Economics Bulletin

Volume 41, Issue 2

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This work was supported by the research cluster "Cultures in Transitions in East Asia and Germany" of the Trier University, funded by the research initiative of the state of Rhineland-Palatinate. I thank Mei Wang, Tom Rosman, Xenia Matschke and Frithjof Küpper for their feedback on this article. I thank Karine Nanyan and Sinean Callery for their help with the preparation of the manuscript.
Citation: Marc Oliver Rieger, (2021) "East Asia's success against COVID-19 – acclaimed or ignored?", *Economics Bulletin*, Vol. 41 No. 2 pp. 662-675.
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Submitted: December 11, 2020. **Published:** April 09, 2021.

East Asia's success against COVID-19 – acclaimed or ignored?

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February 3, 2021

Abstract

In a survey between March and November 2020 based on more than 2000 completed questionnaires, we find that individual perceptions of the numbers of COVID-19-related deaths are highly biased: while the majority of subjects underestimates these cases in Germany, only a small minority knows about the low rates in East Asia. Attitudes towards social distancing and a vaccination are related significantly to this knowledge. This suggests that people who know that COVID-19 can be (at least locally) controlled, like in China or Taiwan, have a more positive and therefore constructive view towards countermeasures. Although knowledge about the situation in East Asia is scarce, we do find that over time more people see East Asia as role model in the handling of pandemics.

Keywords: COVID-19; SARS-CoV-2; misestimation; East Asia; vaccinations; social distancing.
JEL classification: I12, Z13

1 Introduction

Although the COVID-19 pandemic started in late 2019 in Wuhan, China, and led to a dramatic situation there between January and March 2020, as of January 2021, the pandemic is basically eradicated in China. Since 17 May 2020, only

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one official death was reported.[1] This "eradication strategy" has already been suggested in March 2020 in academic studies as a template for other states to follow (Zhang, Wang, Chang, Wang, Xu, Yu, Tsamlag, Dong, Wang & Cai 2020, Liu, Yue & Tchounwou 2020). In April 2020, the effects of stringency measures have already been analyzed in international comparisons (De Brouwer, Raimondi & Moreau 2020), leading to the conclusion that reaching herd immunity would not be a feasible strategy, leaving essentially two options: eradication (as in China) or "flattening the curve" and waiting for a vaccine. While some countries, particularly in East and South East Asia, Australia and New Zealand followed the "eradication route", most others in the world did not.

This resulted in stark contrasts in outcomes: in Taiwan, the last (of only seven) deaths was reported on 11 May, 2020. Other East Asian, but also Oceanian countries like Vietnam, Thailand, Mongolia, South Korea, Japan, Australia or New Zealand have few or no active cases. In Europe and America, however, fatalities have been much higher.

There is a political as well as scientific discussion about what factors led to these stark differences (An & Tang 2020, Cha 2020) that has also been reported occasionally in Western media, but is this difference actually known among the population in the West (more precisely in Germany)? And what consequences does it have if people are aware (or not) of these differences?

To answer these questions we evaluate data from a survey, conducted from March to November 2020 (Rieger & He-Ulbricht 2020). Particularly, we are interested in questions where participants had to estimate numbers of COVID-19 deaths in Germany, China and a couple of other countries. We also compared how people think about the anti-pandemic measures in China and those in Germany, and whether they think we can learn from East Asia regarding countermeasures to pandemics in general.

Personal protection measures have been shown to be effective in previous epidemics and helped to contain the spread of the epidemic, whether they are voluntary or enforced by regulations, see, e.g., Balinska & Rizzo (2009) and Deb, Furceri, Ostry & Tawk (2020). This makes it very important to keep the motivation for compliance high. Welter, Welter & Großschedl (2021) show that compliance with prevention behavior is positively related with self-efficacy, and Hameleers (2021) find that a positive frame setting increases compliance with such measures. Indeed he concludes that "framing the pandemic in terms of gains may be most effective in promoting support for risk-aversive treatments of the pandemic". Both results point to the importance of positive narratives that give support to the feeling of self-efficacy and as a general motivating factor for prevention behavior.

