

Diligence Aversion: The Psychological Burden of Quality Management

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Abstract

Quality management can evidently generate improvements in quality. However, receiving criticism and the pressure to make improvements is psychologically burdensome. We hypothesize that this pressure is valued differently in different cultures. This study measures diligence aversion by running an online survey in eight countries. The elicited measure documents marked international differences. Econometric estimates then support the theoretical propositions that countries with a higher level of diligence aversion produce lower quality goods and generate a lower level of income and happiness. Particularly the fraction of the population with a high level of diligence aversion has a decisively negative effect on the productivity of an economy.

Keywords

Quality Control, Psychological Burden of Diligence, Cultural Differences

1. Introduction

This article explores the psychological stress that comes with the production of high-quality goods and services. It takes diligence, e.g., painstaking effort, careful attention, and thoroughness to produce at a high level of quality. Diligence as instrumental for output quality and economic performance has been discussed before (Weber, 1905; Heckman, 2000; Rindermann and Thompson, 2011). The advantage of diligence is obvious, namely better goods. However, there is a downside to diligence (i.e., the striving for perfection) in the form of its psychological burden. Diligence necessitates self-control on the side of the individual and social control in organizations like firms¹. Studies describe the variety of stresses that

¹In Rötheli (2021) a broad range of studies from anthropology, psychology, business, and economics is presented that documents cultural determinants of diligence and discuss the link between diligence and economic outcomes.

come with working at a high level of diligence. [Smith and Witt \(1993\)](#) cover university professors, [Holst et al. \(2012\)](#) study musicians, and [Mesagno et al. \(2012\)](#) research professional sports athletes. Further, [Chan et al. \(2014\)](#) and [Tremolada et al. \(2015\)](#) describe the pressure of producing output at a high level of quality among construction workers and health professionals, respectively. Finally, [Delbridge et al. \(1992\)](#) show how particular forms of quality control raise stress levels.

We introduce the concept of *diligence aversion* to capture and quantify the psychological burden of quality management. It is important to distinguish diligence aversion from diligence itself. The former measures an attitude that influences the latter. The concept of diligence aversion offers a novel approach to measuring international differences in culture as they pertain to economic outcomes. The tenet of this study is that people in different countries value differently the added income versus the psychological burden that both come with high quality output. Attitudes towards quality control are documented together with their links with economic outcomes across countries. The first contribution of this article is the elicitation of measures on the burden of quality control in eight countries along five dimensions. Based on this measurement the following hypotheses are then tested: (i) Countries with a higher level of diligence aversion achieve a lower level of product quality than countries with a lower level of diligence aversion. (ii) Countries with a higher level of diligence aversion achieve a lower income per capita. (iii) Controlling for the level of per capita income, utility (measured as happiness) is the smaller the higher the level of diligence aversion is.

The analysis here complements and contrasts with a growing literature in the field of quality management studies. In these studies, the role of cultural differences influencing quality management practices is analyzed. [Kujala and Lillrank \(2004\)](#) set the stage for this approach. The general gist of these investigations is that differences in cultural traits can limit the success of efforts for quality improvement. [Lagrosen \(2002\)](#) and [Kull and Wacker \(2010\)](#) address the notion that cultural differences affect the effectiveness of quality management across European and Asian countries, respectively. [Panuwatwanich and Nguyen \(2017\)](#) document the effects of cultural dimensions in a study with firm level data. What the cited studies and the type of engineering work of [Naumova et al. \(2024\)](#) do not acknowledge is to what extent people in different cultures are prepared to bear the pressures of quality management to improve outcomes, including their own income.

By contrast, as is common in economic theory, we focus on a tradeoff namely between the pros (more usable output) and cons (more psychological pressure) of quality management. Related tradeoffs have been central to earlier arguments regarding human efforts in production. At least as early as [John Stuart Mill \(1844\)](#) the notion of “aversion to labor” is part of the economic toolkit. A related but somewhat different idea is captured by the term “preference for leisure” which refers to a tradeoff between time spent for work and time spent for the enjoyment of its fruits (see e.g., [Blum and Kalven, 1952](#)). Diligence aversion is not the same

as either effort aversion or the preference for leisure. Rather, it captures the lack of accuracy, tenacity and perseverance in the production of marketable goods and services². To put it simply, a person may greatly extend effort and time but still lack commitment to quality.

