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Growth During the Time of Covid19

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Abstract

This short piece discusses the results of simple regression analysis using cross country data to determine the factors that have influenced fluctuations in real output during the covid-19 pandemic period. Focus is on explaining not only output growth from 2020 to the first half of 2021, but also the length or duration of recessions. The most prominent factors influencing growth include the ability of a country to contain the spread of infections and vaccinate their population. The size of the covid19-induced fiscal stimulus, also matters, especially health care spending. However, the relationship is nonlinear. Beyond a certain point, fiscal spending leads to lower quarterly growth. Policy recommendations are given.

I. Introduction

The on-going covid19 pandemic has been affecting the global economy for the last few years. Being the first truly large-scale modern pandemic, governments have only started to appreciate its effects and also only begun to formulate approaches to tackle the economic problems that have arisen.

Given that pandemics might affect global economies again in the future, it is a worthwhile exercise to study how the economic effects of pandemics evolve and to look to design possible blueprints for appropriate policy actions to address them and limit their negative repercussions. This paper looks at recent episodes of cross-country outbreaks, traces how pandemics evolve and uses regression analysis to provide suggested courses of action for countries to address the present covid19 crisis and also address future outbreaks.

II. Effects of Pandemics

When the SARS virus traveled across several countries in 2004, it was the first pandemic to affect modern economies and hence was also the first pandemic whose effects on economic growth, health systems, domestic and international trade, could be carefully studied. While the scope of that pandemic is dwarfed in scale and duration by the current covid19 pandemic, SARS

[1] The author wishes to thank the RESPOND project and personnel for assistance and substantive inputs.

provided a preview of the actual economic effects of a broader pandemic. Indeed, many of the economic effects of covid19 are magnified versions of observations of the effects of SARS.

The ongoing Covid19 pandemic is much larger in scope and also more protracted. Hence, it should offer more and deeper insights into the economic effects of pandemics. This paper uses regression analysis to determine the factors that have influenced short-run income fluctuations since the covid19 pandemic began. Policy implications are drawn from the results.

The world experience with SARS in 2004 and then COVID19 since 2020 should provide sufficient knowledge about how pandemics evolve. These two episodes have display commonalities in patterns and suggest the following possible narrative of economic events for pandemics.

1) First infection cases appear; no immediate public health response occurs. Number of cases rise.

2) Growing concern over inability of government to control pandemic leads to public fear, government starts initial containment measures such as granular quarantines.

3) To the extent that it cannot be controlled, fear induces people to change their behavior in a way that contracts: (a) demand for goods and services; and (b) supply of goods and services;

4) The immediate demand side impact is felt on industries whose markets depend on face-to-face contact with customers (airlines, tourism, non-online retail);

5) Household and firm incomes start falling; GDP starts falling

6) The more protracted the pandemic, the greater the probability that governments will introduce restrictions on worker and consumer mobility, which will only reinforce the negative effects of (3) and (4);

7) The more protracted the pandemic, the greater the decline in consumer confidence, which aggravates the fall in consumer demand;

8) Travel restrictions are also introduced, affecting tourism and related industries. Closures can also be ordered on other places with large gatherings such as cinemas, restaurants, malls, sports stadiums, schools, etc.

9) As the pandemic spreads and becomes more protracted, granular quarantines become larger in scale, leading to government-enforced lockdowns of larger and larger geographical areas;

10) Lockdowns and other restrictions can lead to disruptions in domestic supply chains, reducing production, curtailing the supply of important inputs and aggregate supply further.

11) As (2) - (10) bite into firm incomes, firms will start feeling pressure to finance their overhead expenses;

12) Over a longer period, firms can close and/or start to lay workers off or reduce compensation as a response. Household incomes start to fall;

13) Firm investment falls as uncertainty deepens, exports decline if the pandemic is global;

14) Global supply chains can be affected by outbreaks in critical input producing and shipping nations. World trade is undermined.

15) As incomes fall, the quality of credit in the private sector starts deteriorating;

16) As nonperforming loans increase, the banking sector reduces lending; demand for investment goods decline;

17) Asset prices can decline (e.g., in real estate). Prices and turnover in financial markets can also decline in tandem with falling incomes.