[1] All fatality data have been retrieved from worldometers.info.

What could be a better "gain frame", however, then thinking about countries that were so successful in their containment of COVID-19 that they are now free of this disease? We therefore hypothesize that knowing about the possibility of controlling the pandemic (with countries like Taiwan and China as examples) increases the motivation to put efforts into countermeasures like social distancing. Beyond this, however, we also expect this to carry over to other means of prevention, in particular the willingness to get a vaccination.

Our article is related to recent research that studied the ability of Americans to forecast the increase of cases of COVID-19 (Fansher, Adkins, Lalwani, Quirk, Boduroglu, Lewis, Shah & Jonides 2020) and of misperceptions of exponential growth (Lammers, Crusius & Gast 2020). However, contrary to this line of research, we do not study the ability of people to anticipate the results of an exponential increase, but instead we focus on tasks where knowledge about the current numbers is more important than mathematical understanding. Another difference is that we take an international view to detect systematic biases in estimates for different countries.

This paper is structured as follows: In Section 2, the used methodology and data are described. Section 3 presents the empirical results. Section 4 provides a brief discussion of the main findings and their limitations and discusses potential further research questions.

2 Methodology and Data

2.1 Data collection

This study is based on a survey in form of a multiple cross-sectional study starting in March 2020 and advertised at some German universities. Up to the end of 2020, the survey contains data from 2175 subjects in total (not counting additional data collecting efforts in China and the Chinese population of Germany), see Table 1. Most of the survey items of interest for this article were not covered in each survey wave, some only in November.

Table 1: Sample sizes of the survey waves.

March	April	May	June	July	Sep.	Oct.	Nov.	Total
266	268	282	49	151	137	812	210	2175

The survey was announced via the university email system, sent out three times a week to all students and employees. As an incentive to participate, a prize of 50 Euro was offered to a randomly selected participant in each survey wave. The

standardized recruiting led to fairly similar sample characteristics. The sample is not representative of the German population, since most of the respondents were students (71%) and women (61%), and the sample is also fairly young (average 26 years, but including subjects from 14 years to 77 years). The uniform sample selection procedure, however, is very well suited for comparisons over time, and the sample is also useful for multivariate analysis.
The online survey was programmed in EFS Survey (Questback). Each survey took approximately 10 minutes to complete. A detailed description of the items and the survey data is available in Rieger & He-Ulbricht (2020), but some of the items discussed here were added for the more recent waves, so we describe them in more detail.

2.2 Estimation tasks

The survey contained essentially three types of estimation tasks:

(1) A prognosis for the total number of COVID-19 related deaths by the end of 2020 in Germany: "In your opinion, how many fatalities will the current epidemic have claimed in Germany by the end of the year?"

(2) An estimate for the total number of COVID-19 related deaths in China up to the time of the survey: "To your knowledge, how many people have died as a result of the epidemic in China to date (according to official figures)?"

(3) An estimate for the total number of COVID-19 related deaths during the month of November 2020 in a selection of countries (Germany, US, Japan, China, Taiwan): "Please estimate: how many COVID-19 deaths will be officially recorded during November 2020 in the following countries:"

Item 1 was originally intended to capture how well people can perceive the threat of the (in March) exponentially growing numbers of cases. Later it became an indicator for the changes in the perceived seriousness of the situation. It should be remarked that a prognosis of this number should become easier over time as the remaining time period was shrinking and more data became available. At the end of the year 2020, in total 34,194 persons have died on COVID-19 in Germany. We will take this number as a benchmark for the prognosis.
Item 2 was introduced initially as a knowledge question, since until February 2020, reports still focussed on China, making these numbers quite prominent. In the November 2020 wave, the question was re-introduced to test whether people had still some idea about the extent of COVID-19 in China, although this has been covered now much less in the media.

