior and after the outbreak of COVID-19 pandemic (up to 2021). The estimation results confirm conjecture about the positive impact of expected bailout cost and negative impact of effectiveness in the implementation of containment measures on reduction of short-term growth gap, but not in the case of cumulative growth gap over the period 2020-2021. These results indicate that government fiscal spending in the future needs to be more focused on bottleneck sectors and activities that impede growth, as well as to be more supportive toward strengthening healthcare protection against COVID-19, especially when limited fiscal space and current expectations about slow economic recovery are taken into consideration.

Keywords: *economic growth, COVID-19, bailout, containment measures, cross-country regression analysis*

INTRODUCTION

Since the outbreak of the COVID-19 pandemic, the global economy has been struggling with an economic downturn caused by containment measures urgently applied by the national governments to save population health. The containment measures have been effective in saving people health and lives (Deb et al., 2020b), but also entail large short-term economic costs (Deb et al., 2020a).

The economic crises, wars and pandemics are the most frequent causes of prolonged economic downturns both on national and global levels. While the impact of global crises on economic growth has been well documented and examined, in particular due to the recent global crisis 2008/2009, the impact of a global pandemic on economic growth is still a big puzzle. The statistical evidence on the impact of a global pandemic on economic activities is scarce, since the Spanish flu (the most recent case of a global pandemic), happened hundred years

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ago and immediately after the Great War, making even harder for historians and economists to distinguish effects of a pandemic from effects of war.

Jorda et al. (2020), in one of the rare empirical studies on the subject, found that real GDP per capita and the real rate of return on assets have different long-term responses after pandemics and wars. In wars, capital is destroyed so the rate of return remains high for decades and recovery is going slow; on the other hand, capital is preserved during pandemics, so real rate of return may remain negative for a prolonged period, while economic recovery is much faster than in case of wars.

However, COVID-19 pandemic outbreaks only twelve years after the world economy was hit by the biggest economic crisis in recent history. One of the legacies of the global economic crisis is low and even negative real interest rates, that limit the expansive response of monetary policy due to zero lower bound on nominal interest rates. Hence, the majority of the countries have engaged in large-scale discretionary fiscal interventions to prevent economic activities from total collapse. Anderson et al. (2020) grouped fiscal measures undertaken to save the economy into three categories: immediate fiscal impulses, deferrals (postponed payments of taxes and other contributions) and liquidity provisions and guarantees. These measures have a different impact on government accounting positions: fiscal impulses immediately increase expenditure, deferrals immediately reduce revenues, while guarantees have no immediate impact, but can deteriorate fiscal balance in the future if the contingent liabilities are activated.

In this paper, I am primarily interested in the expected impact of immediate fiscal impulses, i.e. discretionary increase in government expenditure (henceforth denoted as fiscal bailout cost), on expectations about short- to mid-term economic growth, after controlling growth for the effects of containment measures. The main objective of this paper is an empirical cross-country examination whether the growth expectations match up with country-specific fiscal bailout measures undertaken to offset severe effects of COVID-19 pandemic on economic activity. Due to the very limited availability of the data (especially actual) I developed a parsimonious model which relies on expectations and does not require extensive dataset for the empirical estimation. The paper is structured as follows. The second section provides an empirical strategy of the cross-country economic growth modelling. The third section presents and discusses descriptive statistics and results of the model estimation. The last section summarizes the main concluding observations and policy recommendations.

EMPIRICAL STRATEGY

The objective of this section is twofold: i) to develop cross-country empirical model that relates expected economic growth in a time of pandemic to the projected costs of fiscal bailout interventions and effectiveness of containment measures; ii) to set up a methodological framework for the quantitative assessment of the model variables based on the information sets available.

The empirical modelling of the cross-country economic growth in existing literature mainly originates from the Convergence Hypothesis. It relies on the Solow-Swan neoclassical model of growth that asserts convergence of the economy toward the long-run equilibrium, whereby the pace of economic growth depends on the pace of convergence of capital intensity (capital per worker) toward steady-state of the economy. In this basic setting, the unconditional convergence approach assumes the common steady-state for all countries, which in turn implies that cross-country variations in the pace of economic growth over a specific period are solely explained by the cross-country differences in the initial level of capital intensity. Nevertheless, Barro in his influential empirical study on cross-country growth determinants (1991) showed that such an approach is oversimplified and popularized the use of conditional convergence approach in econometric analysis of economic growth.

The conditional convergence approach in empirical modelling assumes country-specific steady-state, so that pace of economic growth is conditional to all variables that are likely to influence steady-state. The generic empirical specification of the cross-country growth model based on the conditional convergence approach, such as in Barro (1991), reads as

$$yg_{i,t+h}^{pc} = \alpha + \beta \ln\left[Y_{i,t-1}^{pc}\right] + \gamma X_{i,t,} + \varepsilon_{i,t}, \quad (1)$$

with the following notation of the variables:

- $yg_{i,t+h}^{pc}$ is a cumulative growth rate of country *i* GDP per capita *h*-period ahead;
- $Y_{i,t-1}^{pc}$ is a GDP per capita initial level (lower initial levels implies higher growth rates);
- $X_{i,t}$ is a vector of explanatory variables;
- $\varepsilon_{i,t}$ is a random error assumed to be non-correlated, homoscedastic, and normally distributed.

