

Happiness and Productivity in the European Union

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Abbreviations and Acronyms

Abbreviation	Fully written
AMECO	Annual Macro-economic Database of the European Commission's Directorate General for Economic and Financial Affairs
ARDECO	Annual Regional Database of the European Commission's Directorate General for Regional and Urban Policy
CV	Critical Value
ESS	European Social Survey
EU	European Union
GMM	Generalized Method of Moments
GVA	Gross Value Added
HPW	Happy Productive Worker
HR	Human Relations
ID	Identity
IV	Instrumental Variable
LM	Lagrange Multiplier
NUTS	Nomenclature of Territorial Units for Statistics
OLS	Ordinal Least Squares
rk	Robust Kleibergen
SHS	Subjective Happiness Scale
SWB	Subjective Well-being
TFP	Total Factor Productivity

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Summary

Part 1: Literature Review

Background: The 'happy productive worker' thesis (HPW) holds that the happiness of workers has a positive impact on their productivity. As a result, increasing numbers of wellness programs are being implemented in the workplace, with the aim of improving happiness at work and worker productivity. The purpose of this study is to explore the relationship between happiness on productivity in the workplace, thereby quantifying the contribution of subjective well-being to economic growth and providing insights into fostering and maintaining a virtuous cycle.

Focus on Job Satisfaction vs. Broader Happiness:

- *Job Satisfaction:* Defined as an evaluative judgment about one's job, job satisfaction has been extensively studied in both academic and commercial settings. However, its direct impact on productivity is often modest and varies across contexts.
- *Broader Happiness Measures:* Life satisfaction and affective experiences, which encompass well-being beyond the workplace, are emerging as more robust predictors of productivity. Affective components (how well one feels most of the time) have shown stronger correlations with workplace performance than cognitive evaluations (perception to get from life what one wants).

Mechanisms Linking Happiness and Productivity:

Happiness enhances productivity through several mechanisms:

- *Health:* Happier individuals are physically healthier and more resilient, enabling better performance.
- *Activity:* Positive emotions act as a "go-signal," enhancing energy, focus, and adaptability.
- *Sociability:* Happiness improves interpersonal relationships and teamwork.
- *Top-Down Effects:* Life satisfaction influences domain-specific satisfaction, including work, which enhances productivity.

Methods:

- This study synthesizes findings from 33 studies, yielding 196 correlational results across 26 countries and regions.
- Using the World Database of Happiness, this study categorized findings into cross-sectional, longitudinal, and experimental research.

Key Findings:

- *Strength of the Relationship:* Happiness is moderately to strongly related to productivity at work, and this relationship is sustained over time.
- *Sector and Occupation Variations:* The happiness-productivity link varies across sectors and occupations. The productivity of managers and directors is the most strongly related to their happiness. The associations are also stronger for workers in the public sector.
- *Role of Affective vs. Cognitive Components:* The affective component of happiness shows a stronger correlation with productivity than the cognitive component. However, more research on the cognitive component is needed.
- *Causality:* Strong indications suggest a causal effect of happiness on productivity, but further experimental studies are necessary to confirm this.

Part 2: Empirical Study

In the second part of this deliverable we conduct an empirical study to further explore the relationship between subjective well-being and TFP in European regions. Using OLS and Lewbel IV estimators, we find a significant and positive effect of subjective well-being on TFP and TFP growth. On average, regions that score 1-point higher on subjective well-being report over 27% higher TFP levels and 1% higher annual TFP growth. Since TFP is an important driver of economic growth, these findings indicate that promoting subjective well-being will benefit economic growth at regional level.

Part 1: Literature Review

1 Introduction

1.1 The 'Happy Productive Worker' Thesis

The idea that happy workers perform better is known as the 'happy productive worker' (HPW) thesis. This thesis originated from the human relations (HR) movement in the first half of the 20th century (e.g., Hersey 1932), and it is widely accepted today, as manifested in the discussions that are to be found in management books as well as in ongoing HR practices. Happy workers are not only less absent from work and less inclined to quit (Erdogan et al., 2012), but also more productive when they are at work.

1.1.1 Current Focus on Job Satisfaction

In the literature on happiness and productivity, worker well-being is most often understood in terms of their job satisfaction. Job satisfaction can be defined as an "evaluative judgment one makes about one's job or job situation" (Weiss 2002, p. 175) but is in the popular literature also often referred to as 'happiness at work'. Consequently, much research on job satisfaction has been undertaken, focusing not only on the determinants of job satisfaction, but also on the ways in which job satisfaction can be measured. Indeed, in April 2023, a search for 'job satisfaction' on Google Scholar yielded 3.7 million hits. or related concepts such as engagement or sentiment at work (Wijngaards et al., 2021).

