The Impact of Covid19
on
the Urban-Rural Happiness

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abstract:

People tend to be less happy in cities than in rural areas, the so called "urban-rural happiness gradient." The recent covid19 pandemic allows us to explore one of the disadvantages of large and dense cities: the faster spread of infectious diseases. Using the World Values Survey, we find a large differential, or effect size, pre v during pandemic for cities versus smaller areas—cities became two times less happy during the pandemic versus pre-pandemic compared to smaller areas. In absolute terms, while .2 to .5 difference on a 1-10 SWB scale is not large, given the massive scale of urbanization, the practical effect in the population is large. As in any non-experimental research, causality may not be present. The results from Great Britain, the Netherlands, and Uruguay studied here may not generalize to other countries, especially ones with much different covid19 rates, policy responses, and urbanization patterns.

Here is the great city: here have you nothing to seek and everything to lose. (Nietzsche)

1 Introduction

Covid19 has changed our way of life (Olasov et al. 2022). Pre-pandemic there was city renewal, rebirth, and urban triumphalism. Just a few years back, Ed Glaeser wrote a bestselling book titled, "Triumph of the City" (Peck 2016). The pandemic, however, brought urban scepticism and scare. Many cities were hollowed out in important ways—commercially (e.g., offices, restaurants, stores) and residentially (many urbanites fled urban centers to less dense areas, particularly the suburbs) (Nixey 2020). Pundits now wonder if the "golden era for large cities' might be turning into an 'urban doom loop" (Edsall 2023b, Robbins 2021).

The covid19 pandemic exposed urban-rural differences. A person's chance of getting the virus and surviving it was closely associated to their zipcode (Chen and Krieger 2021). Urban areas were the epicenters of the virus outbreak: the dense population and inevitable close proximity to others, a defining feature of cities, resulted in rapid transmission and a fertile ground for infection. One of the disadvantages of city life is the increased spread of infectious disease[1] (Bettencourt et al. 2010, 2007). The transmission of infectious disease is a social contact process. Urbanization increases the conditions and statistical likelihood that microbes are being spread, which has resulted in a tripling of the total number of disease outbreaks per decade since the 1980s (Ali and Keil 2011, Haggett 1994, Connolly et al. 2021). Although the scale of covid19 was unparalleled, major infectious disease outbreaks in the past, e.g., SARS and Ebola, occurred in urbanising hinterlands and quickly spread to metropolitan areas (Keil and Ali 2007). Rural areas, in contrast, given their low population density and geographic isolation, provide a natural social distancing environment that slows the spread of infectious viruses. As such, covid19 affected cities more than smaller areas (Stier et al. 2021).

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[1]See for example, "SIR Models for Spread of Disease" (Newman 2002, Cooper et al. 2020).

In the present study, we take a development perspective using a measure of human development, progress, or flourishing: subjective wellbeing (SWB). Our hypothesis is that since cities suffer disproportionately from infectious diseases, city happiness decreased disproportionately during the covid19 pandemic.

We start with a brief discussion of the urban-rural happiness gradient, point to gaps in the literature, and reflect on how covid19 impacted different aspects of life in urban versus rural areas. In data section we focus on the sample selection from World Values Surves down to: United Kingdom, the Netherlands, and Uruguay–the countries that are severely affected by the pandemic (infections and deaths) and with substantial samples available pre and during the pandemic for cities and smaller areas. The analysis of the data follows and we conclude with a discussion of the results and limitations/directions for future research.

2 Urban-Rural Happiness

The urban-rural happiness gradient states, generally, that happiness raises from its lowest in largest cities to its highest levels in smallest places, little towns, villages, and open country. Often the gradient is simplified as a gap that exists between the extremes, i.e., large cities versus rural areas. Urban unhappiness is common (Okulicz-Kozaryn and Valente 2021, Senior 2006, Lenzi and Perucca 2016, Morrison 2015, Morrison and Weckroth 2017, Sorensen 2020, Sørensen 2014). Recent studies added nuance: Lenzi and Perucca (2020), Morrison (2021), Okulicz-Kozaryn and Valente (2018), Carlsen and Leknes (2022, 2019), Lenzi and Perucca (2022). As a corollary, exposure to nature, the opposite of urbanicity, is related to happiness (Pretty 2012, Frumkin 2001, Tesson 2013, Maller et al. 2006, Berman et al. 2012).

Easterlin and O'Connor (2023) points out that only a few studies examine the effect of covid19 on SWB. Easterlin and O'Connor (2023) do an overall analysis for Europe, but miss the urban-rural differential. Thus, this is the first study on this topic.

Health is one of the strongest predictors of SWB, if not the strongest—decent health is clearly necessary for SWB (e.g., Campbell et al. 1976) and therefore, expected to be strongly linked with SWB. During pandemics, city inhabitants suffer disproportionately in terms of health because cities are hotbeds of infectious disease—infections and contamination are promoted by proximity and close contact between humans—by definition, cities offer the most fertile ground for infectious diseases to spread. Pandemics by overwhelming urban healthcare deteriorate urban health in general and beyond pandemic-related illness, for instance healthcare is less available for cardioviscular disease and cancer treatment.

There are detailed data for the geography of the covid19 pandemic in the US, and other countries likely followed a similar pattern—large central metropolitan areas were the most affected compared to fringe metros and medium cities (Curtin and Heron 2022). The covid19 urban disadvantage at the beginning of the pandemic translated to almost 2x more incidences of the disease and almost 3x more mortality in urban areas compared to rural areas. Then, the rates converged, and towards the end of the pandemic, cities recovered while rural areas had higher rates (Cuadros et al. 2021). Still, the urban (not rural) scare remains[2] as cities are hit first by pandemics, and proximity to others astronomically increase the chance of infection and death.

It is important to underscore that the infection rates are reported per capita, for example, per 100,000 population. If it was reported per area, say square kilometers (sq km), i.e., how much disease incidence is recorded in a particular area, the urban disadvantage would have been astronomical during a pandemic. For instance in New York City, the population density is about 11k/sq km, whereas in Montana it is about 3/sq km, about a 3600x difference. Urban density not only increases the risk of infection and the spread of infectious diseases (Bettencourt and West 2010), but it also increases the need for social distancing—which in itself (regardless of a pandemic) has a negative effect on SWB by causing psychological distress (Khan et al. 2021).

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[2]This is a speculation, of course, and future research is needed. However, pundits and scholars are starting to discuss how the era of "urban supremacy" might be over and the covid19 pandemic was a catalysis for this phenomenon, see for example Edsall (2023a).

3 Data And Sample Selection

We use the World Values Survey (WVS) 7-wave (1981-2022) cumulative file freely available at: `worldvaluessurvey.org`. The WVS is representative of countries, typically with country-wave samples of over 1k. The key variables are urbanicity and happiness—variable descriptions and distributions, including control variables, are in the online appendix **for peer review appended at the end**.

The rate of covid19 infection increased later in 2020, peaked in 2021 and again in 2022 (see online appendix for covid19 data from `coronavirus.jhu.edu/region`). Hence, the covid19 period sample is 2021 and 2022.

The WVS data in 2021 are only available for: Armenia, Kenya, Maldives, Morocco, and Venezuela. We drop Armenia, Kenya, and Maldives. Armenia's pre-pandemic sample for large city is only 4 respondents. Kenya was only observed in one time period in WVS, 2021. The Maldives is a small island without an urban-rural gradient.

Morocco, a country of 37 million people, seem to have been largely spared from the pandemic: only 1.2m cases (3%) and 16k deaths. Venezuela is a dictatorship largely cut off from the world and might have been protected from covid19 due to its isolation (or perhaps the statistics are tampered with)—despite having about 30 million people in its population, there were only .5m cases (2%) and 5k deaths, compared to neighboring Colombia with a population of 50m with more than 10x the number of cases, 6.3m, and 142k deaths. All cases and deaths data are from `coronavirus.jhu.edu/region`. We examine Morocco and Venezuela further in the online appendix.

In 2022 WVS sampled: Czechia, Libya, Netherlands, Northern Ireland, Slovakia, United Kingdom, and Uruguay. We dropped: Czechia—no city with a population > 500k before 2022 sampled; Libya—only 7 respondents in cities > 500k before 2022; Northern Ireland—data for one wave only; and Slovakia—only 61 respondents in cities > 500k pre-2022. Which leaves us with: the United Kingdom (GBR) with 25m cases out 67m population (37%) and 221k deaths, the Netherlands (NLD) with 8.7m cases out of 18m population (48%) and 24k deaths, and Uruguay (URY) with 1m cases out of 3.4m population (30%) and 7k deaths. In the online appendix we discuss policy responses by country.

4 Results

We start with bar graphs in Figure 1. Each panel shows results for a separate country: United Kingdom (GBR), the Netherlands (NLD), and Uruguay (URY). The Y axis is life satisfaction, and the X axis is the rural-urban gradient, degrees of urbanicity. The blue bars show pre-pandemic averages (year varies by country; the latest available), and the green bars show pandemic averages (2022).

The focus here is on the differential from the bar graphs for cities (>.5m) before and during the pandemic (the last two bars in each country panel). The baseline for urbanicity is smaller areas (all other bars, <.5m).
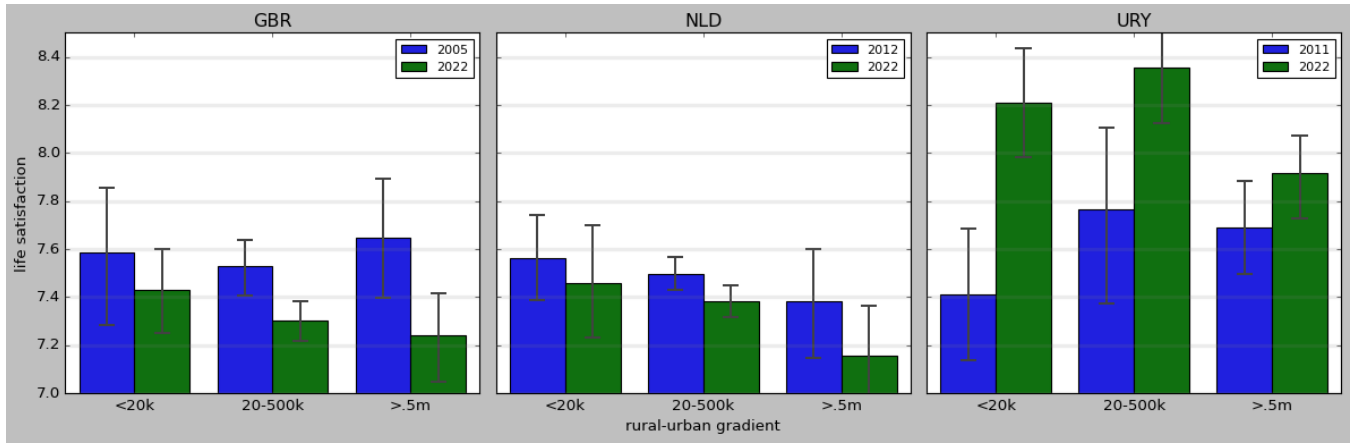
Figure 1: Life satisfaction ($1 = unhappy$ to $10 = happy$) means with 95% CI against rural urban gradient categories. $GBR = $ United Kingdom, $NLD = $ Netherlands, $URY = $ Uruguay.