The main advantage of conditional convergence approach lies in its flexibility, since any variable that arguably impacts the steady-state of the economy may enter the model. This also holds for relevant non-economic variables, for instance, variables that depict political or institutional characteristics of the country, membership to regional unions, etc.

Existing research usually confirms that variables which are proxy for inputs in production function (like school enrolment rate, capital formation, R&D expenses) are significant predictors of cross-country variations in economic growth, in line with theoretical expectations that these variables determine country-specific steady-state of the economy. However, numerous studies found that control variables other than those from production function also have predictive power in explaining growth variations, including fiscal variables, such as level of public debt (Reinhart and Rogoff, 2010) or share of government expenditures (Barro, 1989), as well as non-economic variables such as level of corruption (Mo, 2000).

Application of the conditional convergence growth model in this paper requires several adjustments and simplifying assumptions. At first, analysis is focused only on short-term growth, i.e. expected growth in 2020 and 2021. Since this is a very short period, it is unlikely that the initial level of GDP per capita has predictive power of cross-country variations in cumulative GDP growth and can be neglected. Secondly, it is assumed that variations in variables theoretically asserted to influence country-specific steady-state, like school enrolment rates or capital accumulation, as well as non-economic control variables such as political system or institutional strengths, are not affected by the pandemic in the short run. Thirdly, it is assumed that fiscal bailout to mitigate economic fallout is a one-off cost that occurs only in 2020: no bailout is envisaged in 2020. Finally, bearing in mind the recent research about economic effects of COVID-19 containment measures (Deb et al., 2020a), it is also assumed that containment measures undertaken in 2020 are relevant variables in explaining cross-country variations of growth.

Following the previous set of assumptions, cross-country growth model reads as

$$yg_{i,20+h}^{pc} = \alpha + \beta X_{i,20} + \gamma Z_{i,20} + \varepsilon_{i,20+h}, \;\; h = \{0,1\}, \qquad (2)$$

where $X_{i,20}$ refers to the vector of explanatory variables not affected by the pandemic and $Z_{i,20}$ refers to the vector of explanatory variables which values are induced by the pandemic, in particular fiscal bailout cost and containment measures.

Since I am dealing with estimations and forecasts instead of actual data, the model is further reformulated in terms of expectations conditional on information set available in 2020:

$$E\left[yg_{i,20+h}^{pc} | I_{20}\right] = \alpha + \beta E\left[X_{i,20} | I_{20}\right] + \gamma E\left[Z_{i,20} | I_{20}\right] + \varepsilon_{i,20+h}, \;\; h = \{0,1\}, \qquad (3)$$

The further simplification of the model is derived from the assumption that variations in explanatory variables determining country-specific steady-state are not affected by the pandemic. This implies that forecasts of these variables from 2019 do not change in 2020, since they are robust to shocks triggered by the pandemic, $E\left[X_{i,20}|I_{19}\right] = E\left[X_{i,20}|I_{20}\right]$. Under the additional assumption that variables determining country-specific steady-state explain the majority of variations in cross-country growth, the expected contribution of these variables in explaining growth can be approximated by the expected growth rates from 2019,

$$\beta E\left[X_{i,20+h}|I_{19}\right] \cong E\left[yg_{i,20+h}^{pc}|I_{19}\right]. \quad (4)$$

If the expected growth from 2019 is added to the LHS of the equation, the model can be rewritten as

$$E\left[gg_{i,20+h}^{pc}\right] = \alpha + \gamma E\left[Z_{i,20}|I_{20}\right] + \varepsilon_{i,2020}, \;\; h = \{0,1\}, \quad (5)$$

where $E\left[gg_{i,20+h}^{pc}\right]$ refers to the difference between growth rates expectations from 2020 and 2019,

$$E\left[gg_{i,20+h}^{pc}\right] = E\left[yg_{i,20+h}^{pc}|I_{20}\right] - E\left[yg_{i,20+h}^{pc}|I_{19}\right], \quad (6)$$

which is further denoted as "expected growth gap" due to pandemic.

After model development, the main remaining issue is how to quantify expected fiscal bailout cost and application of containment measures. To quantify expected fiscal bailout cost, I assume that expected fiscal balance in 2020 can be considered as a one-off rise in government expenditure due to the fiscal measures undertaken to preserve economic activity in the time of the pandemic. Since the fiscal bailout cost was not possible to anticipate in 2019, it can be assessed as an expected shock in government expenditure in 2020 relative to 2019 expectations. It can be quantitatively formulated in relative terms (as a % of GDP) as

$$E[fbc_{20}] = E[g_{20}|I_{20}] - E[g_{20}|I_{19}], \quad (7)$$

whereby equation variables read as

- $E[fbc_{20}]$ – expected fiscal bailout cost in 2020, in % of GDP;
- $E[g_{20}|I_{20}]$ – expected government expenditure in 2020 conditional on information set available in 2020, in % of GDP;
- $E[g_{20}|I_{19}]$ – expected government expenditure conditional on information set available in 2019, in % of GDP.

