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The Effect of Private Health Insurance on Doctor Visits, Hospital Nights, and Self-Assessed Health: Evidence from the German Socio-Economic Panel

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Abstract

In Germany, employees are generally obliged to participate in the public health insurance system, where coverage is universal, co-payments and deductibles are moderate, and premia are based on income. However, they may buy private insurance instead if their income exceeds the compulsory insurance threshold. Here, premia are based on age and health, individuals may choose to what extent they are covered, and deductibles and co-payments are common. In this paper, we estimate the effect of private insurance coverage on the number of doctor visits, the number of nights spent in a hospital, and self-assessed health. Variation in income around the compulsory insurance threshold provides a natural experiment that we use to control for selection into private insurance. We find negative effects of private insurance coverage on the number of doctor visits, no effects on the number of nights spent in a hospital, and positive effects on health.

JEL Classifications: I11, I12, C31.

1. Introduction

In Germany, employees are generally obliged to participate in the public health insurance system, where coverage is universal, co-payments and deductibles are moderate, and premia are based on income. However, they may buy

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private insurance instead if their income exceeds the so-called compulsory insurance threshold.[1] Here, premia are based on age and health, individuals may choose to what extent they are covered, and deductibles and co-payments are common.[2] These differences in the incentive structure may affect both health behavior and the demand for medical care. In particular, because of the higher co-payments and deductibles, privately insured patients have stronger incentives to invest in prevention to decrease the likelihood of illness and the need to demand medical services.

An important difference affecting the supply of services is that for the same treatment, the compensation doctors receive for privately insured patients is, on average, 2.3 times as high as the compensation for publicly insured patients (Walendzik, 2008). Therefore, doctors have an incentive to treat privately insured patients first, and more intensively, possibly providing better treatment (Jürges, 2009). This is reflected, for instance, in lower waiting times for privately insured patients (Lungen et al., 2008). These differences affecting the supply of services may also affect the demand for medical care. For example, privately insured individuals may be more inclined to see a doctor because the quality of the treatment is better or waiting times are shorter.

The combination of incentives for supply and demand determine whether the amount of services consumed is higher or lower for privately insured individuals, and what effect insurance type has on their health. Ultimately, it is an empirical question whether more or fewer services are consumed and how health depends on insurance status.

In this paper, we estimate the effect of private insurance on the number of doctor visits, the number of nights spent in a hospital, and self-assessed health.[3] An unusual feature of the German health insurance system allows us to control for selection into private insurance: as soon as income in the last year exceeds the so-called compulsory insurance threshold, individuals become eligible to opt out of the public health insurance system and may buy private insurance instead. Random variation in income around this compulsory insurance threshold generates a natural experiment that allows us to conduct a regression discontinuity (RD) analysis.[4] Our setup is the same as in Battistin et al. (2009). This yields estimates of local average treatment effects for individuals who buy

1 About 90 percent of the German population is insured in the public health insurance system. Most other people buy private insurance (Colombo / Tapay, 2004).

2 In our data, 70 percent of the privately insured individuals who answered the relevant question have insurance contracts that involve deductibles or co-payments.

3 We do not estimate the effects of specific insurance characteristics but interpret the results in light of the fact that deductibles and co-payments are common features of private insurance contracts.

4 The RD approach has been suggested by Thistlethwaite and Campbell (1960) and has recently been developed by Hahn et al. (2001).

private insurance once they become eligible. These effects are of interest to policymakers considering increasing the compulsory insurance threshold. Such an increase would force precisely those individuals for whom we estimate the effect to be publicly insured, and hence our estimates are informative about the effects of such a policy change.

We use survey data from the German Socio-Economic Panel (SOEP) for our analysis because German administrative data, while providing accurate income measures, do not include health-related information. In the data, we find direct evidence of measurement error in income and that there is a sizable number of individuals who, according to their reported income, are not eligible to buy private insurance but at the same time report being privately insured. We model the measurement error in the forcing variable, income in our case, within the RD framework. This then allows us to estimate the effects of interest.

Controlling for selection into private insurance, we find a significant negative effect of being privately insured on the number of doctor visits for individuals who visit the doctor at least once in a three-month period. At the same time, we find no significant effect on the number of nights spent in hospital, which can arguably be influenced less by the individual, and positive effect on self-assessed health. This suggests that privately insured patients receive better or more intensive treatment each time they see a doctor, or that they invest more in prevention.