18) As incomes decline, public revenues fall. Yet governments need to address falling incomes with household and firm subsidies. Efforts to contain the virus and backstop the health system, procure vaccines and boosters also require larger amounts of state funding;

19) Given the decline in revenues and need to increase spending, governments can start to engage in deficit spending, which will increase its stock of domestic and foreign debt and can make it susceptible to adverse interest rate and exchange rate shocks.

20) Unless the government can contain the pandemic quickly and effectively, sovereign fiscal risk increases. Sovereign bond prices can start to fall. Contingent liabilities of government can be triggered.

21) The health system starts showing strain as capacity in terms of beds, rooms, equipment, PPE, human resources, become increasingly congested. The health insurance system also starts showing financial strain as increasing claims are filed.

22) Vaccines and better treatments and treatment protocols become available. Health care workers learn to better protect themselves against the virus.

23) As the state gains better control of the pandemic, mobility restrictions ease.

24) Consumption expenditures bounce back.

25) The rest of the economy bounces back. Until the next wave of infections or until global immunity strengthens and the virus fades and dies.

The pandemic narrative above highlights the real origins and nature of the crisis. This makes it very different from conventional macroeconomic and financial crises, which originate from nominal, financial and fiscal origins: the bursting of credit or asset price bubbles, bank failures, exchange rate collapses. All of these precede conventional economic crises, but the covid19 crisis is different. Unlike the SARS pandemic which died down without need for a vaccine to be developed, covid19 and the strains of it that have emerged have proven to be partially resistant to vaccines. This is because failures to effectively control the virus across borders in the short-run (delta, omicron….) have led to mutations that have challenged vaccines that were only developed to control the original strains. Hence, covid19 has still not completely subsided. Thus, the possibility still exists that conventional crises may occur as an offshoot of covid19. One possible risk is fiscal in nature. A large majority of countries in the world issued large amounts of debt to finance their stimuli.

To keep debt levels sustainable and prepare for future possible outbreaks, countries should be able to grow persistently in the next few years. Growth enables countries to generate primary balances that are as large as possible to amortize newly accumulated debt. Growth will also likely keep market yields on future debt low. Sustained growth will also keep countries from going through volatile jagged-shaped income growth experience. It will also help restore investor confidence.

One possible question posed by the pandemic experience is whether country policies to deal with the pandemic have any effect on growth within the pandemic period. There is anecdotal evidence that certain countries that implemented strong infection containment policies early during the pandemic (e.g., Taiwan and Vietnam) avoided recessions. Regression analysis will confirm whether this is true. Meanwhile, countries that implemented strict mobility restrictions probably also did so at the cost of worker productivity and some fraction of household demand for goods and services that could not be sold in environments other than in face-to-face settings.

Given that the pandemic is on-going, estimating the determinants of short-run real growth from within the first year and a half of this pandemic can be beneficial in the sense that one can distil from regressions results practical lessons for coping and dealing with the ongoing health crisis. These lessons should inform and refine policy at present and moving forward.

III. Data

A cross-country dataset is assembled for this study, with data from 71 countries (see Appendix Table 1 for list), including data from the pandemic period (whole year 2020 – first half of 2021). A description of the data and variable names are found in Appendix Table 2a. Since it was necessary to study data from the first half of 2021, after vaccination programs had already begun in most countries in the world, it was necessary to obtain quarterly data. Hence, countries included in the dataset were countries that produced quarterly data.

Government expenditure data specific to the pandemic comes primarily from the IMF's Fiscal Monitor Database of Country Fiscal Measures in Response to the COVID-19 Pandemic. Much of the national income accounts data across countries comes from the World Development Indicators of the World Bank and the CEIC database. The latter is the source of quarterly data.

Vaccination and case rate data come from World Health Organization (WHO). The Oxford Stringency Index is another source of data. Other data are dummy variables constructed by the author. If data is described as "to date" in Appendix Table1a, the observations are taken as of end-October, 2021 in the relevant datasets. Summary statistics for select variables in Appendix Table 2a are listed in Appendix Table 2b.

IV. Regression Results and Analysis

Using the dataset, cross-country regressions are estimated to look for determinants of short-run growth and speed of recovery (number of quarters spent in recession) during this pandemic period. Lessons from this exercise can provide guidance for governments and policymakers around the world. All of the regressions are in log-log form, so that the estimated coefficients are interpreted as elasticities.