In both the United Kingdom (GBR) and the Netherlands (NLD), the biggest difference pre-during pandemic (blue v green bar) is for the largest places ($> .5m$). Uruguay (URY), on the other hand, experienced an increase in SWB pre-during pandemic across different urbanicity levels, but the largest places ($> .5m$) increased the least. Thus, across the three countries, we find support for our hypothesis that large cities' happiness suffered disproportionately during the pandemic. Next, we repeat the bar graphs, but with more detailed urban-rural classification to explore nuances in Figure 2.
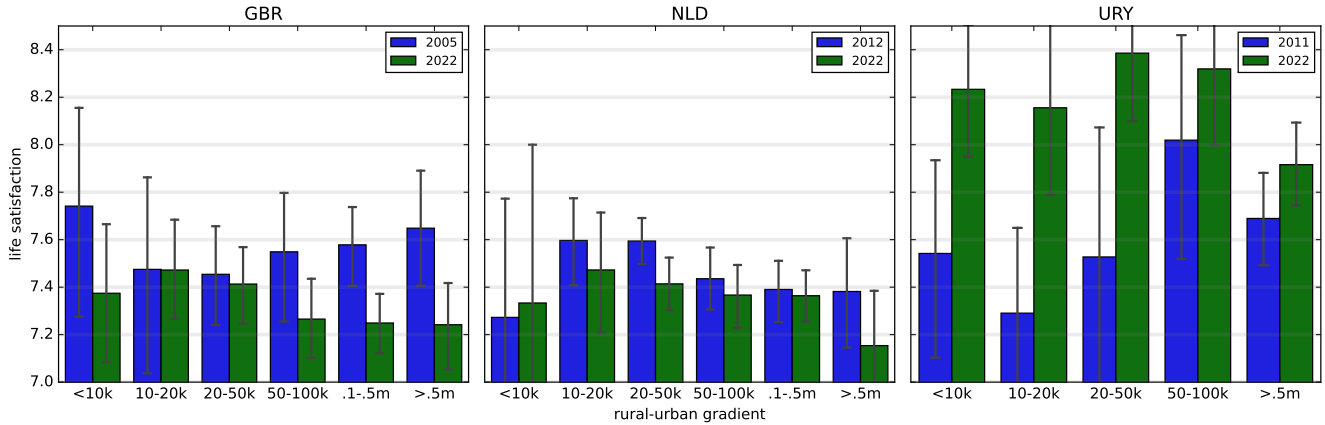
Figure 2: Life satisfaction ($1 = unhappy$ to $10 = happy$) means with 95% CI against rural urban gradient categories. $GBR = $ United Kingdom, $NLD = $ Netherlands, $URY = $ Uruguay. Note: URY is missing .1-.5m category due to small cell sizes.

In the United Kingdom, pre-pandemic, the happiest places were the smallest ($< 10k$), while during the pandemic, both the smallest and largest places were most affected and saw significant reduction in SWB. It is unexpected to see this reduction in the smallest places, and the result could be due to some country specific factors (also note large confidence intervals).

In the Netherlands, there's not much change in SWB in the smaller places pre v during the pandemic, except for the largest cities where there's a larger drop in SWB as expected. There was also a smaller drop in places with 10-20k, and especially in the 20-50k categories.

Uruguay, a developing country, shows a different story: SWB increased across urbanicity, including the largest areas ($>.5m$), but that's also where the smallest increase occurred, as expected. Many of the CI are wide, and so even large mean differences may not be statistically significant. Next, we test the differences with OLS regression.[3] First, since the focus is on cities versus smaller areas (rural and towns), for simplicity, we collapsed all categories $<.5m$ into one, as rural and towns, and contrast it with cities ($>.5m$).

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[3]The usual argument in favor of OLS over categorical models is repeated in the online appendix. And a set of control variables is also motivated.

There are also two technical reasons for such a binary gap approach versus using the original gradient in the bar charts. It is a simpler exposition to have an urban dichotomy as opposed to a gradient, given that we also have two other breakdowns: pre-during COVID, and by country. And, critically, the cell sizes run small with too many breakdowns for this relatively small dataset. When more data becomes available, future research should test the full urban-rural gradient.

Our hypothesis is that while the pandemic decreased SWB in general, we expect to see an even greater SWB decrease in cities. We are focused on the pre-during pandemic differences in SWB levels in city ($> .5m$) versus smaller areas ($< .5m$).

The bivariate regression results are in Table 1. We first separate our analyses by country[4] and then within each country by rural and towns ($< .5m$) versus cities ($> .5m$). We regress life satisfaction on a year dummy for 2022 with the base case being the latest pre-pandemic wave as shown in Figures 1 and 2.

	GBR		NLD		URY	
	$< .5m$	$> .5m$	$< .5m$	$> .5m$	URYrurTow	$> .5m$
2022	-0.21**	-0.41**	-0.12**	-0.23	0.75***	0.23+
constant	7.54***	7.65***	7.50***	7.38***	7.54***	7.69***
N	3111	521	3572	373	1154	836
adj R2	0.003	0.008	0.002	0.002	0.036	0.002
+ 0.10 * 0.05 ** 0.01 *** 0.001; robust std err						

Table 1: OLS regressions of life satisfaction on pandemic dummy ("2022") only. WVS country samples split by rural and towns ($< .5m$) v cities ($> .5m$).

The effect sizes on the year 2022 dummy are the bar length differences from Fig 1 or 2 for cities ($> .5m$) and the average bar lengths for smaller areas now collapsed as ($< .5m$). For GBR the difference pre-during pandemic is about .2 for rural areas and towns ($< .5m$), and the difference for cities ($> .5m$) is about .4, and so forth for the NLD and URY. A remarkable finding in our analysis is the roughly 2 times difference for GBR (.2 v .4) and NLD (.1 v .2) , and 3 times difference for URY (.7 v .2)—this is a strong differential. When comparing cities ($> .5m$) versus smaller areas ($< .5m$), cities became 2 to 3 times less happy during the pandemic compared to pre-pandemic levels.

Still, one of the coefficients for the NLD is not significant, and only weakly significant for URY, and there is left out variable bias. Differences in SWB levels should be even bigger when controlling for SWB predictors as the urban rural happiness gradient often emerges only after controlling for SWB predictors (Okulicz-Kozaryn and Valente 2021). Hence, we elaborate our models with SWB predictors in Table 2.

	GBR		NLD		URY	
	$< .5m$	$> .5m$	$< .5m$	$> .5m$	URYrurTow	$> .5m$
2022	-0.18*	-0.39+	-0.20***	-0.45**	0.42***	0.21
income	0.09***	0.01	0.06***	0.14***	0.07*	0.13***
age	-0.03*	-0.08**	-0.02+	-0.06+	0.00	-0.06**
age2	0.00**	0.00**	0.00**	0.00*	-0.00	0.00**
male	-0.18**	-0.13	-0.11*	-0.27+	0.06	0.19
married or living together as married	0.53***	0.74***	0.44***	0.23	0.46**	0.06
divorced/separated/widowed	0.07	0.15	-0.11	-0.14	-0.37+	-0.19
autonomy	-0.11*	-0.07	-0.11**	-0.01	-0.06	0.06
freedom	0.44***	0.42***	0.35***	0.43***	0.43***	0.36***
trust	0.12+	0.42**	0.43***	0.28+	-0.05	0.10
postmaterialist	-0.05	-0.18	-0.11*	0.14	-0.02	0.15
god important	0.01	0.05*	0.02*	-0.01	0.05**	0.06**
constant	4.08***	5.95***	4.59***	4.80***	3.47***	4.58***
N	1985	309	2283	237	736	579
adj R2	0.321	0.313	0.279	0.398	0.276	0.201
+ 0.10 * 0.05 ** 0.01 *** 0.001; robust std err						

Table 2: OLS regressions of life satisfaction: added predictors of life satisfaction. WVS country samples split by rural and towns ($< .5m$) v cities ($> .5m$).

The elaborated models in Table 2 mostly confirm our earlier results. We find that there's again roughly a 2 times difference for GBR and the NLD, while for URY the differential is reduced from about 3 times to roughly 2 times as well.

As a robustness check we add "health" as a control variable in Table 3. It is important to underscore that there's a confounding effect between pre-during covid19 and health by definition. And there will also be confounding effects between urbanicity and health

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[4]One reason to split by country is that countries are diverse, and pooling them together introduces much heterogeneity, hence, we first proceed country-by-country, and only then introduce a pooled model.

since covid19 is more prevalent (at least in initial phase) in cities as previously discussed. Hence, these regressions are less useful in determining pre-during difference, and the coefficients are smaller and less significant, as expected. Remarkably though, we find that the urbanicity differentials, even though less statistically significant, are still about 2 times larger for GBR and URY and even stronger for the NLD.