There are at least four studies for Germany that relate the demand for medical services to insurance type. They all use data from the SOEP. Geil et al. (1997) estimate a count data model for hospital visits on data from 1984 – 1989, 1992, and 1994. They find no correlation between insurance coverage and the hospitalization decision. Riphahn et al. (2003) estimate a bivariate count data model for physician and hospital visits. They use data from 1984 through 1995 and find that neither hospital nights nor doctor visits depend on the insurance type of the individual. Pohlmeier/Ulrich (1995) and Jürges (2009) estimate negative binomial hurdle models. Pohlmeier/Ulrich (1995) use data from 1985 and find that privately insured individuals are less likely to contact a general practitioner, but once they do so, the number of visits is not significantly different from the one for publicly insured patients. Jürges (2009) uses data from 2002 and finds that privately insured individuals are less likely to visit a doctor at all, but given that they do, the number of doctor visits is significantly greater than that of patients covered by public health insurance. What all four papers have in common is that they do not control for selection into private insurance.

The remainder of this paper is organized as follows. Section 2 discusses the institutional details. In Section 3 we provide information on the data. Section 4 discusses the econometric approach. Results are presented in Section 5. Finally, Section 6 concludes.

2. Institutional Details

In Germany, about 90 percent of the population is publicly insured (Colombo / Tapay, 2004). Buying public insurance is mandatory for dependent employees as long as their income does not exceed the compulsory insurance threshold. The public insurance premium is a certain percentage (currently around 15 percent equally divided between the employer and the employee) of gross income up to the contribution ceiling.[5]

In general, once an individual has bought private health insurance, he or she can only get back into the public system when he or she becomes unemployed (provided that he or she is younger than 55) or when his or her income falls below the compulsory insurance threshold (Colombo / Tapay, 2004).

Due to a reform, the compulsory insurance threshold increased substantially for income earned in 2003 and later. A special rule applied to individuals who in fact bought private insurance in 2003, but who were no longer eligible for this according to the new thresholds. They were still allowed to buy private insurance provided that their income was at least equal to the contribution ceiling, which only increased moderately.[6]

Contributions for private health insurance are mainly based on health and age, so buying private insurance is particularly attractive for young individuals. As a consequence of this, and because of the fact that private insurers are allowed to reject individuals, the risk pool of private insurers is much better than in the public system (Jürges, 2009).

Coverage is universal in the public system. Deductibles and co-payments are limited. Privately insured individuals can buy better care, including, for instance, treatment by the head doctor in a hospital or a single room in a hospital, but this comes at a higher price. Deductibles and co-payments are much more common, and many insurers offer a rebate if an individual has not used any medical services in the past calendar year. Unfortunately, specific characteristics of private insurance are not recorded in our data.

At this point, it is worth mentioning that there is a feature of the German public health insurance system called family insurance. A spouse and children are automatically insured if an individual is insured. For this, it is mandatory that the spouse is not full-time self-employed and that the spouse does not earn

[5] See Jürges (2009) and the references therein for more details on this and the following discussion.

[6] We excluded these individuals from the empirical analysis. Also, individuals can apply for an exemption if they lose eligibility *solely* due to the usual year-to-year increase in the compulsory insurance threshold. This applies to very few individuals in our data, about a tenth of a percent of all individual-year observations, and we therefore abstract from this exemption in the remainder.

more than a rather low specified amount. If a married man is working, this system generates incentives against working for his wife because then she would have to pay contributions which amount to about 7.5 percent of her gross wage. (The employer matches this and pays approximately the same amount to the system). Since there is no family insurance scheme under private health insurance, individual insurance has to be purchased for each family member.

As already pointed out, insurance status has important consequences for the compensation of doctors. For a given treatment, the compensation doctors receive for privately insured patients is, on average, 2.3 times as high as the compensation for publicly insured patients (Walendzik et al., 2008). Furthermore, there is indirect evidence that doctors face significant time constraints when treating patients. The consultation time for the average (publicly insured) individual is very short in Germany.[7] Deveugele et al. (2002, Table 4) compare the average consultation length for general practitioners in six countries and find that with 7.6 minutes it is lowest in Germany. It is highest in Switzerland, where it is 15.6 minutes. Given also the differences in compensation, this suggests that doctors dedicate more time to privately insured patients.