Alongside the academic work that has been conducted, the evaluative and domain-specific concept of job satisfaction is also a notable focus of the commercial operations that serve the human resources departments of many workplaces. The resulting information is used to identify sources of discontentment as well as to assess whether productivity could be boosted by ensuring that its workers experience happiness at work.

At the same time the HPW thesis originated in studies focusing on affective experience, most notably Hersey's 1932 study *Worker's Emotions in Shop and Home: A Study of Individual Workers from the Psychological and Physiological Standpoint*. Studies in workplace 'morale' from the following decade also focused on affective experience, with the shift in emphasis from affective experience to cognitive evaluation occurring in the 1950s, as part of the wider 'cognitive revolution' in psychology (Miller, 2003).

In this article, we report the results of the increased number of studies exploring the relationship between happiness and productivity at work – a shift that is part of the

turn to ‘happiness research’ that has gained in popularity since the 2000s (Veenhoven, 2017) and that takes in both cognitive evaluations and affective experiences. Whereas most previous literature on workers’ happiness and productivity has predominantly focused on the cognitive evaluation of well-being at work, the happiness literature focuses on *context-free measures of wellbeing* such as life satisfaction, contentment, and hedonic level of affect. Accordingly, the happiness literature differs from the job satisfaction in that it focuses on the state of subjective well-being in the work setting, where the source of well-being at work can be unrelated to work. As noted by Wijngaards et al. (2021), workers could, for instance, be worried about one of their family members or reliving a fun holiday while being at work. In this area of research, also interest in affective experience is burgeoning, following also the recent revival of emotions and hedonic level of affect in behavioral economics (Loewenstein, 2000) and positive psychology (Fredrickson, 2003).

1.1.2 Reasons for Focusing on Life Satisfaction Instead of Job Satisfaction

One reason to question the sustained focus on job satisfaction is that its impacts on workplace productivity tend to be not only variable, but also modest (e.g., Argyle 1989; Iaffaldano & Muchinsky 1985; Vroom 1964). This realization prompted Fisher (2003) to consider why so many scholars still believe there to be a strong relationship between job satisfaction, on the one hand, and productivity, on the other hand.

Another reason for questioning the *status quo* is that appraisals of job satisfaction appear to be affected by appraisals of happiness. Some longitudinal studies have shown that this so-called ‘top-down effect’ is much stronger than the contrasting ‘bottom-up effect’ (Headey et al. 1991; Weziak-Bialowolska et al. 2020). As such, then, the impacts of job satisfaction on worker productivity appear to be driven largely by the impacts of happiness on worker productivity. Along these lines, it is not surprising that life satisfaction – as evaluative or overall measure of happiness – was found to be more strongly linked to productivity than to job satisfaction (Jones 2006; Wright et al. 2002; Zelenski et al. 2008).

Similarly, a third reason to redraw attention from *job satisfaction* to happiness is that affective components have been observed as having much larger impacts on performance at work (e.g., Cropanzano & Wright 1999, 2001; Zelenski et al., 2008). Likewise, recent studies in positive psychology that focus on job satisfaction and productivity—and that are often cited as supporting the HPW thesis—also emphasize the impacts resulting from affective components (e.g., Boehm & Lyubomirsky 2008). Hence, in this study, we do not only consider studies that have examined the relationship between life satisfaction and productivity, but also studies that have examined the relationship between hedonic level of affect and productivity.

1.1.3 Evidence on Effects of Happiness on Productivity

The positive effects of happiness are likely to be driven by the following different but related mechanisms:

- *Health.* Happiness fosters physical health, in particular by preventing illness. This appeared in a research synthesis of 30 longitudinal studies by Veenhoven (2008). Healthy people will perform better on many tasks than unhappy people.
- *Activity:* Feeling good works as a 'go-signal' while feeling bad rather inhibits activity. Hence happiness fosters activity, its affective component in particular. To date (August 2024) the World Database of Happiness contains [53 findings](#) on this subject which are typically positive. Active people will perform better on a lot of tasks than indolent people. For example, happy people are more energetic, can concentrate better and have more energy for additional tasks and dealing with setbacks.
- *Sociability.* Happiness facilitates social contacts and strengthens social bonds as demonstrated in a research synthesis of 15 follow-up studies by Agrawal et al (2024). Hence happy people are likely to perform better on tasks that require interpersonal cooperation.
- *Satisfaction with life-domains:* Satisfaction with life-as-a-whole affects satisfaction with life-domains. The relative strengths of this top-down effects differs across domains. In the case of work this top-down effect is stronger than the bottom-up effect but in the case of marriage the top-down effect is about as strong as the bottom-up effect (Headey et al 1991). Satisfaction with a life-domain is likely to foster performance in that domain.