	GBR		NLD		URY	
	$< .5m$	$> .5m$	$< .5m$	$> .5m$	URYrurTow	$> .5m$
2022	-0.12	-0.26	-0.06	-0.24+	0.44***	0.23
health	0.48***	0.67***	0.62***	0.77***	0.56***	0.32**
income	0.05**	-0.01	0.04***	0.08**	0.05	0.12***
age	-0.02*	-0.07*	-0.01	-0.03	0.01	-0.05*
age2	0.00**	0.00**	0.00**	0.00+	-0.00	0.00*
male	-0.16*	-0.15	-0.09+	-0.23+	-0.01	0.14
married or living together as married	0.49***	0.60**	0.38***	0.21	0.41**	0.04
divorced/separated/widowed	0.05	0.20	-0.15	-0.27	-0.36+	-0.16
autonomy	-0.12**	-0.09	-0.10**	0.07	-0.09	0.04
freedom	0.38***	0.29***	0.29***	0.31***	0.40***	0.35***
trust	0.07	0.28*	0.34***	0.21	-0.07	0.01
postmaterialist	-0.05	-0.26+	-0.09*	0.06	0.01	0.12
god important	0.01	0.02	0.02+	0.00	0.05**	0.06**
constant	2.72***	4.29***	2.46***	2.01*	1.31+	3.31***
N	1985	309	2279	236	736	578
adj R2	0.379	0.416	0.371	0.527	0.320	0.216
+ 0.10 * 0.05 ** 0.01 *** 0.001; robust std err						

Table 3: OLS regressions of life satisfaction: added "health." WVS country samples split by rural and towns ($< .5m$) v cities ($> .5m$).

In the online appendix we do not split by urban/rural but instead we add a urban/rural dummy and interaction with the pandemic dummy—the interaction is statistically insignificant, i.e., the pandemic differential urban v rural effect is not statistically significant if split by country. However, if the urbanicity variable is not collapsed into the binary urban-rural, but left as several categories, the differences for the Great Britain and Uruguay are statistically significant. Finally, we pool data for the three countries together in Table 4.

	a1	a2	a3	a4	a5
pandemic	-0.20**	-0.13+	-0.10	-0.02	-0.18*
city lg500k	0.05	0.19*	0.20*	0.11	0.07
pandemic × city lg500k	-0.26*	-0.26*	-0.26*	-0.21+	-0.15
United Kingdom	-0.04	0.03	0.08	-0.01	-0.04
Uruguay	0.82***	0.92***	0.95***	0.68***	0.43***
2005	0.00	0.00	0.00	0.00	0.00
2011	-0.82***	-0.72***	-0.54***	-0.47***	-0.44***
2012	-0.10	0.15+	0.11	0.02	0.05
income		0.14***	0.13***	0.08***	0.08***
age		-0.05***	-0.04***	-0.03***	-0.03***
age2		0.00***	0.00***	0.00***	0.00***
male		-0.16***	-0.17***	-0.16***	-0.11**
married or living together as married		0.46***	0.46***	0.39***	0.44***
divorced/separated/widowed		0.01	0.01	-0.03	-0.07
god important			0.03***	0.03***	0.02***
trust			0.38***	0.25***	0.26***
postmaterialist			-0.04	-0.05+	-0.04
autonomy			-0.10***	-0.10***	-0.09***
health				0.71***	
freedom					0.40***
constant	7.58***	7.42***	7.14***	4.40***	4.47***
N	9196	7746	6038	6032	5970
adj R2	0.020	0.094	0.113	0.230	0.291
+ 0.10 * 0.05 ** 0.01 *** 0.001; robust std err					

Table 4: OLS regressions of life satisfaction. Country-wave pooled models.

We start with a basic model where we regress life satisfaction on a dummy for the largest cities, and during-pandemic wave dummy where "pandemic" $= 1$ if $year = 2022$. We also include country dummies, as we now pull all the data together. We also include year dummies in addition to pandemic dummy since data were collected in different countries in different years.

In column a1, as expected, during the pandemic SWB went down by -.2, and especially so for cities by an additional -.26. When adding basic controls in model a2, "pandemic∗city lg 500k" stays about the same at -.26. We include an extended list of controls in model a3, and again the coefficient stays at -.26. It is only after adding "health" in model a4 that the coefficient slightly drops to -.21.

The addition of freedom in model a5 cuts the effect most substantially to -.15 and loses statistical significance. The freedom variable comes from the following survey item: "Some people feel they have completely free choice and control over their lives, while other people feel that what they do has no real effect on what happens to them. Please use this scale where 1 means 'none at all'

and 10 means 'a great deal' to indicate how much freedom of choice and control you feel you have over the way your life turns out." A rationale to look at freedom is that it confounds with city; i.e., cities have more freedom than rural areas at least in some senses. The idea goes back at least to Ferdinand Toennies' "Gemeinschaft und Gesellschaft" (Tönnies [1887] 2002)–city air is free–e.g., nonstandard/nonconformist people, such as LGBTQ, are more free in an urban area.

The WVS freedom variable also measures control over one's life. Clearly, during the covid19 pandemic, city residents, all things equal, would have felt a greater loss of control over their lives since they were more exposed to being infected. This may explain why 'freedom' removes the effect of the interaction variable "pandemic x city lg500k."[5]

5 Conclusion and Discussion

The present study argues that the covid19 pandemic has lowered SWB in large cities. The covid19 pandemic made the economic advantage and prosperity of cities quickly wither away. The pandemic created significant economic turmoil particularly in large urban centers: as businesses and industries shut down, millions lost their jobs, and thousands fled to the suburbs or smaller places, hoping to avoid human interaction and protect themselves against the virus. Places like New York City, that were vibrant and full of life, became dull and empty. Still, as of 2023, much of the commercial real estate in urban cores is empty.

Urban and rural areas experienced and coped with the pandemic very differently. Urban areas became the center of coronavirus outbreaks around the world, and many cities saw their healthcare systems become quickly overwhelmed given the magnitude of the virus—makeshift hospitals and makeshift morgues were set up in urban places like New York City.

There's always a strong correlation between subjective well being and health. Health is the key predictor of happiness—almost no one considers health unimportant (e.g., Campbell et al. 1976). The virus not only made people severely ill, but it prevented people who had any other health emergencies or issues from being properly taken care of (e.g., cancer, heart disease, diabetes). Thus, the number of people who's health was directly or indirectly affected by covid19 is significantly larger then the reported statistics of covid19 infection. This was particularly an issue in large metropolitan areas. Covid19' impact on wellbeing is arguably larger than simply measuring it by incidence, hospitalization, and death counts–e.g., social distancing in itself (regardless of infection) increases psychological distress (Khan et al. 2021). Thus, it is no surprise that our findings show such a significant and relatively large drop in happiness levels in cities as compared to smaller places.

We interpret the impact of Covid-19 broadly, not narrowly focused on disease and mortality only. There is the scare inflicted by such happenings to people in the vicinity. And there are socio-economic consequences of restrictions, such as unemployment. One of the standard arguments for urban advantage is the availability amenities such as commodities, services, and work/career opportunities. The opportunity to take advantage of such amenities is reduced by the restrictions. Such a "bundle view/domain satisfaction view" of life satisfaction is arguably applicable here.[6]

Understanding the urban-rural discrepancies is important because policymakers can implement policies targeted to create a more healthy and livable environment for urban and rural residents based on the different challenges they experience to foster happiness. The spread of infectious disease in cities is unavoidable and will likely happen again in the near future. Learning from the challenges brought by covid19 might result in lifesaving, health and happiness promoting measures.

It is important to highlight that only the initial phase of an infection per capita is greater in cities, then urban versus rural rates converge, and in the last stage, infections are higher in rural areas as cities get hit first and recover first (Cuadros et al. 2021)—at least in the US—and we assume that elsewhere the mechanism will be similar.

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[5]We thank an anonymous reviewer for providing this explanation. Likewise, the anonymous reviewer also points to institutional trust (the more you trust the institution the more you are confident that the COVID-19 situation is handled well by the authorities). Maybe rural residents have higher institutional trust and if so, maybe this could explain their lower loss of happiness. For discussion see Sørensen and Christiansen (2022). Future research could further explore freedom, control, and institutional trust.

[6]We thank an anonymous reviewer for this point.

But there is arguably a strong psychological effect, urban scare, that will also last well beyond the pandemic in the foreseeable future—future research can test it. Likewise, urban quality of life versus rural quality of life even given similar[7] per capita infection is very different—one can easily go about daily life and even enjoy most rural activities in rural areas, while the opposite is true in cities—the urban way of life is unbearable during a pandemic.

The massive difference in population density of urban versus rural needs to be underscored. The disproportionate population density signifies that even if the infection rate were similar across urban-rural areas, the difference in infection rate per sq km would be massive. And this is one key factor behind the urban scare from covid19—the sheer number of infections in one's proximity was astronomical.

The pandemic has brought attention to the many problems of the cities. In many ways, cities cannot be fixed—there is an inherent conflict, dysfunction and even misanthropy in metropolis (Wirth 1938, Fischer 1972, Okulicz-Kozaryn and Valente 2022, Thrift 2005, Amin 2006, Okulicz-Kozaryn 2015, Peck 2016). Others would argue that a city can be fixed and made happier (for a review see Ballas 2013). An useful discussion of directions for change is Olasov et al. (2022)—for instance, to re-imagine cities as places that offer convivial and sensual shared space for shared pleasure, "a mesh of small, safe, intimate places, rather than a series of grand urban projects."

6 Limitations and Future Research

These are the first analyses examining the urban-rural SWB differential during the covid19 pandemic. As such, there are limitations that need to be considered. First, even though population size and density correlate, they are not the same—future research could use density to explore whether these findings are robust. Unfortunately, the WVS only measures urbanicity by population size, and we know that the spread of infectious diseases like covid19 and the subjective "urban scare" are not only due to population size, but also density.

In addition, there may be time effects—covid19 developed differently in different places over time—see covid19 trajectories in the online appendix. We only used 2 periods for each country—before and during the pandemic. Another dataset that has more time points would be useful to test the robustness of these findings.

One potential threat to identification is that slower diffusion of infectious disease to rural areas compared to urban areas may have affected the results. Another threat is omitted variables, although we have strived to mitigate it with multiple specifications including before-after (pre and during pandemic) 2 group (urban v rural) specification, so called difference-in-difference (DID). Also note that study of urbanization is inherntly observational, not experimental (or even quasi-experimental).

As more data becomes available, it will be instructive to closely examine countries that were most affected by covid19. The results from Great Britain, the Netherlands, and Uruguay studied here may not generalize to other countries, especially ones with much different covid19 rates, policy responses and urbanization patters. Italy and the U.S., for example, will probably show much greater negative effects on SWB than what we found in the UK (GBR), the Netherlands (NLD) and Urguguay (URY). Although covid19 infection rates are significantly lower now (in 2023), and another massive pandemic could be decades ahead, we'll likely experience covid19 lingering effects for many years to come. This could arguably include urban scare, prevalence of misanthropolis (a metropolis full of distrust and dislike of humankind) (Okulicz-Kozaryn and Valente 2022), and possibly an urban crisis. It would be useful to study the long term effect on urban-rural happiness gradient/gap and whether covid19 has widened more permanently the urban-rural happiness gap that had been closing prior to the pandemic (Okulicz-Kozaryn and Valente 2018).