3. Data

The SOEP data we use in this study contain information at the individual level on medical care utilization, self-assessed health, and background variables. We analyze data from western Germany for the period from 1995 to 2006.[8]

Our sample is constructed so that eligibility to opt out of the public insurance system is exclusively determined by income. Unemployed individuals who receive unemployment benefits are required to be in the public health insurance system. Since they have no way of opting out, they are excluded from our sample. Self-employed persons, civil servants, soldiers, teachers in private schools and students are not required to be in the public system, even if their income is below the compulsory insurance threshold. Hence, eligibility does not depend on income and so they are also excluded from the sample. Retired individuals who receive a public pension are required to have public health insurance.

[7] Remember that about 90 percent of people in Germany are publicly insured. See footnote 1.

[8] We do not use data before 1995 because the question on the number of doctor visits was phrased differently. We use data only up to 2006 because from 2007 onwards individuals had to earn more than the compulsory insurance threshold in three consecutive years in order to be eligible to buy private insurance. East German individuals have been excluded because it turned out that for them, even when we control for measurement error in income, there is no jump in the probability of being privately insured when income is equal to the compulsory insurance threshold.

They may opt out if insurance was not mandatory for at least five years after the age of 55 and most of the time before that. Hence, eligibility is only loosely related to income and therefore these individuals are also excluded. People aged 55 or older are excluded for two reasons. First, various ways of opting for (early) retirement are open to them. Second, it is difficult for them to get back into the public health insurance system. Individuals under the age of 25 are excluded because a large proportion of them are covered by their parents' insurance.

Table 1

Descriptive Statistics

	(1) Ineligible	(2) Eligible	(3) Public insurance	(4) Private insurance	(5) Total
At least one doctor visit	0.619	0.594	0.611	0.521	0.613
	-	-	-	-	-
Doctor visits given at least one visit	3.304	2.920	3.243	2.904	3.223
	(4.212)	(3.365)	(4.094)	(3.287)	(4.052)
Doctor visits	2.045	1.733	1.999	1.651	1.977
	(3.682)	(2.963)	(3.581)	(2.866)	(3.541)
At least one night in hospital	0.079	0.065	0.078	0.057	0.076
	-	-	-	-	-
Nights in hospital	0.862	0.655	0.833	0.572	0.613
	(5.027)	(4.033)	(4.844)	(4.603)	(4.830)
Self-assessed health	3.585	3.696	3.596	3.799	3.609
	(0.850)	(0.790)	(0.841)	(0.777)	(0.838)
Gross income	23,914.80	61,249.00	29,879.10	63,515.70	31,998.60
	(9,693.90)	(27,755.60)	(18,005.30)	(41,082.40)	(21,837.50)
Years of education	11.533	13.971	11.881	14.785	12.065
	(2.228)	(2.929)	(2.471)	(2.945)	(2.601)
Married	0.654	0.746	0.676	0.649	0.674
	-	-	-	-	-
Male	0.500	0.848	0.562	0.784	0.576
	-	-	-	-	-
Age	39.393	42.161	39.872	41.775	39.992
	(8.338)	(7.206)	(8.229)	7.274	(8.186)
N	35,822	9,900	42,841	2,881	45,722

Note: Means and standard deviations (in parentheses). For binary variables, only proportions are shown. The sample consists of dependent employees for whom eligibility to opt out of the public health insurance system is exclusively determined by income. *N* is the number of persons per years. Eligible means that individuals may buy private insurance and the number of doctor visits is assessed for the 3 months before the interview. *t-tests* show that for all variables the difference in the mean between ineligible and eligible individuals and between publicly insured and privately insured individuals is significantly different from zero.

To summarize, our study population consists of West German individuals aged 25 to 55 with a regular employment contract for whom eligibility to opt out of the public health insurance system is exclusively determined by income. There are 45,722 observations across individuals and time.Table 1 contains descriptive statistics for the variables used in the analysis. The first set of rows contains the outcome variables.[9]

Individuals who are eligible (to buy private insurance) and privately insured visit the doctor slightly less often, and report being in slightly better health. They report being less likely to stay in hospital and to spend fewer nights in hospital on average.

