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The relationship between income, religiosity and health: Their effects on life satisfaction

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ABSTRACT

Within most countries, the rich are happier than the poor. Those who strongly believe in God are happier than non-believers. Plouffe and Tremblay (2017) probe whether these two patterns also hold at the national level. For religiosity, they find that more religious nations are less happy on average. Regarding income, they fail to find a national-level link between national income and self-reported life-satisfaction, even though much earlier research has shown that economic development up to a point certainly increases average well-being. We show that both findings are wrong and caused by their unusual (and logically incorrect) choice of an income variable at the national level. We re-work their analysis with the standard measure in research in this area, gross domestic product per capita, and confirm the common finding in the literature that national prosperity when properly measured has a very strong effect on average life satisfaction in a country. The national level of religiosity now has no effect on life-satisfaction, even though within most countries religious people are happier than average.

1. Introduction

Plouffe and Tremblay (2017) (hereafter, PT) primarily build on studies by Diener, Sandvik, Seidlitz, and Diener (1993) and Diener, Tay, and Oishi (2013) who looked at the – probably non-linear – relationship between income and wellbeing within countries. People who are comfortable financially are a lot happier than the poor, but the very rich are not that much happier than those who are just comfortable. Between countries the literature finds that richer countries are on average happier than poor countries. In this research note we follow PT by adding a measure of religious conviction at both the national and the individual level. PT note that it is not so clear whether very religious countries are also happier than secular nations, even though it is well established that within countries more religious people often are more satisfied with their lives.[1] They refer to Stavrova, Fetchenhauer and Schlösser (2013) and others on the relationship between religiosity and wellbeing and speculate that there may be an interaction between income and religiosity: perhaps pious believers are bothered less by poverty. We re-work their analysis, improve on their measure of income at the national level, get different conclusions because of that improvement, and also add one more relevant variable at the individual level: people's self-reported health.

2. Data and methodology

The individual-level data are from Wave 6 in the World Value Survey (WVS) and were collected for 59 national samples of at least 1000 respondents per country in the years 2010–2014. The questions are presented in the national language of the respondent, and quality control by the WVS Office checks whether the samples are representative of the national populations in terms of sex, age, education and rural/urban residence of the respondents.

At the individual level, PT include responses to “How important is God in your life” (scale 1 (not at all important) to 10 (very important)). That is one dimension of the religious experience, but there are others[2]; in addition to believing, religion can provide bonding through shared praying, singing or chanting and through sacraments and other rituals. Also, people will feel comfort from shared moral values. The WVS has

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[1] A secular country is officially neutral in matters of religion while a religious country indicates a nation with an official religion (Madeley & Enyedi, 2003). In the context of research with WVS data, though, secular means a country where few people give strong confirming answers to the questions in the Survey about religion.

[2] Daghigh, DeShong, Daghigh, Niazi, and Titus (2019) in this Journal have a nice discussion of the different dimensions of religion in the contest of Shia Islam and show that these dimension have a degree of communality between the great world religions. There is a large literature suggesting that religious attending and religious ceremonies do more for well-being than individual religious beliefs per se. See, for example, Vang, Hou, and Elder (2018).

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other questions on religion, but we follow PT (and avoid data fishing) by using the "importance of God in your life" variable only. For income, PT use "Rate your household income on a scale of 1 (lowest decile) to 10 (highest decile) applicable to your country", as well as the sex, age and education level of the respondent. At the national level, they take the national average of the individual responses for religiosity and the average of the self-rated relative incomes. Our disagreement with PT focuses on the use of a national average for self-reported relative income. We think that makes no sense, since these national averages will by definition be close to the number 5, the midpoint of the scale, for all countries, rich or poor. To help the reader's judgment, we include the original question from the WVS and the answers in Appendix 1. Below we replicate and re-estimate their model with the standard measure for income at the national level, real gross domestic product (GDP) per capita after correction for purchasing power parity (PPP). We shall estimate a multi-level model that includes the five individual level variables from PT (a single worldwide coefficient for each), the two national-level variables (religiosity and national income) and a stochastic intercept for each country. But first we introduce the individual data country by country.