This is only the first study on the topic and more research is needed to examine the impact of covid19 on the urban-rural gradient/gap. We are interested in the general and overall patterns we observed here and believe it provides a good starting point for a much needed debate on this topic. Future research can focus on a more direct link between infections, hospitalizations, and

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[7]Assuming similar per capita rates is not illogical: cities experience increased infection rate only initially, but then infection rates in smaller areas rise as cities recover and disease spreads to smaller areas.

deaths and SWB by linking public health data with SWB data for specific locations. Likewise there is a huge difference in infection rates across countries (e.g., Italy, the US, China), and across places within countries. Such differences could be perhaps explored in a natural experiment framework where massively infected area can be matched with a similar area but with low infection rate.

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7   Online Appendix

[note: this section is appended in the manuscript for ease of peer review; it will NOT be a part of the body of the final version of the manuscript, but will be linked from it and available online instead]

7.1   Variable Definitions and Distributions

Table 5: Variable definitions.

| name	description
happiness	"All things considered, how satisfied are you with your life as a whole these days?" 1="dissatisfied" to 10="satisfied"; WVS
place size	"OBSERVATIONS BY THE INTERVIEWER; Code size of town where interview was conducted"
income	"Scale of incomes"
age	age
male	male
married or living together as married	"Are you currently ....(READ OUT AND CODE ONE ONLY) 1 'Married' 2 'Living together as married' 3 'Divorced' 4 'Separated' 5 'Widowed' 6 'Single/Never married' 7 'Divorced, Separated or Widow' 8 'Living apart but steady relation (married,cohabitation)'"
divorced/separated/widowed	"Are you currently ....(READ OUT AND CODE ONE ONLY) 1 'Married' 2 'Living together as married' 3 'Divorced' 4 'Separated' 5 'Widowed' 6 'Single/Never married' 7 'Divorced, Separated or Widow' 8 'Living apart but steady relation (married,cohabitation)'"
autonomy	"Autonomy index"
freedom	"Some people feel they have completely free choice and control over their lives, while other people feel that what they do has no real effect on what happens to them. Please use this scale where 1 means 'none at all' and 10 means 'a great deal' to indicate how much freedom of choice and control you feel you have over the way your life turns out."
health	"State of health (subjective)"
trust	"Most people can be trusted"
postmaterialist	"Post materialist index "
god important	"How important is God in your life? Please use this scale to indicate- 10 means very important and 1 means not at all important."
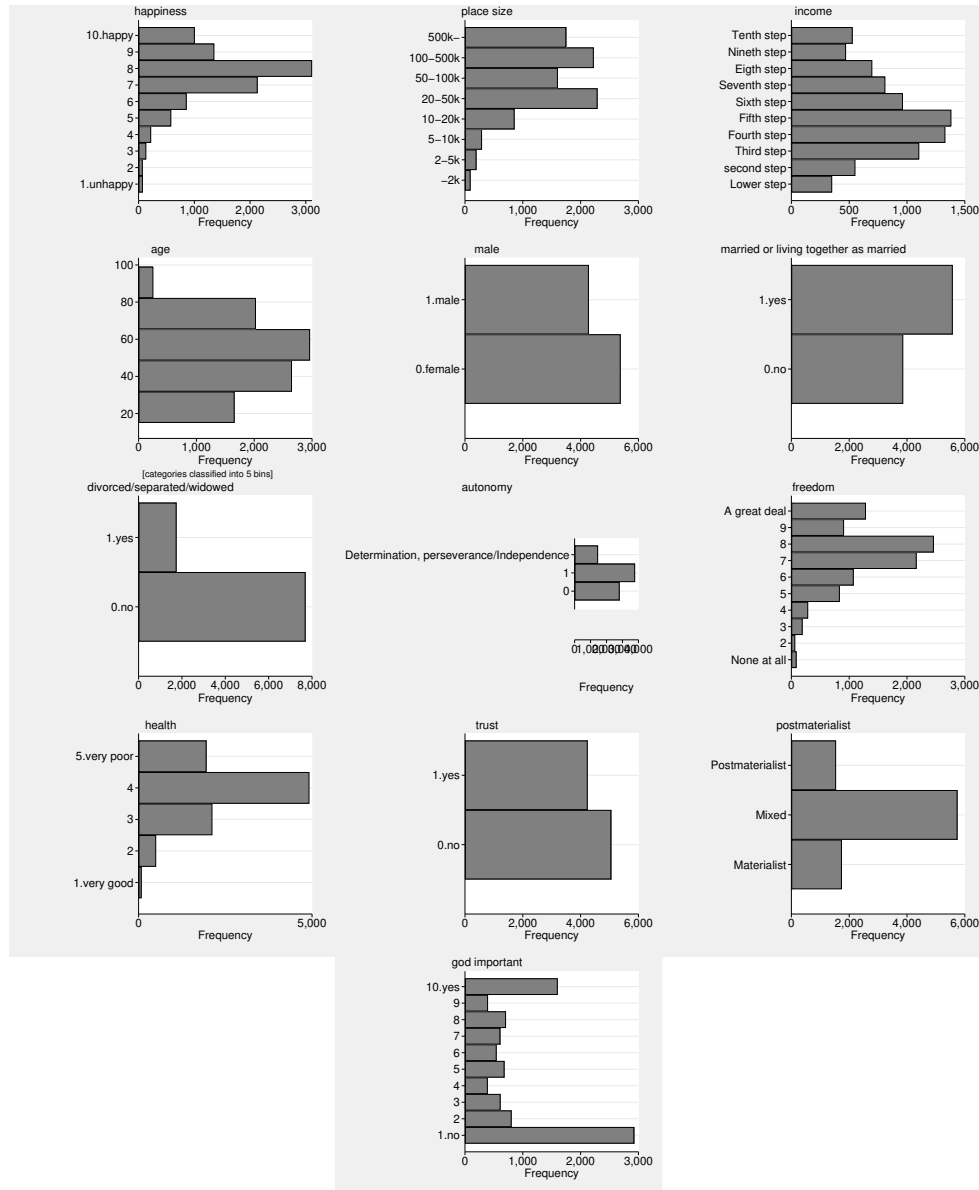
Figure 3: Variables' distribution.

Finally, below detailed distributions aka crosstabs by country and then by urbanicity and wave.

```
. ta X049 yr if cc=="GBR"
ta X049 yr if cc=="GBR"

                  |     Year survey
  Settlement size |     2005      2022 |     Total
------------------+----------------------+----------
       under 2000 |        6        18 |        24
           2-5000 |       18        96 |       114
          5-10000 |       34        92 |       126
         10-20000 |       80       289 |       369
         20-50000 |      264       494 |       758
        50-100000 |      133       419 |       552
       100-500000 |      378       800 |     1,178
     500000 and more |    128       397 |       525
------------------+----------------------+----------
            Total |    1,041     2,605 |     3,646

. ta X049 yr if cc=="NLD"
ta X049 yr if cc=="NLD"

                  |     Year survey
  Settlement size |     2012      2022 |     Total
------------------+----------------------+----------
           2-5000 |        2         2 |         4
          5-10000 |       20        10 |        30
```

13

```
            10-20000 |        187         92 |        279
            20-50000 |        691        647 |      1,338
           50-100000 |        414        465 |        879
          100-500000 |        419        598 |      1,017
      500000 and more |        169        217 |        386
      ----------------+----------------------+----------
               Total |      1,902      2,031 |      3,933

. ta X049 yr if cc=="URY"
ta X049 yr if cc=="URY"

                     |     Year survey
     Settlement size |      2011       2022 |      Total
      ---------------+----------------------+----------
          under 2000 |        11         60 |         71
              2-5000 |        39         40 |         79
             5-10000 |        57         80 |        137
            10-20000 |       118         90 |        208
            20-50000 |        55        140 |        195
           50-100000 |        54        120 |        174
          100-500000 |         1         30 |         31
      500000 and more |       398        440 |        838
      ----------------+----------------------+----------
               Total |       733      1,000 |      1,733
```

7.2   Model and Controls

We use a standard OLS regression with robust standard errors. We treat the 10-step happiness variable as continuous. Ordinal happiness can be treated as a continuous variable (Ferrer-i-Carbonell and Frijters 2004). OLS has become the default method in happiness research (Blanchflower and Oswald 2011). Theoretically, while there is still debate about the cardinality of SWB, there are strong arguments to treat it as a cardinal variable (Ng 1996, 1997).

In the choice of controls, we generally follow Okulicz-Kozaryn and Valente (2021). There are specific controls worth discussing. One great advantage of city living that is often forgotten is freedom, "City air makes men free (Stadt Luft macht frei)" Park et al. ([1925] 1984, p. 12)[8], hence we control for freedom. Health is a key predictor of SWB, and also note that the subjective health measure used here is a reasonable measure of actual health (Subramanian et al. 2009).

