UPDATE – December 15, 2020

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The Brookings Papers of Economic Activity (BPEA) Conference draft was based on data up to June 20, 2020. The version that is forthcoming in the BPEA was updated to include data up to July 15, 2020. Given that COVID-19 has not played out yet, and that it is continuing to take lives across the world, this note provides an update based on data up to December 15, 2020.

The cross-country patterns are remarkably stable. The first two figures update Figure 2 and Figure 3 of the original draft. We still find a strong positive correlation between COVID-19 deaths per million and GDP per capita. Higher-income countries fare the worst, followed by upper-middle-income countries (excluding China). In contrast, lower-middle-income countries and low-income countries have experienced lower deaths per million. Both the size of the differences and the striking differences in the trajectories of the death toll across countries, as evident in the curves of Figure 2, suggest that the cross-country differences cannot be attributed to measurement error alone. Instead, they are indicative of differences in susceptibility as well as infection patterns across countries. For a detailed discussion see the published paper as well as the discussion by Michael Kremer.

The next two tables (as well as the tables in the published version) provide insight into potential drivers of cross-country differences. As with the figures, the patterns in Table 2 proved remarkably robust relative to the original version of the paper. We again find that three variables, i.e., age, obesity, and population density, explain a significant fraction of the COVID-19 deaths. Depending on the specification, we also find evidence that policy, specifically early action, may have contained the death toll, though the associated results are less robust to the specification of the regression.

Finally, in this note, we provide an alternative version of Table 2, in which we do not control for the time that has elapsed since the first death was recorded. In the original BPEA draft, we included this variable in the regressions to account for the mechanical effect of death accumulation: countries that were hit by COVID-19 earlier had mechanically accumulated more deaths by June. However, given that by December 2020, eleven months have elapsed since the emergence of COVID-19 and that many countries have experienced second waves, controlling for this mechanical effect is less justified. The alternate version of Table 2 produces similar patterns to its original version, revealing the important role of age, obesity, and population density. However, we now find a more robust role for policy, i.e., the variable “days before first death that action is taken” is now negative and significant in most specifications.

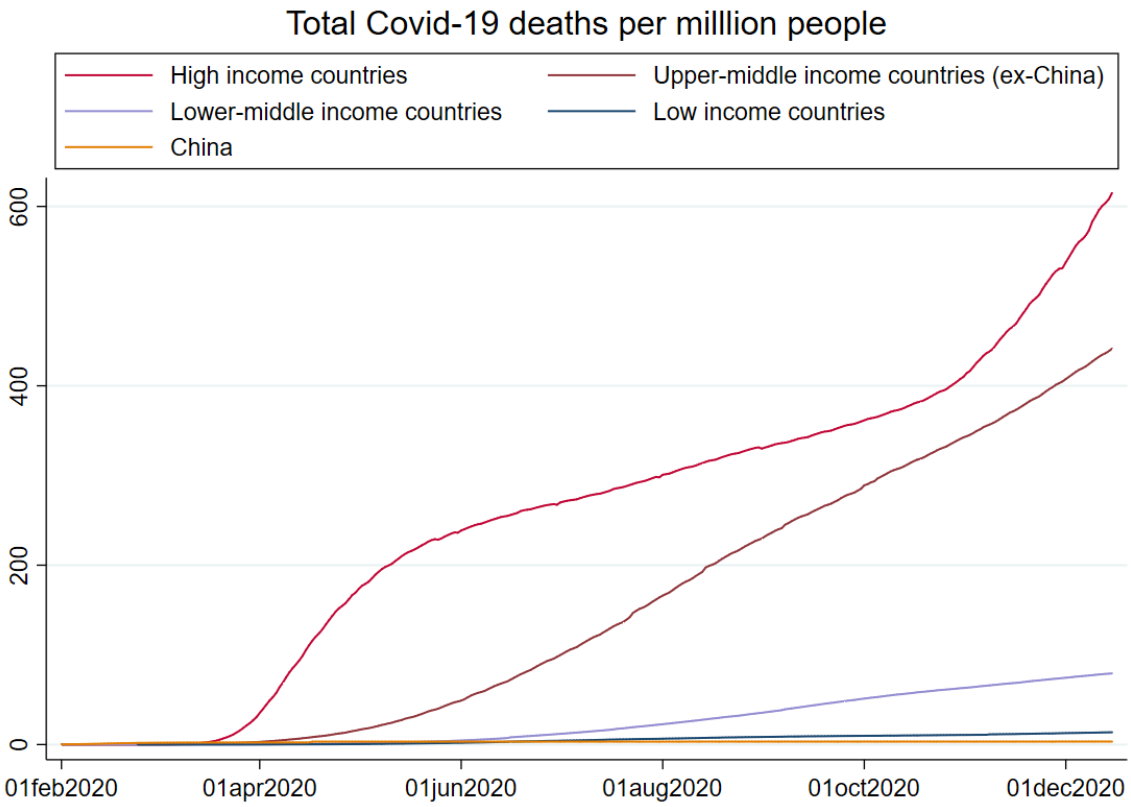

Figure 2, updated 12/15/2020: Reported Covid-19 deaths per capita have been concentrated in high income and upper-middle-income countries