The rest of the article is structured as follows: Section 2 describes the online survey used to elicit data on diligence aversion. Section 3 presents the country findings and documents similarities and differences. Then section 4 provides the wider economic context and presents hypothesis on how diligence aversion affects outcomes like output and happiness. Section 5 evaluates these hypotheses statistically. In section 6 we present evidence that the fraction of a country's population with very high diligence aversion is particularly relevant for economic outcomes. Section 7 investigates, but ultimately rejects, the proposition that diligence aversion for countries not covered in the survey can be extrapolated from other existing measures of cultural differences. Section 8 concludes this investigation.

2. The Survey

For this study we work with the service SurveyMonkey. This surveying institution offers the flexibility to specify groups of subjects in the countries of choice. In terms of respondent specification, we limit participants to have at least a four-year college education, to be fully employed and to be in the age group between 25 and 65. These specifications concerning the pool of respondents seem appropriate when asking for work-related assessments and preferences. The age and gender distributions follow census parameters. The following five questions aim at various components of diligence aversion:

Q1: On a scale from zero (no burden) to ten (unbearable burden) how do you rate the burden of having to regularly check your own work for shortcomings and making improvements?

Q2: On a scale from zero (no burden) to ten (unbearable burden) how do you rate the burden of regularly receiving feedback from *team members* pointing out shortcomings in your work and asking for improvements?

Q3: On a scale from zero (no burden) to ten (unbearable burden) how do you rate the burden of regularly receiving feedback from *superiors* pointing out shortcomings in your work and asking for improvements?

Q4: On a scale from zero (no burden) to ten (unbearable burden) how do you rate the burden of having to regularly check the work of team members for shortcomings and asking for improvements?

Q5: On a scale from zero (no burden) to ten (unbearable burden) how do you rate the burden of having your own work assessed against a very high standard of quality?

²It should be emphasized that a person with high diligence aversion may still perform professional tasks very carefully but would feel significant distress about it. Furthermore, societies with high diligence aversion may apply great care in tasks other than the production of marketable goods.

All these questions cover issues concerning diligence: Question 1 gets at the stress of having to internalize and exercise control over one's own work output. Question 2 deals with the duress of handling critical feedback from others. Question 3 gets at the stress of quality control exercised by superiors. Question 4 gets at the burden of having to assess the work of colleagues. Finally, question 5 is a general evaluation concerning the burden of working under demanding quality requirements.

Given the costs involved in running the survey, we had to restrict the number of responses invited and the number of countries covered. The number of respondents per country was 220. A total of eight countries were investigated. In alphabetical order these are Canada, India, Indonesia, Nigeria, the Philippines, South Africa, United Kingdom, and the United States³. All of these countries are English speaking and hence the survey questions are identical across countries. Further, in terms of available statistics concerning output quality the chosen countries cover a wide range of values. International estimates of product quality from Hallak (2003) as well as the "Made In" country index (measuring the reputation for quality) reported by Statista show our countries with values ranging over the whole spectrum of quality levels⁴.

3. General Results

Here, we present summary statistics for the various survey questions in all eight countries. **Table 1** documents the average country-wise response for each of the five questions. The numbers in parentheses give the corresponding standard deviations. It is apparent that there are marked differences in diligence aversion across our set of countries. E.g., with each of the five questions, U.S. subjects report the lowest level of diligence aversion, while Indonesians show the highest levels. Although there are differences across the five dimensions of our survey, the average individual responses over the five questions are similar.

To assess the differences across country responses we run pairwise t-tests for differences in the average values of diligence aversion. **Table 2** shows the corresponding findings. Specifically, the *p*-values for the tests for significant differences are reported. From these numbers it is apparent that most of the country comparisons yield highly significant differences. E.g., the level of diligence aversion for the U.S. is statistically different from all other countries at least at the 2% level of significance. The same applies for Indonesia, India, and the Philippines. By contrast, the documented averages for the UK, Canada, and South Africa are somewhat clustered. Still, the general picture that emerges is that even with the given number of respondents we can confidently report differences across nations.

³Over all eight countries the total cost of the survey was €8270. The surveys were conducted in the period from November 2021 to January 2022.

⁴For the "Made In" index of quality reputation see <https://de.statista.com/page/Made-In-Country-Index>.

Table 1. Summary of survey answers.