Item 3, finally, intends to measure how many of the respondents knew about the fact that China and Taiwan (among a couple of other countries) are virtually COVID-19 free for a few months now, and numbers are also fairly low in Japan. We also elicited numbers for the US and Germany, for comparison. We did not want to include more countries, as this might have reduced the attention of the respondents too much. Since the survey took place at the end of November, respondents could not check the number, easily on the internet (a concern that could somehow limit the validity of Item 2), but they also had not to make a complicated prognosis as in Item 1, since the situation leading to these numbers was already clear. At the time of writing this article, of course we know the correct answers precisely, also for Item 1.
For Items 2 and 3, we asked explicitly for official figures. This way, we tried to avoid misinterpretations and diverging viewpoints regarding the quality of these numbers from adding noise to these estimates.[2]

2.3 Other relevant tasks in the survey

We elicited a number of items on Likert scales. Important for our purpose are the following:

(1) "We can generally learn from East Asia in dealing with epidemics." (4-point Likert scale from "do not agree" to "agree completely")

(2) "The measures in China were better than those in Germany with regard to the epidemic." (4-point Likert scale from "do not agree" to "agree completely")

(3) "When a vaccine against COVID-19 will be available, will you get vaccinated? (Assuming that the costs are covered by health insurance). — No, definitely not / rather no / rather yes / yes, definitely."

(4) Four items about social distancing: two signalling a positive attitude, two a negative one. These items were already used in Rieger (2020), where in November we omitted the fifth item about attending an outdoor party, as the German weather at that time would have made this question sound a bit strange. Each item was measured on a 4-point Likert scale evaluating the hypothetical behavior from "totally okay" to "unacceptable".

Additionally, we used several demographic variables in this article. For precise elicitation methods, we refer to Rieger & He-Ulbricht (2020).

[2]Indeed, we got a few times the answer 0 for the Item 1, in combination with a strong belief in conspiracy theories regarding COVID-19. The author knows at least one person who believes that it is impossible to die on COVID-19, but even he knows about the non-zero official numbers.

3 Results

3.1 Systematic and unsystematic misestimations

Before we study the results of the estimation tasks for COVID-19 related deaths, we need to emphasize that estimating any such numbers is obviously prone to errors. The most obvious source is a lack of information. We cannot expect that everybody keeps up-to-date with all of these COVID-19 related numbers – total cases, new cases, current cases, deaths etc. Thus, we are not surprised to see large deviations from correct values. This is even more the case for questions (like Item 1) that require the respondent to make a prognosis for the future, something that even experts cannot do well, given that political decisions as well as many a priori unknown factors, e.g., regarding the weather-dependency of infection rates have a huge influence on this.

Nevertheless, all of these deviations should be unsystematic, i.e. we would expect to see the same number of under- and overestimations, and the same kind of deviations for different countries and different times.[3]

If, however, we find systematic deviations, this is interesting and needs to be studied in more detail. We will see in the next subsections that such systematic deviations do indeed exist, and we will also show that some of them have relevant consequences on attitudes towards protective behavior (social distancing and vaccinations).

3.2 Prognosis of deaths in Germany in 2020

In Germany, COVID-19 related deaths increased exponentially in March and April, thus it is not unexpected that in the survey wave conducted at the end of March most respondents still strongly underestimated the number of fatalities by the end of the year (Fig. 1). The median estimate was just 3000. At the end of April, in the second survey wave, this number was already surpassed. The estimates then were therefore substantially higher with a median value of 15,000. Nevertheless, this prognosis was still substantially below the correct number (34,194 deaths). While in May, the estimates went up to 20,000 (median), this number dropped in June (where new cases were less frequent) to 10,000 (median). In October, this number has barely increased, although cases increased exponentially since September and at the time of the October survey, daily deaths already exceeded those from the spring.

[3] With two exceptions: we would expect smaller deviations for Task 1 when the time to the end of the year becomes shorter, and we would also expect to see smaller deviations for Germany, as these numbers should be better known to respondents.

Another interesting finding is that notwithstanding the non-convergence of the estimates to the actual number, we observe a convergence of beliefs to an (underestimated) value: the dispersion of estimates (as given, e.g., by the difference between the 25% and 75% percentiles) decreased over time.