The containment measures applied by national governments include various types of closures and restrictions, such as school, workplace and public transportation closures and restrictions on public events organization, international travels, or internal movements (Deb et al., 2020b). The simplest way to quantify a single containment measure would be the definition of a dummy variable that shows whether this measure has been applied or not. However, following the rationale of making a parsimonious model, I consider the aggregate effectiveness of the applied containment measures per country rather than directly measuring whether each containment measure is applied or not. Since the association of containment measures and flattening of the pandemic curve has been empirically confirmed (Deb et al., 2020b), it is reasonable to assume that effectiveness of containment measures can be approximated by the variables depicting consequences of COVID-19 pandemic on population health.

The assessment of the values of fiscal bailout cost and containment measures effectiveness is largely dependent on the data availability. In this work, I use two datasets: the IMF data from the World Economic Outlook (October 2019 and April 2020) and the World Health Organization data on Coronavirus decease. The October 2019 WEO dataset contains the usual set of macroeconomic variables with mid-term forecasts, including government expenditure. On the other hand, due to high level of uncertainty, the most recent April 2020 WEO dataset is limited only to short-term forecasts (2020, 2021) of the basic macroeconomic variables: GDP, inflation, government fiscal balance (net lending/borrowing) and current account balance. To assess expected fiscal bailout cost, it is necessary to assess $E[g_{2020}|I_{2020}]$, while $E[g_{2020}|I_{2019}]$ is already available in October 2019 WEO database.

The assessment of missing values on $E[g_{2020}|I_{2019}]$ is based on several set of assumptions:

- The expected value of government revenue in 2020 consists solely of expected structural value and cyclical-adjustment due to fallout of economic activity (deferrals or any other possible one-off changes in revenues not related to cyclical-adjustment are neglected);
- The expected value of government expenditure in 2020 consists solely of expected structural value and one-off fiscal bailout (any other source of cyclical-adjustment other than pandemic rescue expenses are neglected);
- Unit elasticity of government revenue to GDP.

The latest assumption implies that a change of revenues is proportional to a change in GDP,

$$\frac{(\Delta R_t/R_{t-1})}{(\Delta Y_t/Y_{t-1})} = 1, \quad (8)$$

where R_t and Y_t are government revenue and GDP at current prices, respectively. This implies that growth rates of government revenue rg_t and nominal GDP yg_t are equal,

$$rg_t = yg_t, \quad (9)$$

where $rg_t = \Delta R_t/R_{t-1}$ and $yg_t = \Delta Y_t/Y_{t-1}$. Since the nominal fiscal balance B_t equals the difference between total revenues and expenditures, $B_t = R_t - G_t$, it can be expressed in a relative term as

$$b_t = \frac{R_t - G_t}{Y_t}. \quad (10)$$

The previous equation can be further rewritten as

$$b_t = \frac{R_{t-1}(1+rg_t)}{Y_{t-1}(1+yg_t)} - \frac{G_t}{Y_t}. \quad (11)$$

Under the assumption of unit elasticity of revenue, the previous equation reads as

$$b_t = \frac{R_{t-1}}{Y_{t-1}} - \frac{G_t}{Y_t} = r_{t-1} - g_t. \quad (12)$$

In the particular context of this analysis, this can be rewritten in terms of expectations as

$$E\lfloor g_{20}|I_{20}\rfloor = r_{19} - E\lfloor b_{20}|I_{20}\rfloor, \quad (13)$$

which is possible to compute since data on both r_{19} and $E\lfloor b_{20}|I_{20}\rfloor$ are available in April 2020 WEO dataset.

The dataset of the WHO on Coronavirus decease contains two types of data: cases of COVID-19 deceases and deaths. Since the effectiveness of the containment measures is inversely related to the number of decease and death cases, two indicators of the containment measures are computed: effectiveness of containment measures in preventing COVID-19 decease cases CC_{20}, and effectiveness of containment measures in preventing COVID-19 death cases DC_{20}. Both indicators are computed as the inverse of the cumulative cases of decease and deaths per million persons on August 31, 2020 (data on population are retrieved from October 2019 WEO and assumed to be unchanged in 2020), rescaled by multiplying with 1,000 and 100, respectively, due to very low non-scaled values of indicators.