	Q1	Q2	Q3	Q4	Q5	Mean
Canada	4.818 (2.56)	4.945 (2.61)	5.164 (2.75)	5.232 (2.59)	5.282 (2.77)	5.088
India	6.796 (2.38)	6.570 (2.50)	6.674 (2.45)	6.624 (2.28)	6.756 (2.33)	6.684
Indonesia	7.077 (2.10)	7.036 (2.06)	7.132 (1.95)	7.045 (2.08)	7.236 (2.21)	7.105
Nigeria	5.486 (2.83)	4.977 (3.12)	5.718 (2.90)	5.573 (2.95)	5.468 (3.06)	5.444
Philippines	5.909 (2.67)	5.782 (2.88)	6.050 (2.95)	5.927 (2.72)	6.318 (2.88)	5.997
South Arica	5.218 (2.87)	4.991 (2.85)	5.336 (2.97)	5.491 (2.78)	5.314 (3.02)	5.270
UK	4.718 (2.37)	4.568 (2.51)	4.882 (2.67)	5.277 (2.55)	4.895 (2.61)	4.868
U.S.	4.411 (2.71)	4.140 (2.62)	4.364 (2.69)	4.877 (2.60)	4.250 (2.75)	4.408

Table 2. Test for differences across national average measure of diligence aversion.

	Canada	India	Indonesia	Nigeria	Philipp.	Sou. Afr.	UK
Canada							
India	0.000						
Indonesia	0.000	0.019					
Nigeria	0.111	0.000	0.000				
Philippines	0.000	0.001	0.000	0.020			
South Afrika	0.420	0.000	0.000	0.465	0.002		
UK	0.289	0.000	0.000	0.009	0.000	0.068	
U.S.	0.000	0.000	0.000	0.000	0.000	0.000	0.014

Next, a more detailed look at diligence aversion within countries is presented. First, we inquire what specific form of quality control yields the highest disutility in any given country. It is found that in three countries (U.S., UK, and South Africa) the highest aversion concerns the giving of *feedback to colleagues*. In three other countries (Canada, Indonesia, and the Philippines) people feel the highest burden to be having their *own* work held against a high standard of quality. In India people find it psychologically most burdensome to having to check their

own work for deficiencies, and in Nigeria people find it most burdensome to receive critical feedback from superiors. These differences may in part be related to the different organizational standards and traditions of countries. A country like the U.S. where peer control is widely used, and hence felt as a burden, differs from a country like Nigeria where hierarchical feedback is more prevalent.

We can also study the data at a finer grain of observation. Indeed, one of the extra pieces of information provided with the survey concerns the gender of respondents as well as the age bracket. Age is captured by the surveying organization into ranges of 18 to 29, 30 to 44, 45 to 60, and above 60. Given that we have a lower (upper) bound age in the survey of 25 (65), these brackets are translated to the averages of these age brackets which are 27, 37, 52.5, and 62.5, respectively. **Table 3** documents the estimated effects of gender (with a dummy of 1 for male and 0 for female) and age found by running regression estimates. In some cases, there are no significant effects at all. E.g., for Indonesia and for South Africa, neither gender nor age appear to have a noticeable effect on the perceived burden of quality pressure. In other countries age effects are significant and they all indicate a tendency of diligence aversion to decline with age. Looking at gender effects, Canada shows in a selective manner—and India more generally—a lower level of male diligence aversion, while the Philippines and the U.S. show elevated levels for men.

Table 3. Estimates of gender effects and age effects.

	Gender effects	Age effects
Canada	Q3 (−0.685*)	Q1 (−0.034**) Q2 (−0.028*)
India	Q1 (−0.568*) Q2 (−0.930**) Q3 (−1.053**) Q4 (−0.496*)	none
Indonesia	none	none
Nigeria	none	none
Philippines	Q1 (0.806**)	none
South Arica	none	none
UK	none	Q1 (−0.035**) Q5 (−0.050**)
U.S.	Q5 (0.660*)	Q2 (−0.028*) Q5 (−0.035**)

Significance of estimated coefficient is documented as follows: * indicates significance at the 10 percent and ** at the five percent level.

4. The Wider Context

To develop the link from cultural differences regarding diligence to output quality, income, and utility we rely on the version of the neoclassical growth model

developed for this purpose in Rötheli (2021). This model makes explicit notions which can be grasped intuitively. The starting point of the analysis is a utility function where people value the good of more income versus the bad of having to produce at a higher level of diligence. In line with the hypothesis of international differences in diligence aversion we allow for the weighting of the two determinants of utility to differ across countries. In the steady state equilibrium, a country where people value the burden of diligence highly will reach a low level of product quality and income compared to a country where the burden of diligence is borne easily⁵. The **Appendix** details the elements of the model and discusses the relationship between the utility parameter capturing the burden of diligence and the measure of diligence aversion conceptualized in the present study. The model has the following concrete implications that will be the subject of our empirical investigation.