More discussion regarding the control choice of freedom is in the paper at the end of the results section.
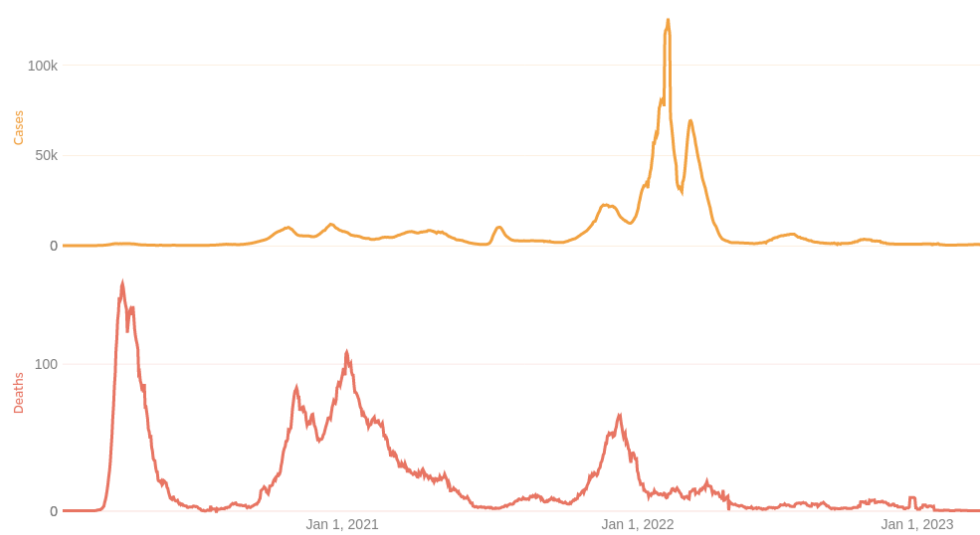
7.3   Covid Trends in GBR, NLD, URY

Ideally, we would like to see trends by settlement size, but these are best and most cross-country consistent data we have found—data from https://coronavirus.jhu.edu/region.
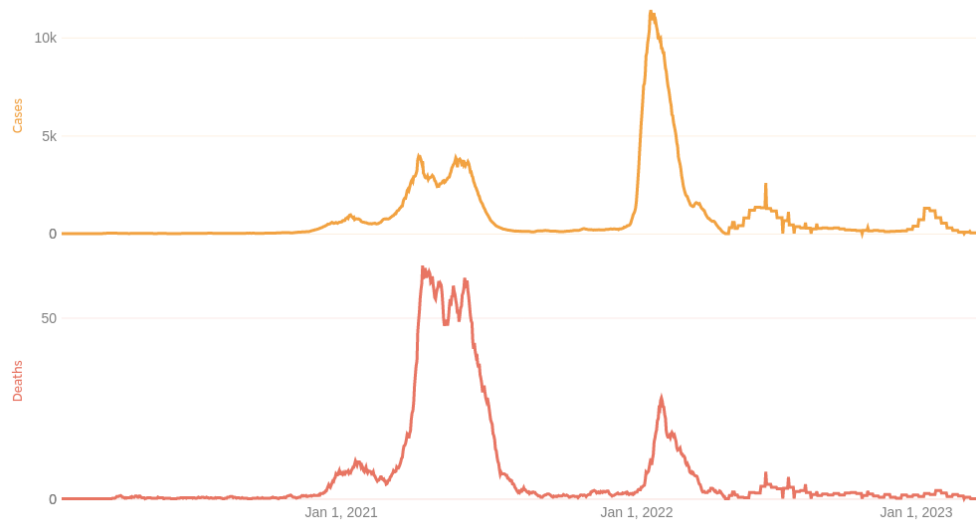
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[8]It originated in the Middle Ages, and it meant freedom from feudalism, non-feudal islands in a sea of feudalism (Harvey 2012).
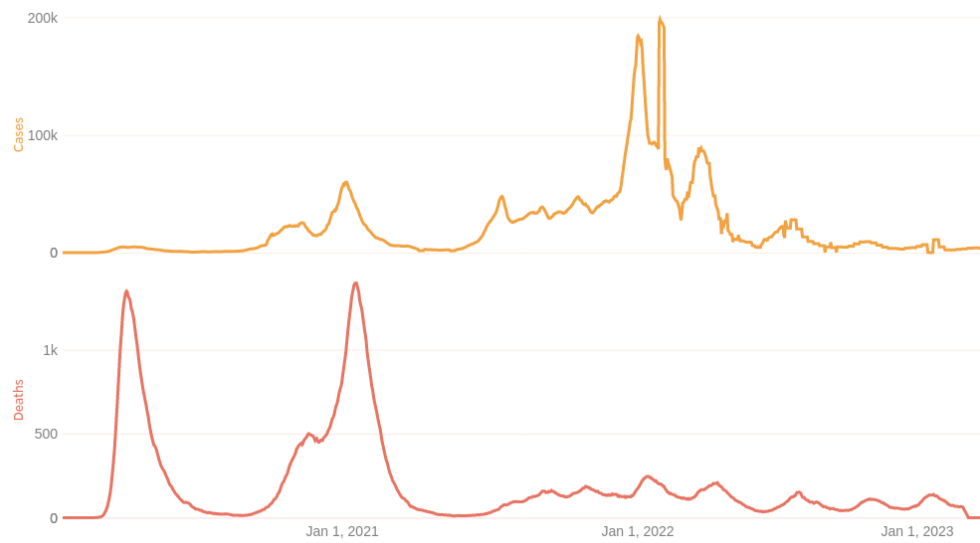
Figure 4: GBR

Figure 5: NLD

15

Figure 6: URY

7.4 Policy Responses in GBR, NLD, URY

The key policy is vaccination. The three countries were relatively highly vaccinated at 75% or more (the timeline is missing in the datasource). % of Population receiving at least 1 dose from `https://coronavirus.jhu.edu/region/`:

GBR 79

URY 87

NLD 75

Next, social distancing and closure measures. There are substantial measures in place for all three countries ranging from partial or receommended restrictions to full or/and necessary restrictions.

Social Distancing and Closure Measures from `https://www.kff.org/report-section/global-covid-19-tracker-policy-actions`

Country	Cancel public events	Stay at home	Workplace closing	School closing	Restrictions on gatherings	Restrictions on internal movement	Intl travel controls
United Kingdom	Require cancelling	No restriction	Partial closing	Partial closing	Full restriction	Internal movement restrictions in place	Partial restriction
Uruguay	Recommend cancelling	Recommend not leaving house	Partial closing	Partial closing	Partial restriction	Recommend not to travel between regions/cities	Full restriction
Netherlands	Require cancelling	Recommend not leaving house	Partial closing	Partial closing	Full restriction	Recommend not to travel between regions/cities	Partial restriction

Table 6: Social Distancing and Closure Measures.

Furthermore, from the same datasource, the United Kindgdom citizens have received broad support in terms of both income support and debt contract relief. The Netherlands citizens have received broad support in terms of income support, but narrow support in terms of debt contract relief. The least amount of support took place in Uruguay: some support in terms of income support, narrow support in terms of debt contract relief.

In terms of Health Systems Measures, still from the same datasource, both United Kingdom and Netherlands in terms of Vaccination Eligibility and Facial Coverings score respectively: Partial availability and Recommended/Partial requirement. The difference for Uruguay is in terms of Vaccination Eligibility: "Universal availability," thus potentially explaining the highest vaccination rate in Uruguay, about 10% higher than in the other two countries.

The most elaborate information[9] on policy responses come from `https://www.imf.org/en/Topics/imf-and-covid19/Policy-Respor` which is cited below. The big advantage is information on the timeline of responses. It is not straightforward to compare this mostly qualitative information. While all three countries produced significant policy responses, the United Kingdom and the Netherlands are much richer countries per capita than Uruguay and hence even similar resources in terms of percent of GDP are higher.