Basic regressions using cross-country data (see Appendix Table 3) suggest that the size of the covid19-induced fiscal spending as a fraction of GDP (based on IMF collated data across countries on different categories of spending responses to the pandemic) is a positive determinant of 2021 cross-country real average quarterly growth rates (where most economies are observed to bounce back from severe declines in the second quarter of 2020). The relationship, however, appears to be nonlinear as the square of the stimulus term is significantly negative. This would imply that the growth gains to additional stimuli are positive initially, but diminish after some point, and beyond this, growth is undermined by too large a stimulus. 2021 average real growth rates are also a negative function of a country's stringency ranking, a positive function of its vaccination rate (vaccinations per unit population) and positively for the dummy for Africa. There is some intuition for the variables. Strict mobility rules, lower fiscal spending and low vaccination rates reduce 2021 real growth rates across countries. The results also support the Keynesian view that increased spending in response to an economic crisis helps to stabilize real GDP (up to a point).

Additional regression analysis (see Appendix Table 4) also suggests that certain factors play a role in prolonging the quarters an economy has experienced negative growth or remains in recession (the duration of the covid19 recession). The empirical evidence points to the following factors prolonging pandemic recessions for countries: (a) persistently high case rates; (b) stringent mobility restrictions in high income countries; and (c) low vaccination rates in Asian countries. The last two variables come from interaction terms.

The underlying intuition is the following. Countries that are unable to control the spread of the virus experience protracted periods of high case rates and stay in recession longer as fear and lockdowns limit economic activities. Meanwhile, more intense mobility restrictions in high income countries have more persistently negative effects on aggregate demand and supply than in other countries as households in higher income countries tend to rely more on physical mobility (for final production and final purchases - of higher value-added products and for tourism) than those households in lower income countries. Furthermore, restrictions in higher income countries also tend to have more disruptive effects on domestic and international supply chains and the movement

of intermediate goods involving these countries. This prolongs recessions not just in high income countries, but in a broader set of countries who depend on high income countries for trade.

Meanwhile, low vaccination rates in Asia can lead to persistently high vulnerability of workers and households to severe covid19, leading to reduced labor supply, reduced productivity and possibly also to reduced demand for consumer goods as unvaccinated people may be subjected to restrictions more stringent than those imposed on the vaccinated population or voluntarily restrict their movement given their greater risk for severe covid19. These effects can also lead to longer recession times in a broader set of countries interdependent on Asian countries for trade. There are well-known risks to extended periods of weakness in the economy, especially long periods of unemployment (hysteresis). Structural shifts in the market for labor during the pandemic can cause structural unemployment to rise as workers need time to acquire new skills.

Regressions using data that cover the entire pandemic period from 2020 onwards (see Appendix Table 5) show that average log difference of real GDP is reduced by the log of the case rate (number of cases per unit population) and is increased by the log of health-related expenditures as a percentage of GDP. High case rates have exerted a drag on real GDP growth through the entire pandemic period. Meanwhile, spending on health-related items has in general supported real economic growth during the protracted period of the pandemic.

V. Conclusion

The pandemic narrative suggests that the negative economic effects of the pandemic can come from many sources (supply and demand side). Hence, the negative economic effects can be immediately profound and lasting. Government policy can certainly contribute to the depth of the economic crisis (e.g., the strict mobility restrictions, sub-par testing, tracing, etc.) but strong policy can definitely mitigate the effects of the economic crisis as well.

The regressions in the paper provide backing for several policy prescriptions at a time of covid19. They underscore the importance of having sufficient fiscal space for responding to pandemic crisis. Spending during a health crisis can benefit the economy through regular Keynesian channels and also by backstopping the health sector in its time of greatest need. Spending more on health equipment, supplies, personnel are precisely what is needed to restore economic health. Other categories of expenditures have less power to increase short-run growth.

In what ways might additional spending on the health sector lead to greater economic growth? One possibility is additional spending to alleviate labor shortages and/or productivity in the health sector. In many countries, working conditions for health care workers (HCWs) during the pandemic have been documented.[2] Nurse and doctor labor supply can get particularly tight especially during infection surges as they not only need to attend to rising patient numbers, they also get infected themselves. Labor supply is tightened all the more when personal infection fears induce voluntary job separations on the part of HCWs. These fears are compounded when personal protective equipment (PPE) is also in short supply, so vulnerability rises even more. Furthermore, the HCWs who do continue working face burnout given their limited numbers. But these labor

[2] World Health Organization (2020), Channelnewsasia (2021), Japan Times (2021), Biana and Joaquin (2020)

supply constraints only serve as even more binding constraints for hospital capacity in the efforts to "flatten the curve". Delays in flattening the curve only serve to raise national case rates or keep them from falling (which we see from the regressions only lower growth and prolong pandemic recessions).