Since the data on GDP per capita in constant prices are not available in April 2020 WEO dataset, real GDP per capita growth rates are approximated by the usual real GDP growth rates. Hence, cumulative expected growth gaps for 2020 and 2021 are assessed, respectively, as

$$E\left[gg_{i,20}\right] = E\left[yg_{i,20}|I_{20}\right] - E\left[yg_{i,20}|I_{19}\right], \tag{14}$$

$$E\left[gg_{i,21}\right] = \left[\left(1 + E\left[yg_{i,20}|I_{20}\right]\right)\left(1 + E\left[yg_{i,21}|I_{20}\right]\right) - 1\right] - \\ \left[\left(1 + E\left[yg_{i,20}|I_{19}\right]\right)\left(1 + E\left[yg_{i,21}|I_{19}\right]\right) - 1\right]. \tag{15}$$

Based on the previous discussion about the concrete definition of explanatory variables, the empirical model can be rewritten as

$$E\left[gg_{i,20+h}\right] = \alpha + \gamma_1 E\left[fbc_{i,20}|I_{20}\right] + \gamma_2 CC_{i,20} + \\ \gamma_3 DC_{i,20} + \varepsilon_{i,20+h}, \quad h = \{0,1\}, \tag{16}$$

Eventually, I took into consideration frequent findings from empirical literature that impact of fiscal variables (typically level of public debt) on economic growth is non-linear, such as in Checherita and Rother (2010). These findings get along with theoretical assumption on debt-stabilizing level of government deficit; running the fiscal deficit beyond stabilizing threshold is a usual sign of deep structural economic problems that limits growth prospective. Extension of the model to include non-linear fiscal impact leads to the final form of the empirical specification:

$$E\left[gg_{i,20+h}\right] = \alpha + \gamma_1 E\left[fbc_{i,20}|I_{20}\right] + \gamma_2 E\left[fbc_{i,20}|I_{20}\right]^2 +. \\ \gamma_3 CC_{i,20} + \gamma_4 DC_{i,20} + \varepsilon_{i,20+h}, \quad h = \{0,1\}, \tag{17}$$

The expected sign of the impact of each explanatory variable on the dependent variable and the corresponding rationale is provided in Table 1:

Table 1: The expected sign of the impact of each explanatory variable on the dependent variable

Variable	Expected sign	Rationale
$E\left[fbc_{i,20}\|I_{20}\right]$	negative	The larger amount of fiscal bailout cost implies more expansive fiscal policy to stimulate economic growth and consequently lower growth gap

$E\left[fbc_{i,20} \vert I_{20}\right]^2$	positive	Beyond a certain threshold, fiscal bailout cost becomes counter-effective for economic growth
$CC_{i,20}$	positive	The more effective implementation of containment measures implies more restriction on economic activity and consequently higher growth gap
$DC_{i,20}$	positive	

RESULTS AND DISCUSSION

The data from the WEO are paired with the WHO data on COVID-19 cases. Only countries for which full set of observations on expected growth gaps, bailout cost and COVID-19 cases are left in the sample. Hence, the final sample includes 172 countries. Further examination of the data revealed several expected growth gap outliers[2], which are excluded from the descriptives computation and regression analysis. The full cross-country dataset is given in the Appendix section.

Descriptive analysis

The descriptive analysis encompasses expected growth gaps for 2020 and 2021, fiscal bailout cost and COVID-19 cases. It is important to notice that for descriptive analysis original values of COVID-19 decease cases (*CC_pm*) and death cases (*CD_pm*) per million persons are considered, rather than their inverted values that indicate the effectiveness of containment measures which are pure computational variables with no natural and straightforward interpretation. The value of basic descriptive statistics is presented in Table 2:

Table 2: Descriptive statistics

Variable	No. obs.	Mean	St. Dev.	Min	Max
gg20	168	-8.2	4.0	-19.6	1.7
gg21	170	-5.7	2.4	-13.0	6.6
fbc	172	4.2	4.2	-18.2	20.8
CC_pm	172	4,193.4	6,283.7	3.1	43,071.2
CD_pm	172	109.4	187.8	0.0	1,235.3

Source: IMF, WHO and author's calculation

[2] Values of the expected growth gap higher than 20 p.p. (in absolute terms) are considered as outliers, based on the arbitrary selected threshold stemming from the data examination.

Note: gg20 – expected real growth in 2020, gg21 –expected cumulative real growth in 2020-2021, fbc – fiscal bailout cost, CC_pm – COVID-19 cases per million persons, CD_pm – COVID-19 deaths per million persons*;*

The expected growth gap can be thought of as a "net" measure of economic downturn, in comparison to the pure GDP growth rate being a "gross" measure of economic downturn, which does not count growth potentials that would be most likely achieved in case that COVID-1p pandemic didn't happen. The mean value of expected growth gap in 2020 is around 8.2 p.p., meaning that the average real growth rate of GDP will be around 8.2 p.p. less than it would be without an outbreak of COVID-19 pandemic. This is a huge economic fallout, probably even higher than 2009 fallout that follows the outbreak of the global economic crisis. Contrary to some expectations, especially at the beginning of the pandemic, that economy will bounce back to its potentials already in 2021, the IMF forecasts are not so optimistic since the expected cumulative growth gap for 2020-2021 is on average 5.7 p.p. less than growth potentials forecasted in 2019.

The expected fiscal bailout cost can be thought of as a one-off expected increase in government expenditure that is a result of the expansive fiscal policy measures undertaken to mitigate economic fallout. The average expected value of fiscal bailout cost is around 4.2% of GDP, indicating that on average 4.2% of the world GDP is expected to be spent to save the economy from the collapse. Eventually, mean values of COVID-19 decease and death cases indicate that on average 4,193 persons per million were infected, and 109 persons per million died from the consequences of the COVID-19 decease.