- A high level of diligence aversion in a country is associated with low output quality in that country.
- A high level of diligence aversion in a country is associated with low output per capita in that country.
- A high level of diligence aversion in a country is associated with a low level of happiness in a country when controlling for the level of income.

5. Documenting the Effects of Diligence Aversion

This section econometrically addresses the just listed hypotheses concerning diligence and macroeconomic outcomes. These hypotheses are assessed with regression estimates using a maximum (given the few observations) of two explanatory variables. To address the first hypothesis, we rely on Hallak's (2003) measure of countries' overall quality level while the measure of diligence aversion (da) is the average response over all our five questions. The concrete relationship estimated is

$$\ln(\text{quality}_i) = \alpha_0 + \alpha_1 \ln(da_i) + \varepsilon_i \quad (1)$$

where i , the country index, runs from 1 to 8. The resulting regression estimate is as follows:

$$\ln(\text{quality}_i) = 4.725 - 3.249 \ln(da_i) \quad (2)$$

(1.749) (0.995)

$$\bar{R}^2 = 0.350, \text{ Std. Err.} = 0.634$$

The estimated negative coefficient for (the natural log of) diligence aversion is statistically significant with a p -value of 0.017 and a t -statistic of -3.263 ⁶. Turning to the next hypothesis regarding diligence aversion and income we estimate the following specification:

$$\ln(y_i) = \beta_0 + \beta_1 \ln(A_i) + \beta_2 \ln(da_i) + \varepsilon_i \quad (3)$$

⁵The levels of utility thus reached in different countries *cannot* be compared. This follows from Boas' (1887) position on cultural relativism, and it is also an implication of the fact that the cardinal utility measures cannot be compared across countries.

⁶All critical levels of significance in our tests are adjusted for the degrees of freedom of the estimate.

Here, the income variable (y) is a country's purchasing-power-parity adjusted 2022 GDP per capita as reported by the World Bank⁷. Further, A stands for the level of technology in a country which is a key variable for which we need to control when estimating the separate effect of diligence aversion. The data for A are the 2022 technology index numbers published by the World Intellectual Property Organization⁸. The resulting regression estimate is

$$\ln(y_i) = 11.214 + \ln(A_i) - 2.853 \ln(da_i) \quad (4)$$

(1.920) (1.164)

$$\bar{R}^2 = 0.792, \text{ Std. Err.} = 0.449$$

A Wald test supports the theoretical presumption that the coefficient of $\ln(A)$ is equal to one. Note that the *negative* effect of $\ln(da)$ is significantly different from zero at the 5 percent level (p -value: 0.049, t -statistic: 2.449). Thus, *ceteris paribus*, diligence aversion systematically diminishes a country's income per person.

Finally comes the link between diligence aversion and utility which is measured here by the life-ladder measure of happiness⁹. The regression equation to be estimated is:

$$happiness_i = \gamma_0 + \gamma_1 \ln(y_i) + \gamma_2 \ln(da_i) + \varepsilon_i \quad (5)$$

The result of this estimate, given that a Wald test does not reject the hypothesis that the constant is zero, is the following:

$$happiness_i = 0.878 \ln(y_i) - 1.755 \ln(da_i) \quad (6)$$

(0.108) (0.708)

$$\bar{R}^2 = 0.781, \text{ Std. Err.} = 0.571$$

The estimated positive coefficient of income is statistically significant at the one percent and the negative coefficient of diligence is significant at the five percent level. Hence, the finding here supports the notion of a positive effect of income and a negative effect of diligence aversion. Overall, these estimates are in line with intuition and theory: diligence is helpful for output quality and income but, *ceteris paribus*, detrimental to happiness.

6. Evaluating the Distribution of Diligence Aversion

Arguably, what determines the output from a chain of production is not the diligence of the average worker. Particularly with respect to the commitment to quality it is plausible that the weaker links, so to speak, dominate the aggregate outcome. Accordingly, we entertain the hypothesis that it is not the average of a country's diligence aversion that has the greatest explanatory power in regression estimates of the sort presented in the previous section. To address this hypothesis, we

⁷See <https://data.worldbank.org/indicator/NY.GDP.PCAP.CD>.