3. Preliminary analysis discussion

It is well-known and obvious that in nearly all countries the rich are more satisfied with their lives than the poor, and that the support, the solace and the community felt by many religious believers makes them more at peace with their life than average. We might commit the fallacy of composition by deducing that citizens of rich countries are also happier on average than people in poor nations, or that secular societies are less happy than countries where religion is very important. Testing for such patterns between nations is the main point of PT, but they also formulate additional hypotheses that focus on combining individual data with national-level indicators for wealth and religiosity.

We start our critique by looking separately at each of the 55 countries for which we have all the data.[3] We use exactly the same variables as PT (who only report world-wide results) and find that relative income makes a significant contribution to individual life satisfaction at the 0.05 level in 51 countries while religiosity contributes significantly in 34 countries. We show the size of these effects in Figs. 1 and 2 below. The effect of a one-step improvement in income is bigger than the effect of a one-step increase in religiosity in 45 of the 55 countries.

Our 55 WVS samples also include a measure for the subjective self-reported health of the respondent (A009) which is measured on a scale of 1–5. We reverse the scale so that 1 stands for very poor and 5 for very good. The health variable is significant at the 0.05 level in 53 out of 55 countries.

4. Empirical results and discussion

4.1. Critical replication of the results in Plouffe Tremblay

PT have two models for individual life satisfaction worldwide, one contained in the other. We discuss the simpler model first. For the five individual variables (income, religiosity, sex, age and education) the same coefficient is imposed for all countries. Below, we will re-estimate this model also with separate and different coefficients for both income and religiosity in each country, which we think is better because the effects are nearly always in the same direction but not of the same size in the 55 different countries. The single worldwide coefficients on the five individual variables are all significant with the expected signs. Turning to the two variables measured at the level of countries, national levels of religiosity appear to depress life satisfaction, but we shall see below that this effect disappears once we use a better measure for national income. The income variable in PT is not significant and that is at variance with much other research.

Unfortunately, they deviate from the literature by using the income variable, x047 in the WVS, not only for each individual – which is fine – but also at the national level which is illogical. It is a relative variable, and so its average for each country should be close to the midpoint of the 1–10 range. Indeed it is, with a worldwide mean across the 59 countries of 4.9 – ideally that should be 5.5 - and a standard deviation of 0.6. Clearly, people in many countries slightly under-estimate their relative income; specifically, in poor countries only 20% of the respondents put their relative income on the high steps 7–10 of the scale, even though ideally each of these four steps should encompass some 10% of the respondents for a total of 40% in steps 7–10.

However, the national average of self-reported income on a 1–10 scale (x047) used here is unsuitable for the question whether people are more satisfied with their lives in richer countries, since it is bound by construction to be very close to the mean of 5.5 in all countries, whether rich or poor. For a better measure of income at the national level, we substitute national GDP per capita in the year of the survey (corrected for PPP) from the World Bank.[4] The coefficient on this correct measure of national income now is highly significant in our replication of the PT model (see line 2 of the Table 1).[5] In two recent papers, Mikucka, Sarracino, and Dubrow (2017) and Churchill, Appau, and Farrell (2017) also find a strong coefficient on income in their work for GDP per capita as the preferred measure of national income.[6]

We conclude that PT's result would not have been different from the above studies regarding a positive effect of national income on life satisfaction if they had used a suitable measure of national income.

4.2. Including health as a determinant of life satisfaction

We now propose a marginally richer model for life satisfaction. It is of interest – and the sample is large enough for that – to estimate separate coefficients per country for the relative income, the religiosity and the health of the respondents. So we begin by allowing these three coefficients to vary country-by-country. Differences with the model in PT now are:

1. We use a better variable for income at the national level (GDP per capita in the survey year with corrections for PPP at constant 2011 international dollars from the World Bank).
2. We add one individual variable for the self-reported health of the respondent which is found to be significant for life satisfaction in 53 out of 55 countries.
3. We estimate the model with a different coefficient for each country for relative income, religiosity and subjective health.

The bottom line in Table 1 once again shows the coefficient on income at the national level from this model. It is an estimate for the full WVS data set. Not only is a higher-than-average income in one's country

[3] We introduce one more variable on people's self-reported health below and report all statistics for the 55 countries for which we have relative income, religiosity and self-reported health as well as education, the three demographic variables and national GDP. Our sample is slightly smaller than that in PT because the World Bank's data for GDP per capita with PPP correction omit Libya, Palestine and Taiwan. So we have 55 national samples rather than 58.