United Kingdom

```
Background. The first confirmed case was reported on January 31, 2020. Cases
initially peaked in April/May, and after weeks of decline, a second and third
waves took hold with the number of cases significantly above those seen during
the initial peak. In response to the initial outbreak, on March 23 the
government implemented a range of measures including travel restrictions, social
distancing measures, closures of entertainment, hospitality, non-essential shops
and indoor premises, and increased testing. The largest economic hit was in
2020Q2 when GDP fell by 19.5 percent q-o-q, reflecting a sharp contraction in
April. Overall, the UK's economy contracted by 9.8 percent in 2020. Frictions in
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[9]Still, we could not find urban-rural details, a pertinent informatoion for the present study, and limitation.

implementing the post-Brexit trade regime will also weigh on activity in the short run. Even after social distancing winds down, a period of corporate balance sheet repair is expected to weigh on investment while labor reallocation takes place gradually. The pre-crisis level of output would be recovered in early-2022 but output would remain about 3 percent below the pre-2020 trend in 2025.

Reopening of the economy. On May 10, 2020, the government set out a roadmap to ease the lockdown in England (Scotland, Wales, and Northern Ireland have separate rules).Reopening took place in three steps starting on May 13 and continuing through July, with educational facilities reopening in September.The relapse of infections led initially to localized restrictions based on a 3-tier system of intensity, but eventually a second country-wide lockdown was put in place on November 5 (similar restrictions were established in Scotland, Wales, and Northern Ireland). Educational facilities, construction, and manufacturing remained open.

New restrictions. On January 4, 2021, amidst rising contagions and the rapid spread of a new string of the virus, PM Boris Johnson imposed a third coronavirus lockdown across England, moving it up to tier 4, shutting schools, restaurants, bars, and non-essential shops and ordering the public to stay at home. Northern Ireland, Scotland, and Wales also went into lockdown. The full emergency lockdown is being lifted in phases, starting with the reopening of schools and recreation in outdoor public spaces on March 8. Non-essential retail, shops, hairdressers, gyms, and outdoor hospitality reopened on April 12 in England. On May 17, outdoors most social contact rules were lifted and indoor hospitality and hotels reopened. The final phase--full reopening--was postponed from June 21 to July 19 on account of a new Covid wave triggered by the Delta variant.

Key Policy Responses as of June 3, 2021

FISCAL
Tax and spending measures to support households and families during the health emergency include: (i) additional funding for the NHS, public services, and charities (GBP48.5billion); (ii) measures to support businesses (GBP29billion), including property tax holidays, direct grants for small firms and firms in the most-affected sectors, and compensation for sick pay leave; and (iii)

strengthening the social safety net to support vulnerable people (GBP8 billion) by increasing payments under the Universal Credit scheme as well as expanding other benefits. The government launched three separate loans schemes to facilitate business' access to credit. Through the British Business Bank, the Coronavirus Business Interruption Loan Scheme supports SMEs and the Coronavirus Large Business Interruption Loans Scheme supports bigger firms, which carry an 80 percent guarantee for loans up to GBP5 million for the former and up to GBP300 million for the latter. In addition, the government put in place the Bounce Bank loan scheme for SMEs with 100 percent guarantee for loan amounts up to GBP50,000. It also deferred VAT payments for the second quarter of 2020 until the end of the financial year and income tax payments of the self-employed by six months. The government paid 80 percent of the earnings of self-employed workers (Self Employment Income Support Scheme, SEISS) and furloughed (Coronavirus Job Retention Scheme, CJRS) employees (to a maximum of GBP2,500 per employee per month) initially for the period March-May. For furloughed employees, the scheme was extended until end-October. From July employers were allowed to furlough employees for part of the daily working hours. Government coverage fell to 70 percent of wages in September (up to GBP2,187) and 60 percent in October (up to GBP1,875) with employers required to contribute the difference to 80 percent of wages (up to GBP2,500). The scheme for the self-employed was extended for three more months but at a reduced level of 70 percent of earnings. Trade credit insurance for business-to-business transactions received up to GBP10 billion of government guarantees through the Trade Credit Reinsurance scheme, with the scheme available for nine months. The government put in place a GBP1bn package to support firms driving innovation and development through grants and loans. To support the international response, the government made available GBP150 million to the IMF's Catastrophe Containment and Relief Trust and provided a new GBP2.2 billion loan to the IMF Poverty Reduction and Growth Trust (PRGT) to help low income countries respond to COVID-19. See also:
\url{https://www.gov.uk/government/publications/guidance-to-employers-and-businesses-about-covid-19/covid-19-sup

In July 2020, the government adopted a package of measures to protect and create jobs and support the economic recovery. These include: providing firms GBP1,000 per furloughed employee retained until end-January; paying the minimum wage for 25 hours per week for six months for young workers at risk of long-term unemployment; increased resources to enhance skills and facilitate reinsertion in the job market; temporary reductions of the VAT rate for hospitality, accommodation and attractions and the real estate transactions tax; increased public spending on infrastructure (including on green projects such as retrofitting houses to improve energy efficiency); and a program to subsidize

dining out during the month of August. Low-income people who need to self-isolate and are unable to work, as well as members of their household, will receive GBP130 and GBP182, respectively. Businesses required to shut down due to localized lockdowns will receive up to GBP1,500 every three weeks.

A package of measures announced on September 24 entailed the following: (i)a 6-month Job Support Scheme (JSS) whereby employers will pay the wages of staff for the hours they work while for the hours not worked the government and the employer will each pay one third of their equivalent salary, up to GBP697.92 per month each. Employees must be working at least 33 percent of their usual hours; (ii) Extending the Self Employment Income Support Scheme for those continuing to actively trade but face reduced demand due to coronavirus, with the initial lump sum covering20 percent of three months' worth of profits for the period from November to the end of January next year up to a total of GBP1,875 (an additional second grant, will be available for the period from February 2021 to the end of April); (iii) extending the temporary 15 percentage point VAT cut (from 20 to 5 percent) for the tourism and hospitality sectors to the end of March next year; (iv) allowing to pay VAT payments deferred until end-March to be paid in 11 installments and self-assessed income tax due in July 2020 and January 2021 to be paid in 12 installments, (v) extending the maturity of loans under the CBILS and BBLs to up to 10 years; and (vi) extending the application period for loans under the CBILS, CLBILS, and BBLS until end-November. In addition, the government launched a new program, Job Entry: Targeted Support (JETS), to help the job search of people receiving unemployment benefits for at least 13 weeks.

Some of the measures announced in the September package were subsequently modified to be consistent with the tighter containment measures.For businesses that stay open, the JSS was modified, with minimum worked hours reduced to 20 percent, the government paying 62 percent for non-worked hours and employers paying 5 percent of non-worked hours. For businesses required to close due to the restrictions, the government will pay two thirds of the employees' salaries (or 67 percent) up to a maximum of GBP2,100 a month, and the employers will cover social contributions. The scheme ran for 6 months from November 1.The value of the grant for self-employed was increased from 20 to 40 percent of profits, up to GBP3,750. The grant for businesses required to close was increased to up to GBP3,000 per month for businesses in England, while additional funds were allocated to the devolved administrations. Businesses in the hospitality, accommodation and leisure sectors in high alert areas will receive grants of up to GBP2,100.

In view of the second lockdown, the government launched a new package of measures in November, including the following: postponing the JSS, canceling the Job Retention Bonus, extending the CJRS until end-March 2021 with the replacement ratio back at 80 percent, increasing the grant of the SEISS also to 80 percent of earnings, and prolonging the deadline to apply for government guaranteed loans until end-January 2021. On December 17, the government announced that it would extend the furlough scheme and the business support program one more month, until April 2021.

On November 25, the government published the 2020 Spending Review setting expenditure limits for FY2021-22, while the OBR presented its revised fiscal outlook. For FY2020-21, Covid-19 support measures were estimated at GBP280 billion. For FY2021-22, the government allocated GBP55 billion for this purpose. Among other uses, these funds will be allocated to Covid testing, PPE and vaccines, as well as the new 3-year Restart scheme to help the long term unemployed find work.

On January 5, 2021, a day after the government imposed its toughest Covid-19 restrictions since last spring (expected now to last until at least March 8), Chancellor Sunak announced a GBP4.6bn fresh financial support package for struggling UK companies. This would be divided in two parts: GBP4bn of one-off "top-up grants" for an estimated 600,000 retail, hospitality, and leisure companies, which can each claim up to GBP9,000; and a new GBP594m discretionary fund made available for councils to support other businesses that were not eligible for those grants but were affected by the restrictions.

On March 3, Chancellor Sunak announced an additional fiscal stimulus of GBP59bn (nearly 2.6 percent of GDP). This is split in virus-related support measures worth an extra GBP43bn for this year, complimented by additional GBP15.7bn of measures to boost the recovery. Support for households included a six-month extension to the furlough scheme (although this will be tapered from July) worth around GBP20bn (the self-employment part of this was more generous than expected at GBP13bn alone). Other measures included a six-month extension to the uplift to universal credit benefit payments (GBP2.2bn), an extension of the full cut in VAT for the hospitality sector (GBP5bn) to the end of September (as well as a phased return back to normal by April next year), a three-month extension of the current stamp duty cut to the end of June (as well as a phased return to normal

by the end of September), and a freeze in alcohol and fuel duty
(GBP1.1bn). Additional funding in the form of business grants was offered
(GBP5bn), discounted business rates were extended to the end of this year
(GBP6bn), and this was accompanied by a generous tax break for businesses that
aims to encourage future investment to be brought forward to this year and next
(which the OBR estimates will cost GBP12bn). Future tax increases centered
mostly on a 6-percentage point rise in corporation tax (from 19 to 25 percent)
in 2023, and a freeze in income tax thresholds.

MONETARY AND MACRO-FINANCIAL

Key measures include: (i) reducing Bank Rate by 65 basis points to 0.1 percent;
(ii) expanding the central bank's holding of UK government bonds and
non-financial corporate bonds by GBP450 billion (in three tranches announced in
March, June, and November); (iii) introducing a new Term Funding Scheme to
reinforce the transmission of the rate cut, with additional incentives for
lending to the real economy, and especially SMEs; (iv) HM Treasury and the BoE
have agreed to extend temporarily the use of the government's overdraft account
at the BoE to provide a short-term source of additional liquidity to the
government if needed; (v) launching the joint HM Treasury-Bank of England Covid
Corporate Financing Facility and three government loan guarantee schemes-- the
Coronavirus Business Interruption Scheme, the Coronavirus Large Business
Interruption Scheme, and the Bounce Back Loan Scheme--replaced by the Recovery
Loan Scheme from April 6, 2021, providing a total of GBP352bn of liquidity and
loan guarantees available to businesses (19.5 percent of GDP); (vi) activating a
Contingent Term Repo Facility to complement the Bank's existing sterling
liquidity facilities; (vii) together with central banks from Canada, Japan, Euro
Area, U.S., and Switzerland, further enhancing the provision of liquidity via
the standing US dollar liquidity swap line arrangements; (viii) maintaining
banks' Systemic Risk Buffer (SRB) rates at the rate set in December 2019, until
at least December 2022, with any decision on the rates taken in December 2022
taking effect from January 2024; and (ix) reducing the UK countercyclical
capital buffer (CCyB) rate to 0 percent from a pre-existing path toward 2
percent by December 2020, with guidance that it will remain at 0 for at least 12
months. In December 2020, the Financial Policy Committee (FPC) updated its
guidance on the path for the CCyB rate, expecting this rate to remain at 0
percent until at least 2021 Q4. Due to the usual 12-month implementation lag,
any subsequent increase of the rate is not expected to take effect until 2022 Q4
at the earliest. See also: \url{https://www.bankofengland.co.uk/coronavirus}. On
February 3, 2021, the Bank of England finalized a technical review of the
potential impact of a negative policy rate, concluding that this could be of use
with further preparations. On March 3, 2021, the government announced the

introduction of a new mortgage guarantee scheme from April 2021 for borrowers with a deposit of just 5 percent on homes with a value of up to GBP600,000, together with the extension of the stamp duty land tax (SDLT) exemption until June 2021. On April 23, 2021, the central banks have decided to discontinue offering dollar liquidity at the 84-day maturity, given improvements in U.S. dollar funding conditions (operational change effective as of July 1, 2021). They will however continue to hold weekly operations with a 7-day maturity.

The Prudential Regulatory Authority (PRA) set out supervisory expectation in March 2020 that large banks should suspend dividends and buybacks until end-2020, cancel outstanding 2019 dividends and pay no cash bonuses to senior staff. In December 2020, the PRA however announced its intention to return toward the standard framework for bank distributions, reflecting some reduction in the uncertainty related to Covid at this time, and the ability of banks to withstand significant losses, according to results of the two stress tests carried by the Prudential Regulation Committee (PRC) and the FPC. The PRA indicated all Pillar 2A requirements will be set as a nominal amount, instead of a percentage of total Risk Weighted Assets (RWAs) and to mitigate the possibility of procyclical market risk capital requirements, the PRA will temporarily allow firms to offset the increase in risk-weighted assets due to the automatic application of a higher VaR multiplier through a commensurate reduction in risks-not-in-VAR (RNIV) capital requirements (see \url{https://www.bankofengland.co.uk/coronavirus/information-for-firms}). The Financial Conduct Authority (FCA) introduced a package of targeted temporary measures to support customers affected by coronavirus, including by setting the expectation for firms to offer a payment freeze on loans and credit cards for up to three months. In November, the mortgage moratorium was extended until end-April and the FCA also extended for 6 months the period to request a payment deferral for consumer credit.