Hospital capacity constraints are not only measured in bed capacity and available medicines. Even more importantly, they are measured in human capacity, which must be strengthened, protected and made more resilient during a health crisis. HCWs should be compensated for bearing more risks and doing more work during a health crisis.

Additional spending to alleviate labor shortages in the health sector can therefore take the form of (temporary or permanent) increases in HCW compensation, additional allowances, faster provisioning of PPEs; fast-tracking of training to augment their numbers (both doctors and nurses are in very short supply in the country). Other productive real sector health expenditures that can alleviate the economic cost of the pandemic include the building of more health care facilities (which of course need to be staffed by more HCWs and similarly equipped). The country could also do better by enhancing critical care equipment such as ventilators. Lastly, the country should provide annual budgets for vaccines and boosters moving forward and also augment the infrastructure for delivering these shots for continuous protection of the population.

Real sector policies related to the easing of mobility restrictions and the speed of vaccination of the population can also spur real growth and hasten the ending of recessions by allowing households greater freedom to increase consumption and workers greater freedom to increase labor and hence also output supply. This also suggests that countries whose labor forces and households adapt faster to challenging work and consumption options during a pandemic can grow faster.

Furthermore, the research done here implies that Keynesian stimuli can lead to greater economic growth in the short-run, but the efficacy of Keynesian spending has its limits. Very large spending packages run the risk of being indiscriminate, unable to boost growth in the short-run.

The current covid19 economic crisis represents a big challenge to all countries' resources and policymakers. The longer the pandemic lasts, the more it exerts a drag on a country's real economic growth and the greater also are the present and future resources required by the country to recover. Further, not only will significant resources be needed to recover lost national income, they will also be needed to rebuild fiscal space and rebuild economic resilience. In a world unfree from covid19, voluntary and involuntary reductions in mobility, unwillingness to pay and unwillingness to produce may translate into sluggish and uneven growth. In this environment, government, tax, spending and economic policy will have to achieve a very fine balance. It will have to continuously sustain the strength of the perpetually challenged health system, stimulate a fragile economy while at the same time building sources of long-run strength and savings. An approach that combines or achieves all of these objectives is desirable. But achieving these also requires leadership, good governance, carefully crafted and sustainable public financing.

What are the implications of the empirical work for country policies moving forward? First of all, it is clear that some sort of support for aggregate demand can help boost short-run growth

across countries, especially during the height of a pandemic as aggregate demand and aggregate supply contract simultaneously. Second, well-targeted health expenditures not only help contain and fight spread of infections. They also stimulate demand and hence matter for growth and getting out of recessions. Third, to get back to a more stable and robust growth path, countries must improve their ability to prevent and respond to future surges through higher vaccination rates, better testing and tracing and less indiscriminate lockdowns. Fourth, countries must rebuild its fiscal space so as to make future expenditures and borrowing more sustainable.

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Appendix

Table 1: Countries in Sample

Albania	Greece	Papua New Guinea
Argentina	Honduras	Paraguay
Australia	Hong Kong, SAR, China	Peru
Austria	Hungary	Philippines
Azerbaijan	Iceland	Poland
Belarus	India	Portugal
Belgium	Indonesia	Romania
Bolivia	Ireland	Russia
Botswana	Israel	Saudi Arabia
Brazil	Italy	Serbia
Brunei	Japan	Singapore
Cambodia	Korea, Rep.	Slovak Republic
Canada	Latvia	Slovenia
Chile	Lithuania	South Africa
China	Luxembourg	Spain
Colombia	Malaysia	Sri Lanka
Costa Rica	Mexico	Sweden
Croatia	Nepal	Switzerland
Czech Republic	Netherlands	Taiwan
Denmark	New Zealand	Thailand
Ecuador	Nigeria	Turkey
Estonia	Norway	Ukraine
Finland	Pakistan	United Kingdom
France	Palestine	United States
Germany	Panama	Vietnam
Ghana		

Table 2a: All variables are one observation per country (cross-country data)