[4] PT note in their concluding remarks that perhaps GDP would indeed be more appropriate if we want to compare countries, but leave it to us to show what a big difference a correct measure makes to the results.

[5] The table in Appendix 1 gives the full model specification copied from PT, but now with the correct measure of income at the national level.

[6] Numerous earlier empirical studies also support a positive cross-sectional correlation in the related area of testing correlations between proxies of social capital and economic development (Beugelsdijk, De Groot, & Van Schaik, 2004; Whiteley, 2000; Zak & Knack, 2001).

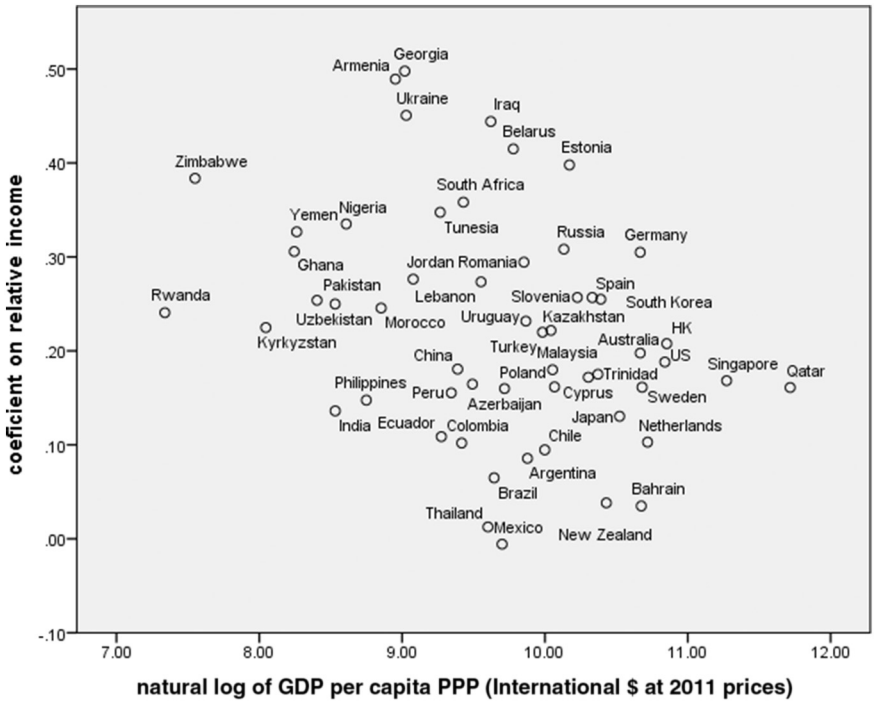

Fig. 1. The sensitivity of wellbeing with relative income as one of the correlates.

We estimate a model for self-reported life satisfaction with relative income as one of the correlates (this figure). In Mexico, Thailand, Bahrain and New Zealand, there is no visible effect. In all other countries, richer people are significantly more satisfied with their lives. Both life satisfaction and relative income are measured on a 1–10 scale, so a coefficient of, say, 0.3 means that someone in the top income category is $5 \times 0.3 = 1.5$ points more satisfied with life on that scale.