The second set of rows contains summary statistics for individual characteristics. Gross income is, by construction, on average higher for those who are eligible. In light of this, it is not surprising that it is higher for the privately insured (because only those with high enough incomes are eligible to buy private insurance). The remaining rows are informative about selection into private insurance. Given the characteristics of public and private insurance, it is relatively more attractive to buy private insurance for individuals who are not married. This is because spouses whose income is relatively low are automatically covered by the insurance of their partner. This is reflected by the fact that privately insured individuals are less likely to be married. Also, they are older and better educated.

Table 2 contains ordinary least squares estimates of the outcome variables in the relevant columns on insurance status, years of education, marital status, and age.[10] The coefficient on insurance status is the observed difference in the average outcome variable between privately and publicly insured individuals once we control for years of education, marital status, and age. We find that there is only a significant difference in self-assessed health.[11] This is in line with Geil et al.'s (1997) finding of no correlation between insurance coverage and the

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9 For the question on self-assessed health, 'bad' is coded as a 1, 'poor' as 2, and so on, up to 'very good' as 5. Hence, a positive association between health and private insurance would be reflected in a positive coefficient on an indicator for private insurance in an ordinary least squares regression.

10 To make the results comparable to our main results below, the sample only contains individuals who earn between 15,000 euros less than and 25,000 euros more than the compulsory insurance threshold. The main difference when we use the unrestricted sample is that the coefficient on private insurance status for at least one doctor visit is negative and significant at the 5 percent level, with a point estimate of -0.029, and the coefficient on at least one hospital night is -0.003 and significant at the 1 percent level. One explanation for this is that the unrestricted sample contains more individuals with high incomes, some of whom are privately insured, and more individuals with low incomes who are publicly insured, and that individuals with higher incomes are in better health.

11 Following Pohlmeier/Ulrich (1995) and Jürges (2009), we also estimated hurdle models, which yielded the same qualitative results.

Table 2

Ordinary Least Squares Estimates

	(1)	(2)	(3)	(4)	(5)	(6)
	At least one doctor visit	Doctor visits for subsample	Doctor visits	At least one night in hospital	Nights in hospital	Self-assessed health
Baseline outcome	0.622***	3.469***	2.197***	0.074***	0.397*	4.177***
	(0.033)	(0.340)	(0.241)	(0.016)	(0.222)	(0.068)
Private health insurance	-0.021	0.170	0.045	-0.009	-0.046	0.083**
	(0.017)	(0.163)	(0.117)	(0.007)	(0.112)	(0.035)
Years of education	0.002	-0.076***	-0.041***	-0.003***	-0.044***	0.028***
	(0.002)	(0.016)	(0.011)	(0.001)	(0.010)	(0.004)
Married	0.011	-0.141	-0.065	0.003	-0.098	0.005
	(0.009)	(0.094)	(0.068)	(0.004)	(0.068)	(0.019)
Gender (male)	-0.182***	-0.448***	-0.873***	-0.019***	-0.138**	0.046**
	(0.009)	(0.099)	(0.078)	(0.005)	(0.069)	(0.022)
Age	0.002***	0.038***	0.031***	0.001***	0.032***	-0.025***
	(0.001)	(0.006)	(0.004)	(0.000)	(0.004)	(0.001)
N	23,820	14,360	23,820	23,820	23,820	23,820

Note: Standard errors are clustered at the individual level and shown in parentheses. *, **, ***, denote significance at the 10, 5, and 1 percent level, respectively. The sample consists of dependent employees for whom eligibility to opt out of the public health insurance system is exclusively determined by income and who earn between 15,000 euros less than and 25,000 euros more than the compulsory insurance threshold. The subsample in column (2) is the subsample of observations with at least one doctor visit.

hospitalization decision and Riphahn et al.'s (2003) finding that neither hospital nights nor doctor visits depend on the insurance type of the individual. It is also in line with Pohlmeier and Ulrich's (1995) finding that once privately insured individuals see a doctor, the number of visits is not significantly different than for publicly insured patients. In contrast to our results, however, Pohlmeier and Ulrich (1995) and Jürges (2009) find that privately insured patients are significantly less likely to contact a doctor. This is because we have restricted the estimation sample to contain only individuals who earn between 15, 000 euros less than and 25, 000 euros more than the compulsory insurance threshold. Once we relax this restriction, we also find a significant negative correlation. Finally, Jürges (2009) finds that given that individuals visit the doctor at least once, the number of doctor visits is significantly higher for privately insured patients. We obtain the same result once we additionally condition on health, which is arguably highly endogenous, since health is directly related to the number of doctor visits and the number of hospital nights. We would like to stress once more at this point that all of the above results, including those reported in Table 2, are purely descriptive as insurance status is very likely to be endogenous.