Variable	Description	Source
gr2021	Log differenced quarterly real GDP growth in 2021 (second quarter real GDP minus first quarter real GDP)	CEIC
lstring	Log of the average global rank of the value of the stringency index to date; lower number = more stringent restrictions	Oxford Stringency Index
lstimgdp	Log of the value of the stimulus to GDP ratio to date	IMF. Fiscal Monitor Database of Country Fiscal Measures in Response to the COVID-19 Pandemic
lstimgdpsq	Log of the value of the stimulus to GDP ratio to date squared	IMF
lvaccrate	Log of the vaccination rate to date (vaccinations as a fraction of the population)	WHO
Africa	Africa dummy	Author
lstringavg	Log of the average of the stringency index to date; higher number = more stringent restrictions for a longer period of time	Oxford Stringency Index
lvaccratehincome	Log of the vaccination rate in high income countries to date	WHO
latam	Latin America dummy	Author
avlogdiffrgdp	Average log quarterly difference of real GDP from 2020 to 2021	CEIC
lcaser	Log of case rate to date (covid cases per 1,000 people)	WHO
lhealth1	Log of covid-related health care spending to GDP ratio to date (includes funds spent on upgrading hospitals,	IMF. Fiscal Monitor Database of Country Fiscal Measures in Response to the COVID-19 Pandemic

	procurement of equipment, PPE, vaccines, boosters, etc.)	
lstringavghincome	Log of average stringency index in high income countries to date	Oxford Stringency Index
lvaccrateasia	Log of vaccination rates in Asian countries to date	WHO

Table 2b: Summary Statistics for Select Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
String	76	81.513	49.061	1	185.00
avgqtrgr	72	- 0.771	2.614	-6.7318	9.18
Qtrneg	76	3.461	1.536	0	5.00
vaccrate	76	0.495	0.220	0.007	0.84
Deathr	76	0.001	0.001	0	0.00
Caser	76	0.063	0.046	0	0.16
stimgdp	75	12.648	9.986	0	46.15
Health	73	1.629	1.959	0	14.59
nonhealth	73	6.122	5.023	0	22.21
accspend	46	1.564	2.436	0	13.68
belowline	50	1.086	1.888	0	12.11
guarantees	60	4.593	6.157	0	35.06
quasifiscal	21	2.531	5.511	0	25.41

Regressions

Table 3: Dependent variable: Average Real Quarterly Growth in 2021

	gr2021	**gr2021**	
lstring	-0.0198 (0.000)	-.0189 (0.000)	A one percent improvement in the stringency index ranking (decline) leads to about a 0.02 percent rise in quarterly real growth
lstimgdp	0.0597 (0.002)	0.0186 (0.005)	A one percent increase in covid19 fiscal stimulus leads to a 0.019 to 0.06 percent increase in quarterly real growth
lstimgdpsq	-0.0123 (0.008)		Beyond a certain level of covid19 stimulus, additional growth declines
lvaccrate	0.0221 (0.019)		A one percent increase in the vaccination rate leads to a 0.02 percent increase in quarterly real growth
Africa	0.1180 (0.001)		African country dummy increases growth
Constant	0.0982 (0.001)	-0.442 (0.000)	
R2	0.3968	0.2421	
Adj R2	0.35	0.2198	
Obs	71	71	

Table 4: Dependent variable: Average Real Quarterly Growth from 2020-2021 (the pandemic period)

	avlogdiffrgdp	
lcaser	-0.0145 (0.003)	A one percent increase in covid19 case rates leads to a 0.015 percent reduction in average real GDP growth during the pandemic
lhealth1	0.0149 (0.097)	A one percent increase in health sector spending leads to a 0.015 percent increase in average real GDP growth during the pandemic
Cons	-0.057 (0.002)	
R2	0.1363	
Adj R2	0.1102	
Obs	69	

Table 5: Dependent variable: Duration of covid-induced recessions

	Lqtrneg	
lcaser	0.1482 (0.000)	A one percent increase in covid19 case rates leads to a 0.15 percent increase in quarters of recession during the pandemic period
lstringavghicome	0.0486 (0.045)	Increases in the stringency index as incomes increase leads to a 0.05 percent increase in quarters of recession during the pandemic period
lvaccrateasia	-0.3786 (0.017)	Increases in the vaccination rate in Asian countries leads to a 0.38 percent reduction in quarters of

		recession during the pandemic period
Cons	1.644 (0.000)	
R2	0.3193	
Adj R2	0.2869	
Obs	67	