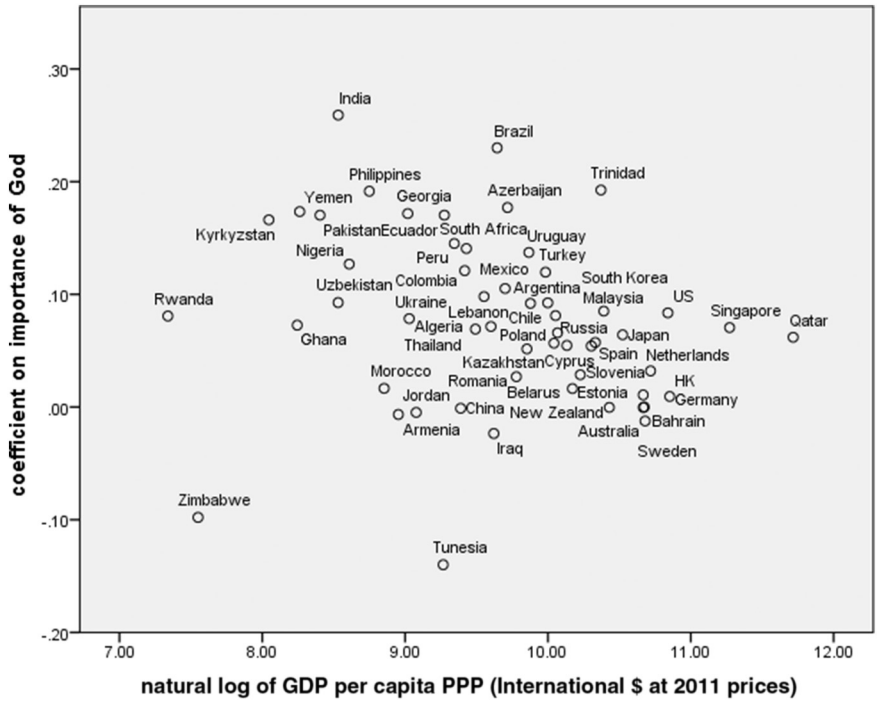

Fig. 2. The sensitivity of wellbeing to religiosity.

This figure indicates the sensitivity of self-reported life satisfaction to religiosity. At the average coefficient of 0.1, a very religious person (10 on the 1–10 religiosity scale) would be 1 point higher in life satisfaction on its 1–10 scale than a non-believer.

positive for life satisfaction at the individual level, but it is also very clear that richer countries on average are happier places to live in.[7]

Fig. 1 shows the sensitivity of wellbeing with relative income as one of the correlates. In poorer countries, being a little more prosperous brings a much greater increase in wellbeing than in rich countries. Note also that in much of Latin America, poor people are not that much less satisfied with their lives than rich people. In most middle-income countries, relative income does make a big difference to people's wellbeing; much less so in most of Latin America according to these estimates.

Fig. 2 shows that attaching more importance to God in your life contributes to well-being, but not by much. The coefficient is significant in 34 out of 55 countries, but small, remembering that both religiosity

[7] We follow PT and other cited literature in estimating a simple linear relationship. In richer models, and with data for more countries than the 55 countries in this replication of PT, we could include measures of inequality, the social safety net, corruption, quality of institutions etc.

Table 1
Life satisfaction as dependent variable - only coefficient on income shown.

PT's finding: income aggregate	0.08 (0.16)[0.50]
GDP per capita (based on PT, wave 6 dataset only)	0.41(0.14)[2.9]*
GDP per capita (full World Values Data set)	0.64 (0.18)[3.5]**

Note: standard errors in brackets and t-value in parentheses. For a list of other variables see Table 2 below. PT use the national average of self-reported income which logically has to be near the midpoint of its Likert scale for all countries. We follow the literature in employing GDP per capita in the survey year with correction for purchasing power parity. Now the coefficient is strongly positive, showing that average life satisfaction is higher in richer countries. Fig. 1 shows differences in life satisfaction within countries.

* P < 0.05.

** P < 0.001.

and life satisfaction are measured on a 1–10 scale. In this model, the gap in life satisfaction between rich and poor is larger in nearly all countries than the gap between pious people and non-believers.

Fig. 3 is about health and wellbeing. Note the very large coefficients for a number of rich OECD countries, such as the United States (US), Japan, Australia, Sweden and the Netherlands. Points on the 1–10 scale for life satisfaction.

4.3. Further results with the interaction between income, religiosity and health

We now evaluate the final column in Table 2 of PT where they look at interaction effects. In their paper, these are the product of individual relative income and individual religiosity as well as the product of national income and national religiosity. Since we have added subjective health as an individual explanatory factor for life satisfaction, we have two more possible interaction variables: health paired with income and health combined with religiosity.

The product of income and religiosity is insignificant in PT at both the individual and at the national level and that gets confirmed in our replication. The coefficient for the product term of health and religiosity at the individual level has a t-value of 3 but the standardized coefficient is tiny when compared to the coefficients for health and religiosity on their own. The interaction between health and income at

Table 2
Life satisfaction as dependent variable.