On February 2021, the BoE reminded to the eight major UK banks of the importance of the first RAF submissions (Resolvability Assessment Framework). Note in this respect that the dates of these submissions, initially announced in May 2020 by the BoE and the PRA had been extended by a year (from the first Friday in October 2020, to the first Friday in October 2021), to alleviate operational burdens on banks during the COVID-19 crisis.

EXCHANGE RATE AND BALANCE OF PAYMENTS

No measures.

The Netherlands

Background. In response to a first wave of COVID-19 infections in late February 2020, the authorities adopted a series of sanitary measures, including a partial lockdown to limit the spread of the virus. Following a progressive easing of these measures from May 11, and the resurgence in the number of infections, several containment measures with gradual restrictions were announced successively on August 6, August 18, September 25, October 2, October 14, and November 4.

After a second and more severe wave of infections started late in the summer 2020, the number of infections surged again toward the end of the year, prompting the authorities to impose the strictest lockdown since the beginning of the pandemic. All non-essential businesses, schools (with few exceptions), daycares, and many public spaces such as parks and zoos were ordered to close. It was required to work from home unless not possible, avoid public transportations, limit gatherings to one guest from a different household (three during Christmas celebrations), maintain social distancing, and strongly advised not to travel abroad. These restrictions initially in place from December 15 to February 9, were subsequently extended through April 27. A curfew from 9 pm to 4:30 am was also introduced (from January 23 to April 27). In addition, a negative PCR test was required for travelers to the Netherlands from high-risk countries.

On March 3, a few restrictions were lifted to allow partial reopening of primary and secondary schools. This was followed by a progressive reopening strategy, as infections and hospital admissions declined steadily and vaccines became widely available (as of June 30, 2021, about 15.5 million doses of vaccines have been administered), Under the first phase starting on April 28, the curfew was lifted, restaurants and cafés were allowed to operate outdoor, and shops to reopen at limited capacity, among other measures. Additional restrictions were lifted in a second phase from May 19, including the use of public transportations, travel to certain destinations, and hours of operations for some businesses. Under the third phase starting on June 05, restaurants and cafes can operate indoor, cinemas and other larger cultural institutions can reopen, all under strict conditions (including for example maintaining 1.5 meters social distancing). From June 26, the fourth phase allows all businesses to operate at their regular hours, with a requirement to maintain a 1.5 meters

distance or to wear a face mask, except if vaccinated. The advice to work from home and restrictions to group gathering are lifted. Several travel restrictions are also lifted.

Key Policy Responses as of July 1, 2021

FISCAL

A series of fiscal measures have been introduced since the start of the pandemic to contain the economic impact of the outbreak. The two first support packages (announced in March and May, respectively) include spending measures estimated at about 35.3 billion euros (4.4 percent of GDP) in 2020, and covering (i) compensation of up to 90 percent of labor costs for companies expecting a reduction in revenues of 20 percent or more; (ii) compensation for affected sectors (hospitality, travel, agriculture, culture, and others); (iii) support for entrepreneurs and the self-employed, start-ups and small innovation companies; (iv) scaling up of the short-time working scheme (unemployment benefit compensation available to companies needing to reduce their staff by at least 20 percent), (v) allowances for SMEs to help them finance their fixed costs. In addition, companies can defer tax payments without penalties, and calculate provisional taxes on the basis of expected reduced activity levels. In 2020, revenue shortfalls from deferral of tax payments and other forgone revenue measures are estimated at 17.2 billion euros (or 2.2 percent of GDP). Also, public guarantee schemes (with a ceiling increased by 65 billion euros, or 8.1 percent of GDP), especially for SME loans but also covering large firms, are expanded to help the most vulnerable companies to manage their liquidity problems. A guarantee scheme for supplier credit has also been established. On August 28, the government announced the third support package which primarily aims at expanding and adjusting measures already in place on the expenditure side through June 2021. The authorities also aim at supporting labor mobility toward expanding sectors. Platforms to facilitate job transition are being developed, and public financing is being allocated for training, re-skilling and career counseling. Tax incentives are also introduced to support private investment. In 2020, expenditure support amounted to 27.8 billion (or 3.4 percent of GDP), and the government has budgeted a 40.9 billion (or 4.7 percent of GDP) support package in 2021.

MONETARY AND MACRO-FINANCIAL

The ECB decided to provide monetary policy support through (i) additional asset purchases of EUR120 billion until end-2020 under the existing program (APP), and

(ii) providing temporarily additional auctions of the full-allotment, fixed rate temporary liquidity facility at the deposit facility rate and more favorable terms on existing targeted longer-term refinancing operations (TLTRO-III) starting between June 2020 and June 2021. Further measures included an additional EUR750 billion asset purchase program of private and public sector securities (Pandemic Emergency Purchase Program, PEPP) until end-2020, an expanded range of eligible assets under the corporate sector purchase program (CSPP), and relaxation of collateral standards for Eurosystem refinancing operations (MROs, LTROs, TLTROs).

The ECB Banking Supervision allowed significant institutions to operate temporarily below the Pillar 2 Guidance, the capital conservation buffer, and the liquidity coverage ratio (LCR). In addition, new rules on the composition of capital to meet Pillar 2 Requirement (P2R) were front-loaded to release additional capital. The ECB considers that the appropriate release of the countercyclical buffer by the national macroprudential authorities will enhance its capital relief measures. The ECB Banking Supervision further decided to exercise -- on a temporary basis -- flexibility in the classification requirements and expectations on loss provisioning for non-performing loans (NPLs) that are covered by public guarantees and COVID-19 related public moratoria; it also recommended that banks avoid pro-cyclical assumptions for the determination of loss provisions and opt for the IFRS9 transitional rules. More recently, ECB Banking Supervision asked banks to not pay dividends for the financial years 2019 and 2020 or buy back shares during COVID-19 pandemic, from which the conserved capital should be used to support households, small businesses and corporate borrowers and/or to absorb losses on existing exposures to such borrowers.

In addition, the Dutch central bank has reduced systemic buffer requirements for the three largest banks to support bank lending. The central bank is also taking measures to provide temporary regulatory relief to less significant banking institutions.Banks under direct supervision of DNB are also allowed to exclude specific central bank exposures when calculating their leverage ratios. Furthermore, the planned introduction of a floor for mortgage loan risk weighting was initially postponed; however, the May 2021 Financial Stability Report announced that this floor would be introduced on January 1, 2022. The largest Dutch banks grant SMEs a six-month postponement of their loan repayments. To protect homeowners, the government and relevant stakeholders agreed that there will be no mortgage foreclosures until July 1 2020. From July 1st, homeowners facing financial difficulties are encouraged to contact their

lender to renegotiate more flexible terms for the period covering the ongoing economic crisis. On October 6, 2020, the authorities adopted a law to facilitate debt restructuring for companies facing financial difficulties. The law is intended to prevent bankruptcies.

EXCHANGE RATE AND BALANCE OF PAYMENTS
No measures.

   Uruguay

Background. The first cases of COVID-19 were reported on March 13, 2020. The government introduced a series of public health measures, such as school closures, cancellation of public events, and active discouragement of large gatherings. Starting April 22, customers must wear face masks while shopping in supermarkets; this rule is currently being expanded to other establishments. International travel has been severely restricted. After months of relative stability, the number of new infections has increased sharply in November.Daily new cases have increased exponentially since Q4 2020, surpassing 450 per million as of end-March (higher than in neighboring Brazil), although the death count remains relatively low. The recent surge likely reflects limited movement restrictions in late 2020 and the emergence of the highly contagious P.1 variant in Brazil, as the two countries share a porous border.

Reopening of the economy. Construction activity was allowed to restart in mid-April of 2020, government offices re-opened in early May, and shopping centers reopened on June 9, all with appropriate sanitary precautions. Bars and restaurants are reopening, and the soccer matches began in August, without the spectators. As of June 29, almost all schools (including in the capital Montevideo) have been re-opened. Starting August 3, school hours were extended to be closer to normal hours. Borders, however, will remain largely closed for the foreseeable future. However, amid the recent steep rise in COVID-19 cases, there is growing public pressure to impose stricter lockdown measures. Borders have been closed since December 2020, in-person schooling is suspended, government offices closed, and the population encouraged to stay home.

Vaccination. Vaccination started on March 1, 2021 and is one of the fastest rollouts in the region, next to Chile, reflecting the efficient registration setup via web and mobile apps. The government has secured around 5.5 vaccine

doses and about 18 percent of the population has received at least one dose of vaccine as of end-March. The government plans to get the entire population vaccinated in the 1 half of 2021 on a voluntary basis.

Key Policy Responses as of June 3, 2021

FISCAL

Additional resources to address the public health emergency have been mobilized, including by resorting to contingent credit lines from other international financial institutions. In 2020, the overall above-the-budget-line fiscal cost has been estimated at $800 million (1.6 percent of GDP). The measures include (i) relaxation of rules for claiming the unemployment insurance (0.8 percent of GDP); (ii) expanded assistance to the most vulnerable groups (cash and direct provision of food, 0.2 percent of GDP); (iii) expanded sick leave benefits, including for older workers, so they do not have to leave home (0.1 percent of GDP). Furthermore, some tax and pension obligations are being postponed or reduced and utility payments are being cancelled or reduced for some companies. Starting in June, the government subsidized employment by paying companies 5,000 pesos per month (about 1/3 of the current minimum wage) for three months for each new hire. As a solidarity measure, the salaries of better-paid public officials are being reduced by up to 20 percent, with the savings directed to the newly-established Coronavirus Fund. Other sources for the Coronavirus Fund include the additional Social Security Assistance Tax, the 2019 profits of Banco República and the National Development Corporation, and donations. Currently, this fund finances the cash subsidies and food assistance for the most vulnerable, together with the cash subsidies for the employees in the construction industry affected by the pandemic-related work stoppages. In March 2021, the government announced an extension of some of the measures, including extension of credit guarantees and unemployment insurance, tax relief for small businesses; increase in assistance to the most vulnerable; and extension of investment incentives.In April 2021, the government announced that it plans to spend $900 million (1.6 percent of GDP) in Covid-related measures during 2021. It also complemented existing measures with a 6-month suspension of social security contributions for SMEs in sectors most affected by the pandemic (e.g.; tourism, hotels, restaurants etc).

MONETARY AND MACRO-FINANCIAL

The central bank has been focused on maintaining the appropriate level of liquidity in the system. It has temporarily reduced the reserve requirements

that apply to the nominal peso and the inflation-adjusted peso deposits in the
commercial banks. This measure has injected about USD 150 million of additional
liquidity into the financial system.

The central bank has temporarily relaxed the regulations in the securities and payments markets and extended the

Loan payments for households and businesses that occur between March 1 and August 31, 2020 are to be deferred fo

The fund that guarantees loans for SMEs has been expanded from USD 50 million to
USD 500 million (utilizing financing from international organizations). That is
expected to allow to guarantee the SME loans up to USD 2.5 billion. In addition,
the rate of commission charged by the fund will be reduced
substantially. Moreover, two more guarantee lines are being established, one for
larger enterprises and another for enterprises in the sectors (such as tourism)
that are directly affected by border closures.

BROU (the country's largest commercial bank, which is government-owned) will
extend soft loans to enterprises. The financing available currently is USD 50
million, which may be augmented--also with financing from international
organizations--to USD 120 million. In addition, direct credit program for micro
and small enterprises will extend working capital loans of up to 18 months to
the affected businesses at subsidized rates. Loan repayments for these
enterprises are being suspended for at least 30 days.

EXCHANGE RATE AND BALANCE OF PAYMENTS
The exchange rate has been allowed to adjust, with the central bank intervening to limit undue volatility in the

7.5 Interaction or Pandemic Dummy with Urban/Rural Dummy Separately for Each Country

In Table 1, we repeat the previous 3 sets of models, but instead of splitting by urban/rural, we add an interaction to test if the
pandemic urban rural difference is statistically significant, and it is not. The sign and effect sizes are as expected.

	GBR1	NLD1	URY1	GBR2	NLD2	URY2	GBR3	NLD3	URY3
prePos=1	-0.21**	-0.12*	0.75***	-0.18*	-0.22***	0.29+	-0.13+	-0.07	0.29*
city lg500k	0.11	-0.12	0.16	0.25	0.16	-0.07	0.16	0.11	-0.12
prePos=1 × city lg500k	-0.20	-0.11	-0.53**	-0.24	-0.12	-0.11	-0.17	-0.12	-0.08
income				0.08***	0.07***	0.10***	0.04**	0.04***	0.08**
age				-0.04***	-0.02*	-0.03	-0.03**	-0.01	-0.02
age2				0.00***	0.00***	0.00	0.00***	0.00***	0.00
male				-0.18**	-0.12*	0.08	-0.16**	-0.10*	0.03
married or living together as married				0.56***	0.43***	0.28*	0.51***	0.37***	0.25*
divorced/separated/widowed				0.07	-0.10	-0.21	0.06	-0.15+	-0.19
autonomy				-0.10*	-0.10**	-0.04	-0.11**	-0.08**	-0.06
freedom				0.44***	0.36***	0.39***	0.37***	0.29***	0.37***
trust				0.16**	0.43***	0.11	0.11+	0.32***	0.01
postmaterialist				-0.06	-0.09*	0.06	-0.07	-0.08*	0.04
god important				0.02*	0.01	0.05**	0.01	0.01	0.05**
health							0.51***	0.64***	0.46***
constant	7.54***	7.50***	7.53***	4.30***	4.58***	4.20***	2.89***	2.37***	2.45***
N	3628	3872	1696	2290	2520	1160	2290	2515	1159
adj R2	0.003	0.003	0.020	0.319	0.287	0.215	0.383	0.386	0.248

+ 0.10 * 0.05 ** 0.01 *** 0.001; robust std err

Table 7: OLS regressions of life satisfaction.

However, having more gradation in urbanicity, produces more statistical significance in table 8. The rationale is to use more/fuller information on urbanicity. And with regressions, the rationale is also to have a large stable base case, here $< 50k$, and compare it against the 3 larger places $50 - 100$, $100 - 500$, $gt500$