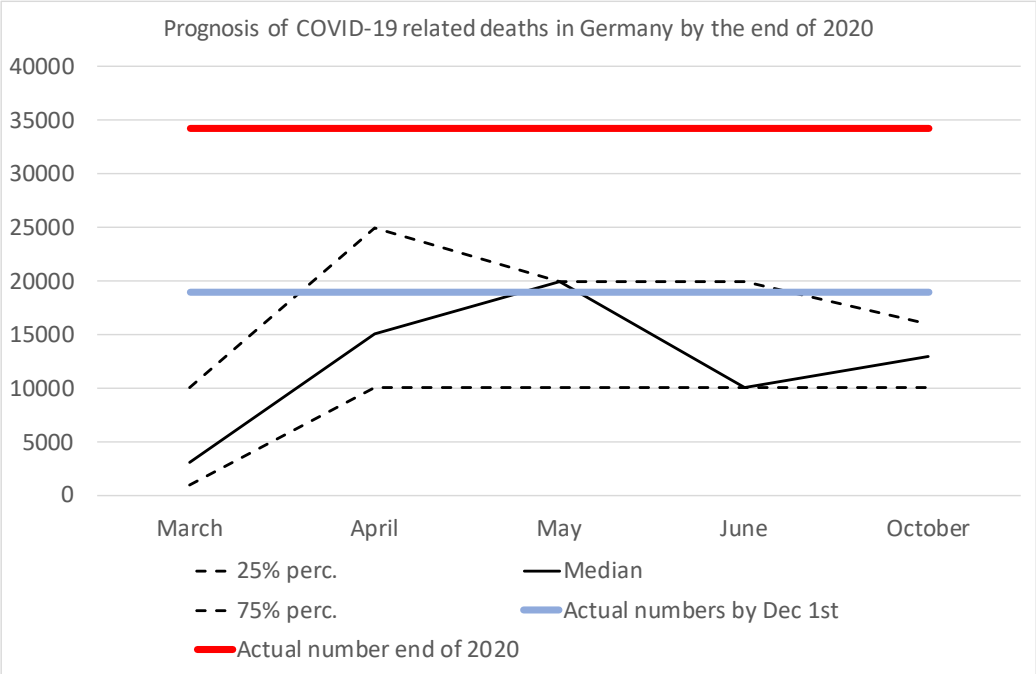

Figure 1: Most Germans significantly underestimated the number of COVID-19 related deaths in Germany. Since April, the number of people underestimating the number increased.

3.3 Knowledge on deaths in China

The underestimation of COVID-19 related deaths in Germany in itself is not as remarkable, provided that the same effect were to occur for most other countries. There are, however, interesting and systematic differences that we want to study in the following.

First, we evaluate Item 2 from the survey, the estimate of the up-to-then number of COVID-19 fatalities in China. Contrary to the German numbers, we find here a substantial *overestimation*: in spring, around 30% estimated the number to be higher than 5000, although the real numbers were only around 3300 in March and 4600 in April (and since then basically constant). Nevertheless, the

median estimates were quite good, particularly in April. This is probably related to the intense media coverage of the events in China on German news during the preceding months.The proportion of respondents overestimating the number of COVID-19 related deaths substantially, however, increased in November to 43%. While a substantial number of respondents still made a relatively good estimate, there were also much more extreme overestimations than in spring: 18% now even overestimate this number by more than one order of magnitude. We also observe that basically nobody *underestimated* the numbers substantially. It seems like the majority knew the numbers, but those who didn't, overestimated them severely.

Table 2: Fatalities in China were overestimated by many respondents, even though we only counted numbers exceeding 5000 as overestimation. Overestimations were significantly more widespread in November. Proportions sharing the same superscript letter cannot be distinguished statistically (t-test, 5% level).