	PT replication	Health added model
Individual-level		
Intercept	2.381	−0.253
	[1.741]	[−0.197]
Religious belief	0.070**	0.068**
	[21.036]	[21.036]
Income	0.261**	0.223**
	[66.628]	[58.031]
Sex (0 = male, 1 = female)	0.052*	0.106**
	[3.437]	[7.197]
Age	−0.005**	0.005**
	[−9.147]	[9.746]
Education	0.016**	−0.002
	[4.045]	[−0.467]
Country-level		
Religious belief aggregate	−0.051	−0.059
	[−0.937]	[−1.164]
GDP per capita	0.323*	0.302*
	[2.754]	[2.752]
Health		0.692**
		[70.345]
Variance components		
Residual	4.013**	3.750**
	[187.57]	[187.50]
Intercept	0.504**	0.443**
	[5.066]	[5.063]
Number of estimated parameters	10	11

Note: t-value in brackets. Multi-level models for life satisfaction. Same specification as in PT Table 2 but with a correction for the income variable at the national level. GDP now is positively related to life satisfaction. No link between national level religiosity and individual happiness. All relevant coefficients are very similar to those in Table 2 in PT, apart from the intercept. That is because their national-level income variable is so different from ours. Column 2 adds the variable for individual health.

* P < 0.05.

** P < 0.001.

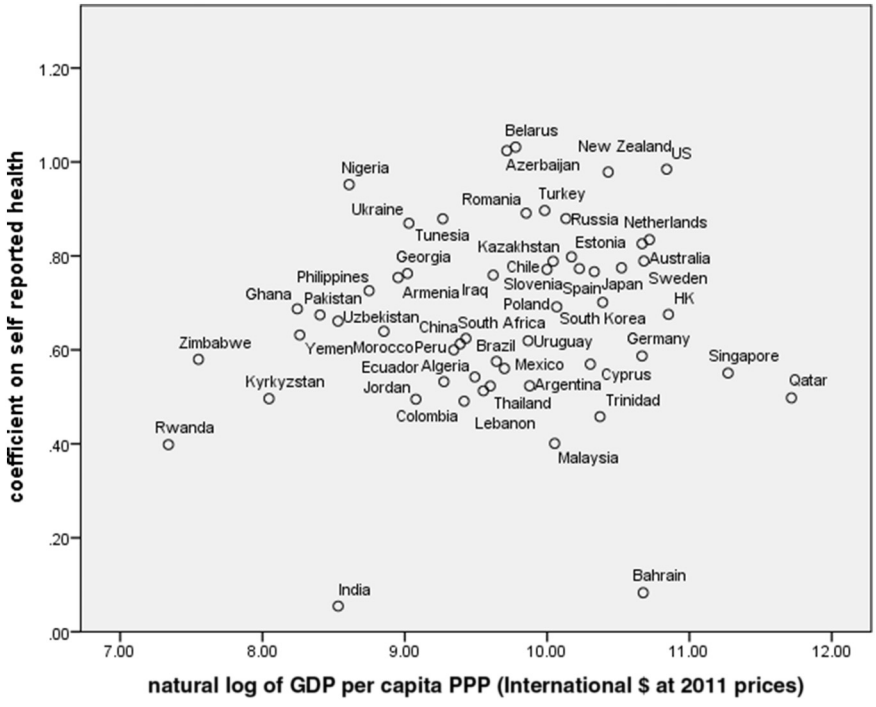

Fig. 3. The sensitivity of wellbeing to health.
We estimate a model for self-reported life satisfaction with s elf-reported health as one of the explanatory variables. Apart from Bahrain and India, the coefficient is strongly significant in all countries. Relative health is measured on a 1–5 scale, so a coefficient of, say, 0.8 means that someone who is in excellent health (score 5) is 3.2 points higher on average on the 1–10 scale for life satisfaction.

the individual level has a t-value of −7.2 if we estimate one coefficient for the complete international sample. Individual coefficients, if we estimate for each country separately, are significantly negative in 16 countries, meaning that in these countries being rich and healthy is nicer than just being rich, but that we should not just add the separate effects. Conversely, being poor and unhealthy is terrible, but not as bad as would be suggested by adding the two separate effects. Richer data would be needed to further investigate.