```
                   |              town3
Settlement size |       1         2         3         4 |      Total
-------------------+--------------------------------------+----------
    under 2000 |      95         0         0         0 |         95
      2-5000 |     197         0         0         0 |        197
     5-10000 |     293         0         0         0 |        293
    10-20000 |     856         0         0         0 |        856
    20-50000 |   2,291         0         0         0 |      2,291
   50-100000 |       0     1,605         0         0 |      1,605
  100-500000 |       0         0     2,195         0 |      2,195
 500000 and more |   0         0         0     1,749 |      1,749
-------------------+--------------------------------------+----------
        Total |   3,732     1,605     2,195     1,749 |      9,281
```

	x1GBR	x2NLD	x3URY	x4GBR	x5NLD	x6URY
2005	0.00			0.00		
2022	-0.08	-0.17*	0.83***	-0.02	-0.31***	0.76***
town3=1	0.00	0.00	0.00	0.00	0.00	0.00
town3=2	0.05	-0.15+	0.59*	0.13	-0.08	0.70**
town3=3	0.08	-0.20*		0.17	-0.08	
town3=4	0.15	-0.21	0.26	0.48**	0.23*	0.15
2005 × town3=1	0.00			0.00		
2005 × town3=2	0.00			0.00		
2005 × town3=3	0.00			0.00		
2005 × town3=4	0.00			0.00		
2022 × town3=1	0.00	0.00	0.00	0.00	0.00	0.00
2022 × town3=2	-0.21	0.10	-0.53	-0.32	0.04	-0.54+
2022 × town3=3	-0.25+	0.14		-0.25	0.08	
2022 × town3=4	-0.33+	-0.06	-0.61**	-0.38+	-0.14	-0.54**
2012		0.00			0.00	
2012 × town3=1		0.00			0.00	
2012 × town3=2		0.00			0.00	
2012 × town3=3		0.00			0.00	
2012 × town3=4		0.00			0.00	
2011			0.00			0.00
2011 × town3=1			0.00			0.00
2011 × town3=2			0.00			0.00
2011 × town3=4			0.00			0.00
income				0.14***	0.13***	0.16***
age				-0.05***	-0.05***	-0.05**
age2				0.00***	0.00***	0.00**
male				-0.28***	-0.09*	-0.08
married or living together as married				0.54***	0.46***	0.41***
divorced/separated/widowed				0.04	0.07	-0.08
constant	7.50***	7.59***	7.43***	7.28***	7.57***	7.51***
N	3628	3872	1696	2846	3250	1650
adj R2	0.003	0.004	0.021	0.085	0.108	0.067

+ 0.10 * 0.05 ** 0.01 *** 0.001; robust std err

Table 8: OLS regressions of life satisfaction.

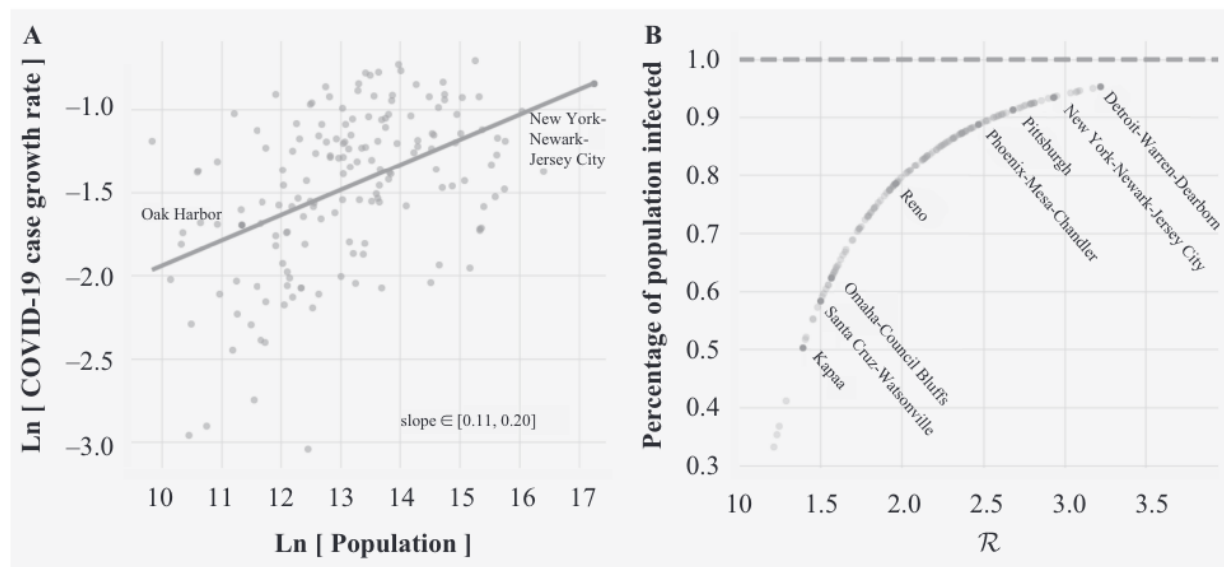## 7.6 Morocco (MAR) and Venezuela (VEN)

Morocco (MAR), like Uruguay (URY) in the body of the paper, increased SWB everywhere, but least in the largest cities (>500k), and also in 100-500k category. The 20-50k category should not be interpreted as there are only 22 observations in 2001, (and 0 obs in the 50–10k category).

In the case of Venezuela (VEN), most places had a drop in SWB, and while larger places had a little more drop than smaller ones, there are no clear patterns unlike in other countries. And this is not surprising. Venezuela, like Morocco, only had a little proportion of its population affected by covid, about 2-3 percent. But unlike Morocco, it is a non-free autocracy with an unstable/turbulent economy—we did not expect to see much of an effect of covid in Venezuela.
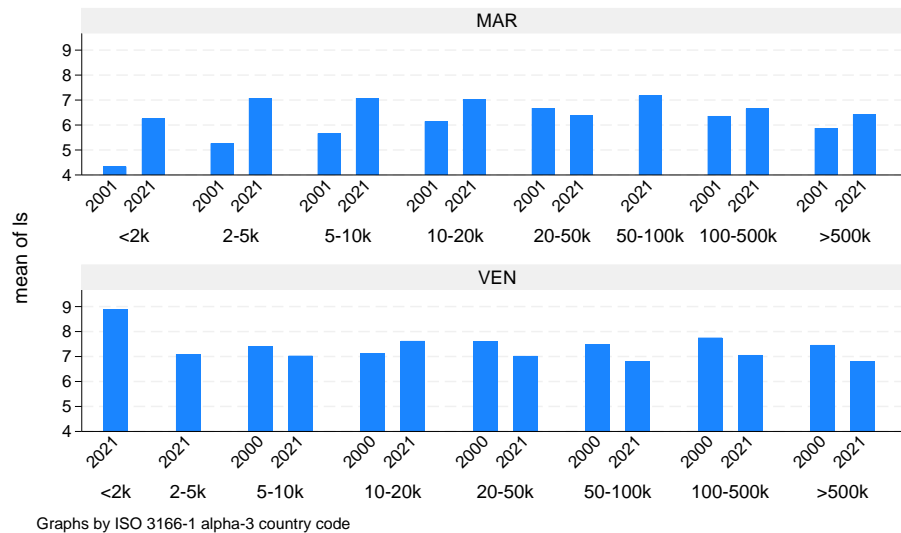
Figure 7: Urban-rural happiness gradeint in Morocco and Venezuela pre and during the pandemic.

8 Urbanism and infectious disease spread

Figure 8: Bettencourt (2021)