⁸Concretely, we use the score of the "Global Innovation Index 2022" reported in https://www.wipo.int/global_innovation_index/en/2022/.

⁹The data come from <https://worldhappiness.report/ed/2022/#appendices-and-data>.

compute the values of diligence aversion that mark the borders of the successive quantiles for the 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, and the 90% quantile for each country's distribution of da values. As an example, the 10% quantile for Canada is 1.8 indicating that the 10 percent of Canadians with the lowest diligence aversion (measured as the average of the five questions) report a da of 1.8 or less. In comparison, the corresponding value is 4.2 for India. **Table 4** shows the details for all countries.

Table 4. Quantiles of the distribution of diligence aversion.

	10%	20%	30%	40%	50%	60%	70%	80%	90%
Canada	1.8	3.16	4	5	5.5	5.8	6.4	6.8	7.8
India	4.2	5	5.8	6.4	6.8	7.4	7.8	8.4	9.2
Indonesia	4.6	5.96	6.4	7	7.2	7.68	8	8.6	9.62
Nigeria	1.98	3.2	4.2	5	5.6	6.28	6.86	7.6	8.82
Philippines	2.58	4	4.8	5.2	6.2	7.08	7.6	8	9
South Africa	1.8	3	4	4.8	5.4	5.8	6.6	7.4	8.6
UK	1.6	2.8	3.94	4.6	5.2	5.6	6.26	6.8	7.4
U.S.	1.5	2.2	3.4	4	4.6	5.2	5.8	6.2	6.8

As the table indicates there are interesting international differences on the low side of diligence aversion as well as on its high side. Looking first at the 10 percent quantile of the country sample with the *lowest* level of diligence aversion, the group of countries made up by Canada, Nigeria, South Africa, the UK, and the U.S. all have values below 2. By contrast, the Philippines, and even more so India and Indonesia, show much higher levels of diligence aversion (up to 4.6 for Indonesia) even for the 10 percent of the population with the lowest diligence aversion. On the high side of the distribution of diligence aversion, the values reported for Indonesia is still the highest but now the differences in comparison with India, Nigeria, the Philippines, and South Africa are markedly smaller compared to the differences in average values reported in **Table 1**.

The computed nine quantile values allow us to complement the regression estimates of the previous section. It is thus possible to test the hypothesis whether, mainly for quality and for income, it is not the average of a country's diligence aversion that has the highest explanatory power. Intuition would suggest that it is rather the workers with the highest level of diligence aversion that determine the outcome. The following three estimates show the result of grid searches over each of our three endogenous variables. For the variables quality, income per capita, and happiness we run nine separate regressions (with the nine different quantile measures of da) and report the estimate that leads to the best fit for each of the endogenous variables. The quantile measures of diligence aversion are now identified as da_{10} , da_{20} , and so forth up to da_{90} .

Table 5 summarizes the results. The best fit for the quality and the income variable results from using the $da90$ and $da80$ respectively as the measure of diligence aversion. This is in line with intuition. Indeed, the “weaker” links (i.e., people with a high level of da) in the chain of production are seen to determine the outcome here. By contrast, for the happiness estimate it turns out that the $da40$ variable generates the best fit. In fact, when comparing this new result with the happiness estimate of equation (6) there is barely a difference between using the 40 percent quantile measure and the measure for the mean. This makes sense because after controlling income it should be the *average* person’s diligence aversion that determines the average person’s happiness.

Table 5. Regression estimates with quantile measures of diligence aversion.

$$\ln(\text{quality}_i) = 10.891 - 5.529 \ln(da90_i), \quad \bar{R}^2 = 0.656, \text{ Std. Err.} = 0.461 \\ (2.597) \quad (1.242)$$

$$\ln(y_i) = 15.582 + \ln(A_i) - 4.614 \ln(da80_i), \quad \bar{R}^2 = 0.869, \text{ Std. Err.} = 0.357 \\ (2.545) \quad (1.312)$$

$$\text{happiness}_i = 0.875 \ln(y_i) - 1.809 \ln(da40_i), \quad \bar{R}^2 = 0.792, \text{ Std. Err.} = 0.556 \\ (0.104) \quad (0.690)$$

7. Relationship to Hofstede’s Measures of Cultural Difference

The dimensions introduced by Hofstede (Hofstede, 2001; Hofstede and McCrae, 2004) play a prominent role in the literature on economic implications of cultural differences. According to Hofstede, cultures differ with respect to six dimensions, i.e., individualism, power distance, masculinity, uncertainty avoidance, long-term orientation, and indulgence. These concepts are explained in detail in online resources that also offer international data on these indicators¹⁰. Several publications along these lines propose significant effects of cultural dimensions on economic outcomes internationally (Chambers and Hamer, 2010; Gorodnichenko and Roland, 2011; Faruq and Weidner, 2018).