In the following, we control for selection into private insurance by performing an RD analysis where the forcing variable is gross yearly income. This is

not reported by the SOEP respondents but constructed from their reports on their average gross monthly income in the previous year and their reports on supplementary income such as 13th month salary, 14th month salary, Christmas bonus, vacation pay, profit share, premia, and bonuses. Using self-reported income and the compulsory insurance threshold, we can compute the eligibility status for every individual. We find that there is a sizable number of individuals, 20 percent of those with private health insurance, who, according to their reported income, are not eligible to buy private insurance, but at the same time report having done so. See Hullegie/Klein (2010) for more information on measurement error in income.

4. Econometric Approach

Let $(y_i(0), y_i(1))$ be the pair of potential outcomes for each member i of the study population. In our case, $y_i(0)$ denotes the health outcome of individual i if public health insurance is assigned to him and $y_i(1)$ denotes the health outcome individual i experiences if private health insurance is assigned to him. That is, we consider private health insurance to be the "treatment".

Let z_i^* denote the difference between income earned in the previous year and the corresponding compulsory insurance threshold. Then, an individual is eligible to buy private health insurance when $z_i^* \geq 0$. Buying private insurance is voluntary for those who are eligible, so some will buy it while others will not.

Under the usual assumptions, the average treatment effect for individuals who would buy private health insurance when they become eligible is given by[12]

$$(3) \quad \Delta^{LATE} \equiv \mathbb{E}\left(y_i(1) - y_i(0) | p_i = 1, z_i^* = 0\right) = \frac{\mathbb{E}\left(y_i | z_i^* = 0^+\right) - \mathbb{E}\left(y_i | z_i^* = 0^-\right)}{\mathbb{E}\left(p_i | z_i^* = 0^+\right)},$$

where y_i is the observed health outcome, p_i is an indicator of private insurance, $\mathbb{E}\left(\cdot | z_i^* = 0^+\right) \equiv \lim_{\delta \downarrow 0} \mathbb{E}\left(\cdot | z_i^* = \delta\right)$, and $\mathbb{E}\left(\cdot | z_i^* = 0^-\right) \equiv \lim_{\delta \uparrow 0} \mathbb{E}\left(\cdot | z_i^* = \delta\right)$. This effect is of particular interest because it is directly related to the question of what the effect of requiring all individuals with incomes slightly above the compulsory insurance threshold to buy public insurance would be, namely the opposite of the effect we estimate.

We account for measurement error in income using a parametric model. The main assumption, apart from functional form assumptions, is that $z_i^* = z_i - u_i$,

[12] The RD method, as implemented in our paper, requires three assumptions to hold, which is very plausible in our case. Due to space limitations, they are only discussed in Hullegie/Klein (2010).

where z_i is the difference between reported income and the compulsory insurance threshold, and u_i is normally distributed, independent of z_i with mean zero and variance σ_u^2. We then jointly estimate the equation for the probability of being privately insured conditional on reported income, the denominator in equation eq (3) above, and the equation for medical care utilization conditional on reported income, the denominator in the same fraction. Throughout, we allow the probability of being privately insured to have year-specific jumps at the compulsory insurance threshold. This is reasonable since the compulsory insurance threshold has changed over time. We impose that the local average treatment effect is the same in all years, i.e., we impose that Δ^{LATE}, our parameter of main interest, is not only locally independent of z_i^*, but over a whole range of values. See Hullegie/Klein (2010) for further details.