Finally, we can use these data for some insight in the sources of reduced life satisfaction. We compare results for the people who answer 1–3 for their estimate of life satisfaction to the complete sample. Naturally, such unhappy people have a lower score on self-reported income, less religiosity and poorer health in most countries. But if we look at the results for the individual countries, we find an interesting outcome for the self-reported health. Unhappy people on average are more unhealthy than average for all countries (except Bahrain where there is no difference), but the gap is especially marked for the rich Western countries. In the eight rich Western countries in the dataset (Australia, Cyprus, Germany, Netherlands, New Zealand, Spain, Sweden and U.S), poor health is a much more important cause of misery than on average worldwide. A simple test regressing the difference in health between unhappy people and their national average on a dummy variable for the rich West gives a t-value of 4.4.[8]

5. Conclusions

PT find “contrary to prediction, there was a negative main effect of country-level religious belief on life satisfaction, and no main effect of country-level income on life satisfaction”. We show that an unfortunate decision to use a measure of relative income not only at the individual level but also as a national average is responsible for both parts of that quote. Working with the standard measure for income at the national level, we get a strong positive coefficient. Life satisfaction on average is higher indeed in richer countries. At the same time the coefficient that measures whether there is an effect of country-level religiosity on life satisfaction loses its significance: within most countries the more religious people tend to be happier, but, correcting for GDP per capita, there is no evidence of a link between religiosity and life satisfaction at the national level.

We add a variable from the WVS that indicates the self-reported health of the respondent. In statistical terms, health correlates with life satisfaction at least as strongly as income and much more than religiosity. Note that PT, this critical comment, and all the cited empirical literature do not investigate possible reverse effects of wellbeing on income or religiosity. People who are satisfied with their lives may well have more energy and confidence in their education, their training and their work and thus achieve a higher income. Unfulfilled people can lack the confidence to do well in school or at work. Religious people may have sources of strength that help them overcome adversity. Life satisfaction is bound to have positive effects on self-reported health as well, but obviously this cross-sectional dataset does not enable study of the multiple interactions during people's lifetimes from health to income, from income to health and between health and religiosity. Further research should look for ways to model these reverse effects.

We perform a final test for those in the sample who rate themselves much less satisfied than the average for their country and find that in the rich Western countries, poor health has become a more important cause of limited life satisfaction than being at the lower end of the income scale. Average incomes of course are higher in the rich West and the welfare state alleviates extreme poverty, so that in rich countries being in poor health becomes a more important source of reduced life satisfaction. Concern about income inequality in rich countries should be extended to a concern about inequality in health, and life satisfaction of the poor might increase more easily with better health facilities and more attention to prevention than by focusing only on the disposable income of the poor.

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Appendix 1

Table 3
Wording Used in the WVS indicators and World Bank open data.

Variable	Description	Code
Life satisfaction	WVS Question “All things considered, how satisfied are you with your life as a whole these days?” (recoded)	1 = Dissatisfied 10 = Satisfied.
Woman	WVS Code respondent's sex by observation (recoded)	1 = female 0 = male
Age	WVS Question “This means you are ___ years old (write in age in two digits).”	Actual age of respondent
Education	WVS Question “What is the highest educational level that you have attained?” (Recoded) “No formal education” is the reference category	1 = Incomplete primary school 8 = University-level education, with degree
Income	WVS Question “Here is a scale of incomes. We would like to know in what group your household is, counting all wages, salaries, pensions and other incomes that come in. Just give the letter of the group your household falls into, before taxes and other deductions.”	1 = lowest 10 = highest
Religious belief	WVS Question “How important is God in your life? Please use this scale to indicate.”	1 = not at all important 10 = very important
Health	WVS Question “All in all, how would you describe your state of health these days? Would you say it is…” Recoded	1 = Very poor 5 = very good
GDP per capita	GDP per capita in the survey year with corrections for PPP at constant 2011 international dollars from the World Bank	

Source: WV6_Official_Questionnaire_v5_SilatechMenaModule_English.doc, retrieved from http://www.worldvaluessurvey.org/WVSDocumentationWV6.jsp. World Bank open data. Retrieved from: https://data.worldbank.org/indicator/NY.GDP.PCAP.PP.KD.

[8] Data used and results obtainable from the authors.

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