Source: Our World in Data

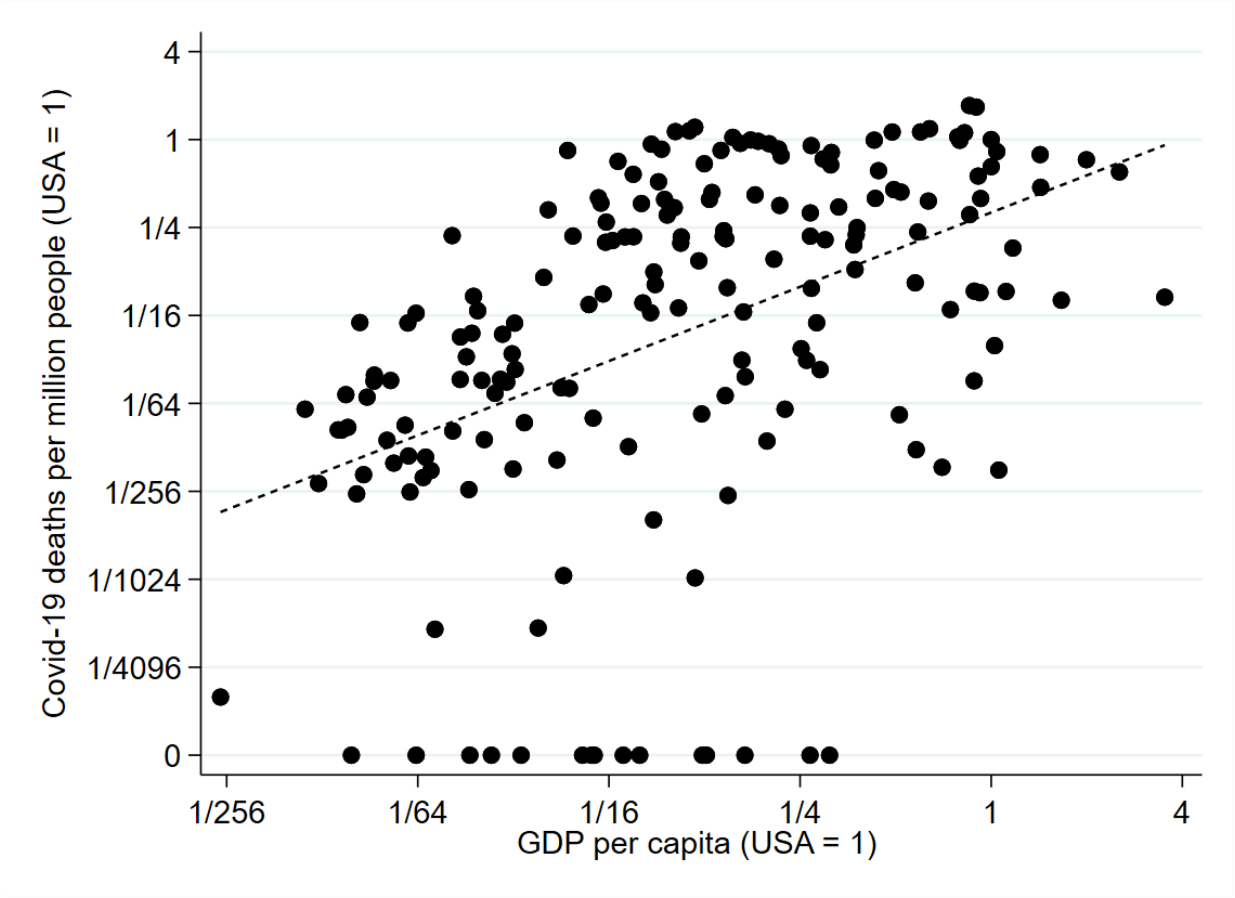

Figure 3, updated 12/15/2020: National income and Covid-19 deaths per million are positively correlated

Sources: Our World in Data. World Development Indicators
Notes: Ordinary least squares fit shown as dashed line