Hofstede’s measures are not tied to our new concept of diligence aversion in a conceptual manner. Empirically, however, it is plausible that diligence aversion might be statistically explained by Hofstede’s dimensions of culture. E.g., his concept of long-term orientation and indulgence appear related to diligence aversion, the former positively and the latter negatively. When computing correlations between these two specific dimensions and the measure of diligence aversion these are 0.63 and -0.92 , respectively. Thus, it is conceivable that regression estimates could offer a way to extrapolate the findings on diligence aversion from our eight countries to all countries covered by Hofstede’s survey. To assess this notion, we

¹⁰The data used here is from: The dimension scores in the Hofstede model of national culture can be downloaded at: <https://geerthofstede.com/research-and-vsm/dimension-data-matrix/>.

run regressions that relate our measure of diligence aversion for the eight countries to the measures of Hofstede for these countries. Given that our survey only provides eight data points we limit the number of regressors to four, which helps with the problem of overfitting. In concrete terms, we run 15 different regressions. This number is the total of possible combinations of four out of six dimensions from Hofstede's list.

At first glance the result of this regression exercise appears promising. The R^2 of the estimates range between a maximum of 0.970 and a minimum of 0.840¹¹. Corresponding to this explanatory power, the fitted values for nations' diligence aversion are close to the numbers elicited in our survey. E.g., for Indonesia where the surveyed average value of diligence aversion is 7.105, the range of fitted values is between 7.033 and 7.165. Hence, it seems promising to use the Hofstede data to extrapolate diligence aversion to a wider set of countries. However, this hope is quickly shattered when computing out-of-sample values. When using the estimated coefficients from the 15 different regressions and applying these weighting schemes to countries that are *not* covered in our online survey, the outcome is sobering.

Take the examples of Germany and Switzerland, two countries with a reputation for diligence and high-quality products. When computing (out-of-sample) diligence aversion measures for these countries based on the Hofstede data, we find—depending on the regression equation used—a wide range of extrapolated values. For Switzerland the extrapolated values for diligence aversion range from 0.282 to 7.936, while for Germany the range is even wider and lies between -0.687 and 9.913. Accordingly, our sensitivity analysis in the tradition of [Leamer \(1985\)](#) documents that diligence aversion values cannot be inferred from already existing measures of cultural differences¹².

8. Summary and Conclusions

An internationally conducted survey investigates how people judge the psychological burden of quality management. People in different countries indeed value differently the pressure to produce high quality output. The elicited data in the form of the newly minted concept of diligence aversion offers a novel perspective on economically relevant differences in cultures. The statistical analysis using the new measure shows that the level of diligence aversion affects economic outcomes as expected from economic theory. Regressions indicated that countries with a higher level of diligence aversion tend to produce (i) lower quality goods, (ii) have lower per capita income and—after controlling for the level of income—(iii) achieve a lower level of happiness. These findings support the notion of a tradeoff between the positive (higher income) and negative (higher stress) sides of quality management.

¹¹The highest value here results from the combination of dimensions power distance, masculinity, uncertainty avoidance, and long-term orientation.

¹²For the same reason, trying to replace the measure of diligence aversion with a weighted average of "big 5" personality dimensions appears like a pointless exercise, as already indicated by [Borghans et al. \(2008\)](#).

The approach developed here offers an innovative perspective on the cultural aspects of quality management debated in the literature. Our findings suggest that it may be wrong to see culture as helping or hindering managerial efforts at quality improvements. Instead, quality management needs to be aligned with cultural values that influence the tolerance for criticism. Longitudinal replications could provide valuable insights into potential trends in diligence aversion across different societies. Extending our study by surveying additional countries promises important insights into possibilities and limits of quality management, and more generally, the cultural determinants of economic performance. Hence, researchers with the means to conduct this survey in their country would be very welcome to contact the author of this article.