	March	April	November
25% percentile	3000	4500	4600
Median	3700	5000	5000
75% percentile	8000	8000	20,000
Real Deaths	3300	4634	4634
Proportion overestimating	$32\%^a$	$28\%^a$	$43\%^b$

3.4 Estimation of current deaths around the world

Table 3: Estimates of deaths during November 2020 for selected countries: it shows a clear lack of knowledge of most respondents regarding the situation in some East Asian countries, but also a clear underestimation of deaths in the US and Germany.

	Germany	USA	China	Taiwan	Japan
25% percentile	325	2500	10	5	56.75
Median	1000	10,000	100	100	200
75% percentile	4000	40,000	1000	675	1000
Correct number	6240	40,173	0	0	353
N	189	188	190	188	190

The previous findings are limited in that they might be impacted by an (often healthy) mistrust in official statistical numbers from China as well as a kind of

"home bias" regarding Germany. In the final estimation task, we therefore asked respondents to estimate the number of COVID-19 related deaths during November for Germany, USA, China, Taiwan and Japan. This question was only asked in November, and allowed for a direct elicitation of the differences in estimation biases between these countries (Table 3).
The results clearly show that most of the German respondents were not as aware of the very positive situation in China and Taiwan (where the last fatality prior to our survey had occurred many months before), so numbers of current deaths in China as well as in Taiwan were overestimated by 84% of the respondents. In Taiwan, e.g., the median estimate for the month of November (100) was 14-times as big as the *total* number of COVID-19 related deaths (seven).[4]
On the other hand, numbers in Germany and the US were underestimated (respectively, by 86% and 77% of the respondents). The estimates for Japan, however, were basically correct.
In summary, it seems that the catastrophe at home is underestimated by Germans, but the achievements in (at least parts of East Asia) were noticed only by a minority.

3.5 Relation between knowledge and attitudes towards countermeasures

All of the previous analysis would be of little importance if "knowing the numbers" would be just a quiz and would not impact relevant parameters. This is, however, not the case: when we test the (non-parametric) correlation of the estimates with attitudes towards vaccinations and social distancing, we find a significant relation: those who know about the positive outcomes in China and Taiwan think more positively about social distancing and are more willing to get vaccinated against COVID-19 (see Table 4). In other words: attitudes about COVID-19 prevention are more positive when people know about the low death rates in some countries which is in accordance to our "positive frame" hypothesis.
There are two obvious interpretations of this finding:

- There could be a third unobserved factor influencing both which could be education or intelligence (smarter people know more about what happens in other countries and at the same time think more positive about vaccinations and social distancing). While this seems plausible, the lack of correlation between the US or German fatalities and the attitudes about vaccinations and social distancing suggests that this might not be the right explanation.

[4]Most respondents did, however, know that the situation there is better than in Germany or the US. They just severely underestimated the size of the difference.

Table 4: Relation of estimates of COVID-19 related deaths in various countries with attitudes towards social distancing and vaccinations. Spearman correlation coefficients (top) and p-values (bottom) are listed.

Country	Positive about social distancing	Willingness to get vaccinated
Germany	0.026	0.062
	0.726	0.401
China	-0.165*	-0.193**
	0.023	0.008
Taiwan	-0.154*	-0.207**
	0.035	0.004
Japan	-0.032	-0.026
	0.663	0.723
USA	0.05	0.125
	0.498	0.089

*=significant on 5%, **=significant on 1% level.

- More likely, the knowledge that COVID-19 can be defeated at least in some countries motivates people to have a more positive attitude towards countermeasures, while others are more easily going to give up in despair and stop caring. This explanation fit well with our data and would verify our hypothesis based on the ideas in Hameleers (2021), but further results is needed to support it.

3.6 Learning from East Asia?

Knowledge about the success of countries like China or Taiwan against COVID-19 is still scarce (as we have seen). The number of people, however, who agree that we can learn from East Asia how to handle a pandemic situation has increased between spring and fall in our survey data. The same is true for the overall assessment of the performance of China as compared with Germany (Table 5), but the increase was smaller. This might be explained by the initial mishandling of the situation in Wuhan, as well as recent Chinese propaganda efforts regarding COVID-19 and its alleged origin outside China: this propaganda has been received very critically in the West (see, e.g., Hernandez (2020)) and may have backfired (Rieger 2021).