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Ln(real GDP per capita)	0.845***	0.600***	-0.018	0.632***	0.486***	-0.095	0.008	-0.332	0.030	-0.537
	(0.095)	(0.079)	(0.135)	(0.084)	(0.104)	(0.142)	(0.164)	(0.236)	(0.151)	(0.342)
Square root of time since first death (=0 if no deaths)		0.426***	0.420***	0.328***	0.310	0.395***	0.383***	0.568**	0.371***	0.718***
		(0.015)	(0.024)	(0.079)	(0.277)	(0.081)	(0.080)	(0.267)	(0.077)	(0.172)
Population over age 70 (%)			0.113***			0.127***	0.138***	0.131***	0.078*	0.279***
			(0.028)			(0.029)	(0.031)	(0.037)	(0.040)	(0.095)
Obesity prevalence (% of adults)			0.093***			0.110***	0.119***	0.118***	0.115***	0.216***
			(0.018)			(0.018)	(0.018)	(0.024)	(0.018)	(0.042)
Days before first death that action is taken				-0.005	-0.004	0.000	0.001	0.005	0.001	0.023*
				(0.005)	(0.006)	(0.005)	(0.005)	(0.006)	(0.005)	(0.012)
Containment and health response 4 weeks after first death (0-100)					0.024*					
					(0.013)					
Workplace mobility decline 4 weeks after first death (%)					-0.045***					
					(0.010)					
Public transit mobility decline 4 weeks after first death (%)					0.022					
					(0.013)					
Ln(Population density in largest urban center)							0.805***	0.947**	0.898***	2.132***
							(0.285)	(0.385)	(0.301)	(0.604)
Ln(Covid-19 tests per 1,000 people)								0.269		
								(0.177)		
Contact tracing comprehensiveness index (0-2)								-0.118		
								(0.185)		
Feb. precipitation (mm/day)									0.138*	0.264
									(0.073)	(0.170)
Mar. precipitation (mm/day)									0.055	-0.094
									(0.078)	(0.265)
Apr. precipitation (mm/day)									-0.229**	-0.719***
									(0.094)	(0.182)
May precipitation (mm/day)									0.162***	0.405***
									(0.059)	(0.111)
Distance to equator (degrees latitude)									0.026**	-0.040
									(0.012)	(0.027)
Constant	-3.558***	-7.724***	-4.684***	-6.205***	-6.879	-4.086***	-12.022***	-14.306***	-13.495***	-26.780***
	(0.865)	(0.656)	(0.953)	(1.677)	(4.460)	(1.480)	(3.434)	(5.267)	(3.592)	(7.600)
Adjusted R-squared	0.203	0.690	0.731	0.646	0.446	0.725	0.696	0.547	0.721	0.607
Number of Observations	184	184	168	164	119	154	151	98	151	151
Population Weighted	No	No	No	No	No	No	No	No	No	Yes

Table 2, Updated 12/15/2020

Notes: Standard errors are robust to heteroskedasticity. ***p<0.01, **p<0.05, *p<0.1.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Ln(real GDP per capita)	0.845***	0.154	0.689***	0.541***	0.056	0.155	-0.169	0.177	-0.137
	(0.095)	(0.214)	(0.088)	(0.099)	(0.131)	(0.151)	(0.222)	(0.141)	(0.363)
Population over age 70 (%)		0.164***			0.107***	0.117***	0.138***	0.055	0.225**
		(0.035)			(0.029)	(0.030)	(0.038)	(0.040)	(0.101)
Obesity prevalence (% of adults)		0.090**			0.103***	0.113***	0.115***	0.110***	0.186***
		(0.039)			(0.018)	(0.018)	(0.025)	(0.018)	(0.043)
Days before first death that action is taken			-0.023***	-0.010**	-0.020***	-0.018***	-0.006	-0.017***	-0.003
			(0.002)	(0.004)	(0.002)	(0.002)	(0.006)	(0.003)	(0.008)
Containment and health response 4 weeks after first death (0-100)				0.027**					
				(0.013)					
Workplace mobility decline 4 weeks after first death (%)				-0.048***					
				(0.011)					
Public transit mobility decline 4 weeks after first death (%)				0.022*					
				(0.013)					
Ln(Population density in largest urban center)						0.748**	1.155***	0.855***	2.330***
						(0.307)	(0.390)	(0.322)	(0.632)
Ln(Covid-19 tests per 1,000 people)							0.256		
							(0.182)		
Contact tracing comprehensiveness index (0-2)							-0.085		
							(0.202)		
Feb. precipitation (mm/day)								0.136*	0.220
								(0.071)	(0.182)
Mar. precipitation (mm/day)								0.067	-0.069
								(0.082)	(0.279)
Apr. precipitation (mm/day)								-0.221**	-0.630***
								(0.103)	(0.190)
May precipitation (mm/day)								0.168**	0.383***
								(0.066)	(0.117)
Distance to equator (degrees latitude)								0.027**	-0.030
								(0.013)	(0.030)
Constant	-3.558***	-0.083	-0.603	-2.286*	2.213**	-5.482	-7.767*	-7.404**	-18.496***
	(0.865)	(1.272)	(0.824)	(1.364)	(0.916)	(3.391)	(4.246)	(3.658)	(6.551)
Adjusted R-squared	0.203	0.321	0.615	0.444	0.679	0.652	0.521	0.678	0.555
Number of Observations	184	168	164	119	154	151	98	151	151
Population Weighted	No	No	No	No	No	No	No	No	Yes

Table 2, updated 12/15/2020, not including (the square root of) days since first death

Notes*:* Standard errors are robust to heteroskedasticity. ***p<0.01, **p<0.05, *p<0.01