Regression analysis

Two models are estimated, one for the expected growth gap in 2020, and one for the expected cumulative growth gap over the 2020-2021 period. Standard errors are corrected to be heteroskedasticity-robust. Table 3. shows the estimation results of the first model, wherein the expected growth gap in 2020 is a dependent variable.

Table 3: Estimation results, expected growth gap in 2020 model

E[gg20]	**Coef.**	**Robust Std. Err.**	**t**	**P>|t|**
E[fbc]	-1.0519	0.1894	-5.55	0.000
$E[fbc]^2$	0.0482	0.0154	3.13	0.002
CC	0.0102	0.0040	2.56	0.011
CD	-0.0011	0.0024	-0.48	0.633
_cons	-5.3974	0.5306	-10.17	0.000

Source: Author's calculation

Estimation results of the model get along with theoretical expectations given in Table 1. If the joint impact of both linear and non-linear fiscal effects is considered, increase in expected bailout cost of 1 p.p. implies almost unit reduction of expected growth gap in 2020, and this impact is significant at 1% level.

As previously mentioned, indicators of the effectiveness of containment measures are artificial variables, and estimated regression coefficients for these two variables have no natural quantitative interpretation. Nevertheless, the positive sign of regression coefficients can be interpreted as a contribution of containment measures to the widening of expected growth gap. The estimated regression coefficient for the effectiveness of containment measures in preventing COVID-19 decease cases appears to have a significant positive impact at 5% level, as expected: effective containment measures to flatter pandemic curve reduce expected growth. This is not the case with the effectiveness of containment measures in preventing COVID-19 death cases, whereby coefficient is both negative and insignificant.

The overall explanatory power of the model in absolute terms, measured by R-squared, does not appear quite high: cross-country variations of explanatory variables explained around 25% of variations in growth gap. However, when compared to the similar work this is a solid explanatory power bearing in mind the parsimonious model specification and size of the sample; for instance, Barro (1991) use 8-10 explanatory variables in regression analysis and got R-squared values 50-60%.

On the other hand, the estimated impact of the expected fiscal bailout, both linear and non-linear, on the expected cumulative growth gap 2020-2021 seems to be insignificant, despite regression coefficients still have the proper signs (Table 4). Also, the positive impact of the effectiveness of containment measures in preventing COVID-19 decease cases seems to fade and even turns to be good for growth potentials: effective flattening of the pandemic curve in 2020 increase growth prospective already in 2021. Impact of the effectiveness of containment measures in preventing COVID-19 death cases appears positive and significant, which is a puzzling result. However, an inverse number of decease cases is a more direct measure of containment effectiveness than an inverse number of death cases, because the number of death cases also reflects conditions of the national healthcare system (in countries with advanced healthcare systems, a ratio of deaths over deceases is expected to be generally lower). Hence, a possible answer to this puzzling result may be simple expectations that countries with underdeveloped national healthcare systems may have prolonged exposure of population health to the pandemic which in turn reduce potentials for economic stabilization. It is also important to mention that the overall explanatory power of this model is quite low (only 5%), so all estimation results have to be taken with caution.

Table 4: Estimation results, expected cumulative growth gap 2020-2021 model

E[gg21]	Coef.	Std. Err.	t	P>|t|
E[fbc]	-0.1437	0.0980	-1.47	0.145
E[fbc]^2	0.0049	0.0062	0.79	0.430
CC	-0.0071	0.0029	-2.50	0.013
CD	0.0032	0.0007	4.44	0.000
_cons	-5.2709	0.3134	-16.82	0.000

Source: Author's calculation

The main limitation of the regression analysis in this work, of course, is the use of the IMF estimations and forecasts instead of actual values of economic variables. Hence, forecast errors (the difference between forecasted and actual values), which are an inevitable result of uncertainty in the future, in this particular case may be additionally pronounced as they reflect deficiencies of data inputs and limitations of the macroeconomic models used for projections, as well as subjective beliefs of the IMF analysts. The second important limitation is that deferrals are not counted in the computation of fiscal bailout cost, so they are likely overestimated.

CONCLUSIONS

When the results of the descriptive and regression analysis are jointly considered, a couple of important concluding remarks can be derived:

- The envisaged recovery of economic activity is very slow. The expected real growth rate in 2020 is on average 8.2 percentage points lower relative to pre-pandemic growth prospective. Cumulative growth gap in 2021 is expected to be reduced for only 2.5 percentage points. Assuming the constant recovery rate of 2.5 percentage points reduction in cumulative growth gap, at least 2-3 years will be needed to catch up the value of global economic output that was projected before the pandemic outbreak.
- Expected fiscal bailout in 2020 appears to be successful in mitigation of economic fallout in 2020, but this positive effect seems to fade over short- to mid-term. This is the matter of the particular concern: the recent global economic crisis has left many countries with high public debt, means of monetary policy have been pretty exhausted, and anti-pandemic bailout considerably reduced fiscal space for the expansive counter-cyclical fiscal policy in the future.