Table 5: Average values of a 4-point Likert scale agreement (values from 1 to 4, see Sec. 2 for details). In autumn, more respondents were agreeing to the statements that we can learn from East Asia about handling a pandemic, and that China handled the situation better than Germany. Still the overall level of agreement was rather on the low side. Common letters denote no statistically significant difference between the respective pair of values.

	March	April	May	June	November
Learning from East Asia	—*	2.19^{a}	2.20^{a}	$2.27^{a,b}$	2.64^{b}
China handled better	$1.90^{a,b}$	1.72^{a}	1.76^{a}	$1.73^{a,b}$	2.11^{b}

*not elicited

3.7 Robustness test

One might argue that estimating absolute numbers of deaths in a country might be simply a too demanding task for respondents. It might be easier to think about it in terms of frequencies, e.g., the average number of deaths per week. Also, the discrepancy between the countries might simply be a result of the sudden increase in cases in some countries (in particular Germany) in November, and thus disappear when measuring at another point in time. To test this concern, we therefore added as robustness another smaller scale survey with $N = 70$ subjects, recruited in the same way as for our main survey, and distributed on 24-26 January 2021. This time we asked the respondents: "How many deaths per week from COVID-19 occur currently on average in the following countries (according to official figures)?" We also added one more country, namely Australia, where COVID-19 has also been mostly contained, but which is culturally closer to Germany than the East Asian countries.

We then computed the average numbers for the three weeks prior to the survey (3-24 January) and compared them to the estimates (Table 6). The results confirmed the previous observations: values for the US and Germany were severely underestimated (albeit in the case of Germany not as much as before), while values for China, Taiwan and Australia were dramatically overestimated.

The case of Australia, by the way, is interesting, as it demonstrates that the underestimation of the success in the fight against COVID-19 does not only apply to culturally distant countries (like China), but also to culturally closer countries (like Australia). In light of concerns regarding the intransparency of Chinese statistics, it also emphasizes the point that overestimation cannot be caused by a distrust in official statistics of a non-democratic state (like China) or democratic, but culturally distant countries (like Taiwan).

Table 6: Robustness test: estimated and real *average weekly* deaths due to COVID-19 in selected countries.

	Germany	USA	China	Taiwan	Japan	Australia
25% perc.	700	2000	5	5	50	4.75
Median	2000	10,000	200	100	300	90
75% perc.	6125	22,000	1000	738	1000	1000
Correct number	5835	21,826	0.33	0	563	0
N	70	70	70	70	70	70

Another potential concern is whether our results might be biased by the sample characteristics, given that our sample is on average younger and better educated than the average German population. We did, however, not find a significant correlation between age and any of the COVID-19-related estimates (Spearman correlations not significant on 5% level). We also did not find any significant difference in these estimates between participants with university degree and those without (t-tests not significant on 5% level). Thus, there seems to be no reasons to assume that our results would not carry over to a broader population.
We can, of course, not exclude that the results might differ for other, potentially very different, countries.

4 Conclusions

In this brief article, we have found some evidence that individual perceptions about the number of COVID-19 related deaths in a country are systematically biased: in our sample from Germany, numbers for Germany are underestimated, while numbers for East Asia are overestimated. This misestimation seems to be not only of academic interest, but is related to attitudes towards social distancing and vaccinations. We conjecture that knowledge about the successful fight against COVID-19 in some countries can lead to a more positive attitude about countermeasures. Spreading this information might therefore have positive effects on public health in Germany and other comparable countries.

Acknowledgement

This work was supported by the research cluster "Cultures in Transitions in East Asia and Germany" of the Trier University, funded by the research initiative of the state of Rhineland-Palatinate. I thank Mei Wang, Tom Rosman, Xenia Matschke

and Frithjof Küpper for their feedback on this article. I thank Karine Nanyan and Sinean Callery for their help with the preparation of the manuscript.

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