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Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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Appendix. Theoretical Considerations

1) The theoretical model

The relationships of interest are developed here in a variant of the neoclassical growth model. Output follows a Cobb-Douglas production function. Per-capita output of goods is y , k is the input of capital per worker, A stands for the state of available technology, and α is a parameter:

$$y_t = dAk_t^\alpha, \text{ where } 0 < \alpha < 1 \quad (\text{A1})$$

New in the model is the idea that only a fraction of output produced comes in usable form. Here, we assume a one-to-one link between diligence (d) and quality. The range of d is between zero and one. I.e., a fraction $1-d$ of all goods are defective and are of no use. Faulty goods when directed towards consumption are equally useless as when they are channeled towards production in the form of capital goods. Thus, accumulation of workable capital goods follows

$$k_{t+1} - k_t = sdAk_t^\alpha - \delta k_t, \quad (\text{A2})$$

where s is the savings rate and δ is the rate of decay of capital. Given only a fraction of goods produced is usable consumption is

$$c_t = (1-s)dAk_t^\alpha. \quad (\text{A3})$$

Besides consumption the second element affecting wellbeing is the disutility of applying a high level of diligence. This is captured by utility being positively related to $1-d$.

$$u_t = c_t^{1-\gamma} (1-d)^\gamma, \text{ with } 1 > \gamma > 0 \quad (\text{A4})$$

The parameter γ captures the relative disutility of diligence over the utility of consumption. For our purposes we will focus on steady-state outcomes, which are $k = \left(\frac{sdA}{\delta}\right)^{\frac{1}{1-\alpha}}$ for the capital stock and $y = dA\left(\frac{sdA}{\delta}\right)^{\frac{\alpha}{1-\alpha}}$ for income. Further, steady state utility is

$$u = (1-s)^{1-\gamma} (dA)^{1-\gamma} \left(\frac{sdA}{\delta}\right)^{\frac{\alpha(1-\gamma)}{1-\alpha}} (1-d)^\gamma. \quad (\text{A5})$$

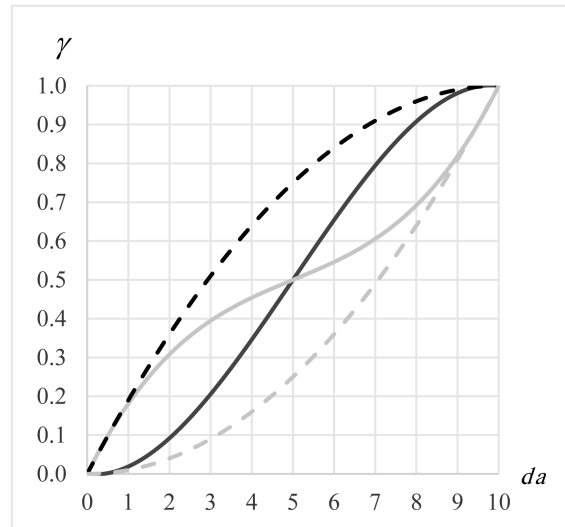
The level of diligence in the steady-state equilibrium is

$$d = \frac{1-\gamma}{1-\gamma\alpha}. \quad (\text{A6})$$

2) Relating the preference parameter γ to diligence aversion (da)

It is important to distinguish our new measure of diligence aversion (da) from diligence (d) itself. The former measures an attitude that influences the latter. Further, diligence aversion, i.e., the measure of the psychological burden of quality management is not the same as the preference parameter γ in our model. Still, the two concepts (i.e., da and γ) are closely tied. We propose that the theoretical parameter γ is monotonously positively related to the empirically

measurable diligence aversion: The higher the diligence aversion, the higher is the preference for the absence of diligence. It appears that—in principle—the noted relationship could be linear, but clearly various curvatures of this function are possible. The figure below shows four non-linear versions.



The best we can hope to achieve in terms of clarification is an empirically informed speculation on the *shape* of this relationship. For this purpose, we make use of equation (A6) that relates diligence (or quality) to the preference parameter γ . Given that only one further parameter (α , commonly assumed to be one third) appears, we deduce a first rough measure of γ from Hallak's (2003) quality data for our eight countries. These γ -values are then used jointly with the survey values for da . When fitting the four variants of the curve shown above it turns out that the solid *s*-shaped version offers the best fit. Hence, it appears that at low (high) levels of da an increase goes together with an over-(under-)proportional increase in γ .