- The effectiveness in the implementation of containment measures to save population health tends to reduce growth, as expected. However, the finding that effectiveness of containment measures in preventing COVID-19 decease cases reduces growth only in short-run is encouraging; it indicates that effects of containment measures in preventing COVID-19 death cases on growth reduction are likely to also disappear in the mid-run.

Putting all conclusions together, one crucial policy recommendation can be derived: if the fiscal authorities worldwide aspire to accelerate economic recovery without endangering fiscal solvency and population health, future fiscal policy actions have to be more selective, tailor-made and focused on the critical economic sectors and activities, while government spending on medical means of healthcare protection against COVID-19 needs to intensify to gradually eliminate the application of strict containment measures.

REFERENCES

[1] Anderson, J., Bergamini, E., Brekelmans, S., Cameron, A., Darvas, Z., Domínguez Jíménez, M., Midões, C. (2020). Bruegel Dataset "The fiscal response to the economic fallout from the coronavirus".

[2] Barro, R. (1991). Economic Growth in a Cross Section of Countries. *The Quarterly Journal of Economics*, Vol. 106, No. 2, pp. 407-443.

[3] Barro, R. (1989). A Cross-Country Study of Growth, Saving, and Government. *National Bureau of Economic Research Working Paper* No 2855.

[4] Checherita, C., Rother, P. (2010). The Impact of High and Growing Government Debt on Economic Growth: An Empirical Investigation for the Euro Area. *ECB Working Paper* N° 1237.

[5] Deb, P., Furceri, D., Ostry, J., Tawk, N. (2020a). The Economic Effects of COVID-19 Containment Measures. *IMF Working Paper* WP/20/158

[6] Deb, P., Furceri, D., Ostry, J., Tawk, N. (2020b). The Effect of Containment Measures on the COVID-19 Pandemic. *IMF Working Paper* WP/20/159

[7] Jorda, O., Singh, S., Taylor, A. (2020). Longer-Run Economic Consequences of Pandemics. *Federal Reserve Bank of San Francisco Working Paper* 2020-09

[8] Mo, H. K. (2000). Corruption and Economic Growth. *Journal of Comparative Economics*, No. 29, pp. 66–79.

[9] Reinhart, C., Rogoff, K. (2010). Growth in a Time of Debt. *American Economic Review: Papers & Proceedings*, No. 100, pp. 573–578.

APPENDIX:

Table A1. Cross-country Data

ISO	gg20	gg21	fbc	CC_pm	CD_pm	ISO	gg20	gg21	fbc	CC_pm	CD_pm
AFG	-7.50	-6.26	1.117	1,045.2	38.4	**CZE**	-14.00	-4.82	4.889	2,290.6	39.8
ALB	-13.01	-5.58	3.229	3,268.3	97.6	**DNK**	-12.50	-4.55	7.53	2,876.3	107.5
DZA	-11.39	-3.45	11.316	1,016.9	34.6	**DJI**	-7.50	-2.78	2.46	4,995.4	55.7
AGO	-4.02	-2.83	5.146	87.1	3.6	**DMA**	-8.12	-10.71	2.165	281.7	0.0
ATG	-17.96	-8.75	6.003	1,010.8	32.3	**DOM**	-4.97	-7.45	1.63	9,088.1	162.1
ARM	-6.25	-6.30	2.392	14,746.0	296.1	**ECU**	-10.13	-4.77	7.394	6,581.4	379.6
ABW	***-25.80***	-5.37	14.829	16,500.0	71.4	**EGY**	-0.88	-7.34	0.771	995.1	54.4
AUS	-12.78	-5.86	8.764	1,004.0	23.9	**SLV**	-9.90	-5.77	5.452	3,823.8	106.4
AUT	-11.51	-6.08	6.814	3,041.1	81.9	**GNQ**	-7.75	6.63	5.652	3,633.1	61.0
AZE	-2.89	-5.79	18.405	3,609.6	52.8	**ERI**	-5.74	-2.08	-0.218	51.6	0.0
BHS	-15.01	-3.73	2.946	5,603.7	112.9	**EST**	-15.37	-6.00	7.707	1,799.1	48.5
BHR	-6.58	-5.21	8.26	34,132.4	125.1	**SWZ**	-2.75	-0.30	2.261	4,090.6	81.6
BGD	-7.51	-3.55	1.303	1,865.8	25.5	**ETH**	-1.10	-7.13	1.195	534.5	8.3
BRB	-14.70	-3.15	3.627	602.8	24.4	**FJI**	-12.80	-5.50	7.852	31.3	2.2
BLR	-9.48	-3.12	1.864	7,565.9	71.3	**FIN**	-9.13	-6.08	6.013	1,463.8	60.7
BEL	-11.49	-5.30	7.688	7,452.7	863.2	**FRA**	-11.65	-5.65	7.067	4,041.0	470.0
BLZ	-19.60	-9.23	4.154	2,374.4	32.0	**GAB**	-4.76	-4.94	2.711	4,088.9	25.5
BEN	-1.46	-3.13	0.95	181.6	3.4	**GMB**	-3.98	-3.22	-1.126	1,190.7	40.9
BTN	-0.20	-7.94	0.681	269.9	0.0	**GEO**	-7.00	-11.16	5.727	400.5	5.1
BOL	-5.80	-7.72	0.235	9,987.4	427.5	**DEU**	-12.10	-4.86	6.676	2,921.3	112.1
BIH	-8.50	-6.94	5.263	5,650.8	169.0	**GHA**	-4.38	-2.62	4.302	1,465.3	9.1
BWA	-12.16	-9.46	3.868	686.7	2.5	**GRC**	-15.10	-9.45	9.2	945.9	24.5
BRA	-8.19	-7.02	2.439	18,318.3	573.7	**GRD**	-14.10	-7.85	4.792	220.2	0.0
BRN	-2.24	-3.58	15.023	322.1	6.7	**GTM**	-7.42	-4.01	1.9	4,196.4	155.6
BGR	-10.04	-4.50	3.663	2,326.1	88.1	**GIN**	-4.69	-1.56	2.539	687.7	4.3
BFA	-3.81	-4.42	3.265	67.3	2.7	**GNB**	-4.50	-8.69	0.696	1,210.0	18.6
BDI	-9.75	-2.57	-0.849	38.6	0.1	**GUY**	***46.52***	***-32.15***	11.377	1,508.3	44.6
CPV	-9.55	-8.94	8.17	6,890.9	71.6	**HTI**	-5.20	-5.56	1.97	729.8	17.9
KHM	-7.64	-9.56	0.816	16.6	0.0	**HND**	-6.40	-5.69	-0.454	6,216.9	192.0
CMR	-5.27	-6.08	2.617	750.5	16.1	**HUN**	-7.30	-5.33	2.065	610.9	62.9
CAN	-10.47	-5.79	10.974	3,408.7	243.3	**ISL**	-13.25	-5.31	5.068	5,896.4	28.0
CAF	-2.95	-5.10	4.102	907.2	11.8	**IND**	-5.55	-5.56	0.177	2,678.9	47.7
TCD	-6.23	-4.62	1.432	79.1	6.0	**IDN**	-7.71	-1.82	3.181	644.4	27.5
CHL	-9.76	-5.79	4.243	21,456.7	588.5	**IRN**	-9.10	-4.09	5.128	4,486.3	257.7
CHN	-8.03	-1.57	4.625	64.6	3.4	**IRQ**	-11.92	-6.45	20.834	5,910.2	177.9
COL	-6.13	-6.26	1.792	11,907.3	378.4	**IRL**	-13.06	-7.69	5.826	5,810.1	359.0
COM	-4.26	-6.11	2.12	484.0	8.0	**ISR**	-11.27	-7.95	6.487	12,545.9	104.5
COD	-5.78	-6.19	1.237	102.1	2.6	**ITA**	-13.96	-6.06	5.945	4,443.6	587.8
COG	-5.71	-3.68	2.112	871.1	17.1	**JAM**	-9.11	-5.04	1.728	735.0	6.6
CRI	-6.26	-5.82	1.659	7,816.3	82.3	**JPN**	-8.18	-3.23	4.289	537.8	10.1
CIV	-6.00	-3.18	2.244	683.1	4.4	**JOR**	-7.39	-5.28	3.463	195.2	1.5
HRV	-13.97	-9.81	6.999	2,493.3	45.3	**KAZ**	-6.66	-6.27	5.192	7,011.5	95.6
CYP	-12.07	-6.91	2.088	1,697.5	24.0	**KEN**	-5.12	-5.01	0.896	689.9	11.6