5. Results

Table 3

Main Results

	(1)	(2)	(3)	(4)	(5)	(6)
	At least one doctor visit	Doctor visit for subsample	Doctor visit	At least one night in hospital	Nights in hospital	Self-assessed health
Δ^{LATE}	-0.079	-3.746***	-2.137***	-0.063*	-1.084*	0.449***
	(0.076)	(0.945)	(0.546)	(0.035)	(0.572)	(0.160)
Baseline outcome	0.606***	3.329***	2.013***	0.074***	0.783***	3.614***
	(0.005)	(0.054)	(0.039)	(0.002)	(0.039)	(0.011)
N	24,203	14,579	24,203	24,203	24,203	24,203

Note: Standard errors are clustered at the individual level and shown in parentheses. *, **, *** denote significance at the 10, 5, and 1 percent level, respectively. The sample consists of dependent employees for whom eligibility to opt out of the public health insurance system is exclusively determined by income and who earn between 15,000 euros less than and 25,000 euros more than the compulsory insurance threshold. The subsample in column (2) is the subsample of observations with at least one doctor visit.

Table 3 presents the estimates of Δ^{LATE} for the number of doctor visits in the past three months, the number of nights spent in hospital, and self-assessed health. The respective baseline outcome is the average outcome for publicly insured individuals whose actual income is equal to the compulsory insurance threshold.

In specification (1), we use an indicator for at least one doctor visit as the dependent variable. This is a linear probability model since the expected outcome is a probability. 60.6 percent of the publicly insured individuals see a doctor at least once within a three-month period. We find no significant effect of private insurance on this. In specification (2), we estimate the effect of pri-

vate insurance on the number of doctor visits for individuals who visit a doctor at least once. The baseline outcome is 3.329 doctor visits. The effect of private insurance on this is estimated to be negative and significant at the 1 percent level. The estimated magnitude of the effect, however, seems to be too big. Specification (3) is for the number of doctor visits in the entire sample. This is a combination of the two effects discussed above. The mean baseline outcome is estimated to be 2.013. The estimated effect is negative and significant at the 1 percent level, but again the magnitude of the point estimate is too big as it exceeds the baseline in terms of the magnitude.

Our interpretation of these results is that the patient and the doctor jointly determine the number of doctor visits, and that either fewer visits are needed for privately insured patients because they have invested in prevention or because they are treated more intensively. This is reasonable because doctors are paid based on the number of treatments, not on the number of visits, and receive a higher compensation when they treat privately insured patients. They are time-constrained and may thus focus on treating privately insured patients first (Lungen et al., 2008; Jürges, 2009), while spending relatively little time on publicly insured patients (Deveugele et al., 2002).

In specification (4), we use an indicator for at least one night spent in a hospital as the dependent variable. This is also a linear probability model. We find that 7.4 percent of the publicly insured spend at least one night in a hospital. The results indicate that there is no significant effect of private insurance on this (at the 5 percent level). Specification (5) is for the number of nights spent in hospital and here, too, we find no significant effect of private insurance (also at the 5 percent level). These findings for hospital nights are intuitively plausible as the number of nights spent in hospital can be influenced less by the individual, as compared to the number of doctor visits.

Finally, we find that private insurance has a positive effect on health. Although, again, the size of the effect seems to be too big, it is plausible that privately insured patients report being in better health because they either invest more in prevention or because they receive better treatment once they visit a doctor.

These results are robust to a number of robustness checks for which results are reported in Hullegie and Klein (2010) and the corresponding Online Appendix.

6. Conclusions

In this paper, we estimate the effect of private health insurance on the number of doctor visits, the number of nights spent in hospital, and self-assessed health in Germany. Variation in income around the compulsory insurance

threshold generates a natural experiment which allows us to control for selection into private insurance and estimate respective average treatment effects for individuals who buy private insurance once they become eligible by earning enough.

We find a significant negative effect of private insurance on the number of doctor visits for individuals who see a doctor at least once. At the same time, we find no effect of private health insurance on the number of nights spent in hospital, and a positive effect on self-assessed health. This suggests that private health insurance either has a positive effect on investment in prevention because of the monetary incentives provided to the insured, or that privately insured patients receive more intensive or better treatment each time they visit a doctor.

In order to draw policy conclusions, it will be important to investigate which one of the two mechanisms is at play, and to validate that the effect of private health insurance on health – as measured by more objective indicators – is indeed positive.

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