Table A1. Cross-country Data - continued

ISO	gg20	gg21	fbc	CC_pm	CD_pm	ISO	gg20	gg21	fbc	CC_pm	CD_pm
KOR	-4.58	-2.84	1.316	384.7	6.2	PRT	-13.00	-6.52	7.101	5,627.7	177.2
UVK	-12.50	-6.04	1.498	7,383.9	281.1	PRI	-7.50	-3.13	0.903	10,368.7	137.0
KWT	-4.54	-3.49	16.843	18,003.8	112.7	QAT	-9.38	-5.39	2.231	43,071.2	71.6
KGZ	-12.03	-3.68	7.485	6,870.9	165.8	ROU	-8.90	-7.90	4.659	4,445.5	183.3
LAO	-4.88	-7.32	2.01	3.1	0.0	RUS	-8.96	-6.11	5.662	6,783.3	117.1
LVA	-16.89	-6.81	4.71	722.1	17.6	RWA	-3.15	-6.58	4.887	324.8	1.3
LSO	-10.33	-3.86	-1.489	520.5	15.1	SMR	-17.57	-8.73	3.613	21,617.6	1,235.3
LBR	-6.53	-1.40	-1.63	284.6	17.9	STP	-11.50	-8.47	2.872	4,036.0	67.6
LBY	***-139.3***	***-25.3***	-18.16	2,040.6	35.3	SAU	-5.21	-3.88	7.922	9,237.2	113.5
LTU	-16.24	-5.84	7.949	1,032.3	30.9	SEN	-2.50	-5.54	2.187	808.5	16.9
LUX	-9.74	-5.80	3.49	10,789.9	202.0	SRB	-10.49	-3.92	7.36	4,503.2	102.1
MDG	-4.62	-5.30	0.928	548.6	7.1	SYC	-18.87	-11.27	16.446	1,364.6	0.0
MWI	-1.50	-7.36	2.246	272.9	8.6	SLE	-6.31	-8.07	2.062	261.3	9.0
MYS	-10.70	-2.37	3.627	284.6	3.8	SGP	-6.43	-3.19	7.227	10,012.5	4.8
MDV	***-21.27***	-7.83	6.445	20,610.2	75.3	SVK	-11.16	-7.07	5.08	711.1	6.1
MLI	-2.60	-4.42	5.064	145.2	6.6	SVN	-13.49	-8.78	6.926	1,384.7	61.9
MLT	-9.83	-4.22	8.665	3,839.2	22.7	ZAF	-9.80	-4.57	6.463	10,626.0	238.5
MRT	-6.17	-9.96	2.019	1,730.4	39.2	SSD	1.67	-5.37	-0.709	188.9	3.5
MUS	-12.70	-9.21	8.055	273.1	7.9	ESP	-12.28	-7.65	7.617	9,951.7	624.1
MEX	-9.65	-7.04	2.159	4,698.8	506.8	LKA	-4.72	-4.31	2.974	137.3	0.5
MDA	-7.10	-6.77	2.65	10,361.4	280.1	SDN	-4.19	-7.48	12.435	305.1	19.0
MNG	-9.00	-3.86	5.135	91.2	0.0	SUR	-9.80	-5.20	-2.288	6,612.0	112.0
MNE	-15.45	-8.55	10.958	7,731.9	158.9	SWE	-11.96	-5.51	5.844	8,160.3	565.0
MAR	-8.52	-7.12	3.719	1,725.3	31.2	CHE	-9.74	-5.31	6.229	4,904.2	201.8
MOZ	-2.50	-3.28	3.564	122.6	0.7	TJK	-4.50	-2.65	3.179	920.1	7.3
MMR	-5.74	-3.18	0.684	14.6	0.1	TZA	-2.55	-5.37	0.098	9.0	0.4
NAM	-5.68	-3.39	0.99	2,995.1	29.3	THA	-12.73	-7.60	3.246	50.2	0.9
NPL	-2.47	-4.78	1.63	1,355.2	7.8	TLS	-6.80	-9.35	-0.732	20.8	0.0
NLD	-10.48	-7.92	6.951	4,066.6	360.7	TGO	-3.00	-5.96	0.503	170.3	3.3
NZL	-13.15	-7.09	5.275	275.4	4.4	TTO	-7.14	-5.87	5.364	1,218.7	15.2
NIC	-6.00	-5.10	1.176	560.5	21.0	TUN	-8.36	-5.75	0.648	312.7	6.4
NER	-7.16	-2.84	0.82	50.4	3.0	TUR	-10.00	-6.32	2.546	3,234.6	76.2
NGA	-5.78	-6.23	2.033	268.0	5.0	UGA	-0.73	-4.82	-1.882	72.5	0.8
MKD	-11.00	-3.94	3.522	6,892.7	288.6	UKR	-11.30	-10.69	7.265	2,895.1	61.1
NOR	-9.22	-7.56	7.207	1,968.4	49.3	ARE	-6.77	-5.64	9.319	6,483.4	35.5
OMN	-5.82	-8.12	9.969	19,866.2	157.2	GBR	-10.54	-5.74	6.804	5,002.0	620.6
PAK	-3.52	-5.03	-1.646	1,445.1	30.7	USA	-10.65	-5.32	9.603	17,916.8	551.8
PAN	-6.08	-9.40	3.926	21,649.0	470.0	URY	-8.00	-3.52	2.184	446.1	12.5
PNG	-3.88	-3.22	0.506	53.4	0.6	UZB	-5.20	-3.43	3.631	1,261.2	9.6
PRY	-5.00	-5.45	4.29	2,303.1	41.1	VNM	-4.30	-3.53	0.969	10.9	0.3
PER	-9.78	-7.29	5.447	19,677.3	880.3	YEM	-9.10	-12.95	1.164	61.8	17.9
PHL	-6.97	-4.66	1.302	2,007.2	32.5	ZMB	-5.86	-4.69	0.308	656.4	15.7
POL	-8.81	-6.40	5.053	1,761.0	53.5	ZWE	-9.90	-10.36	1.631	430.2	13.1

Source: IMF, WHO and author's calculation

Note: gg20 – expected real growth in 2020, gg21 –expected cumulative real growth in 2020-2021, fbc – fiscal bailout cost, CC_pm – COVID-19 cases per million persons, CD_pm – COVID-19 deaths per million persons;

Expected growth gap outliers are marked in italic and bold.