These causal mechanisms fit Fredrickson's 'Broaden-and-Build theory' (2004), which holds that positive affect broadens one's action repertoire. Feeling good makes people more curious and open to innovation, new social contacts, receptive for feedback, training, and so on. In contrast, people who feel less well often have tunnel vision, focusing strongly on solving the specific problem causing the negative feeling. As a result, happy people build more sustainable resources than unhappy people, such as more knowledge and skills, a better career, a stronger social network, and better health, which all contribute to greater productivity at work.

1.2 Research Questions

In this paper, we explore how happiness works out on productivity in the domain of work, seeking answers to the following questions:

1. Is happiness positively associated with worker productivity, if so, how strong is this effect?

2. If happiness is associated with worker productivity, do its effects differ across sectors and occupations?
3. If happiness is associated with productivity at work, is there a difference in the relative importance of its affective component (how well one feels most of the time) and the evaluative component (fulfillment of personal goals)?
4. To what extent are the above correlations driven by a causal effect of happiness (top-down) on productivity rather than by an effect of productivity on happiness (bottom-up)?

1.3 Approach

We considered the available quantitative research findings on the relationship between the happiness of employees and their productivity in the workplace, using the World Database of Happiness. We searched this ‘findings archive’ (Veenhoven, 2020) for studies on the topic, then examined the results in terms of their applicability to the questions outlined above. We sorted these findings in terms of type of study: (1) cross-sectional research in which happiness and productivity of individuals is measured at one point in time, (2) longitudinal research in which the happiness and productivity of the same individuals are measured repeatedly, and (3) experimental research in which happiness is manipulated for a group of individuals and subsequently effects on productivity are researched. We present our results in separate tables relating to these three types of findings.

1.4 The Structure of This Paper

The remainder of this paper is organized as follows. We describe the key concepts and corresponding measures in Section 2. In Section 3, we explain how we used the World Database of Happiness for our research synthesis, describing its methodology for gathering and describing research findings. We then present our results and propose answers to our research questions in Section 4. We proceed to discuss our findings in Section 5 and provide concluding remarks in Section 6.

2 Concepts and Measures

2.1 Happiness

In the broadest sense, the word ‘happiness’ denotes ‘a good life’ In this paper, however, we understand happiness in the more limited sense of ‘subjective well-being’, following the definition proposed by Veenhoven (1984) that is at the basis of the World Database of Happiness on which we draw for this research synthesis.

2.1.1 Definition and Components of Happiness

Veenhoven (1984, 2000) defined happiness as ‘the degree to which an individual judges the overall quality of his/her own life-as-a-whole favorably’. In short, then, how much one likes the life one lives. This is also known as subjective well-being or life-satisfaction. Within this concept, Veenhoven distinguishes a cognitive component, called Contentment and an affective component referred to as Hedonic level of Affect’.

Contentment is the degree to which we perceive to get what we want from life. This concept presupposes that an individual has developed conscious wants, has formed ideas about their realization, and is able to question whether they are living their life in accordance with them.

Hedonic level of affect is the degree to which positive affective experiences outweigh negative affective experiences, which is also referred to as the ‘affect balance’. A person’s hedonic level of affect can be assessed over different periods of time – for an hour, a week, or a year, for instance, as well as over a lifetime. In this paper, our focus is on the ‘enduring’ hedonic level of affect – this assesses averages over longer periods of time, such as months or years.

Although these two components are typically related, they do not always go hand-in-hand: we may feel good most of the time, while being far from getting what we want in life, as is often the case in unemployed (Knabe et al., 2010). Similarly, even though we have achieved our goals, we may still feel miserable, as has happened in some famous movie stars. The effects of these two components on an individual’s overall happiness (life-satisfaction) appears to differ, research has shown that our overall happiness primarily depends on how well we feel most of the time (Kainulainen et al. 2018).

2.1.2 Measurement of Happiness

Along these lines, it is possible to distinguish between measures of the cognitive component of happiness and measures of the affective component the former capture perceived differences between what one wants from life and what life brought so far, whereas the latter asks respondents the extent to which they experienced positive and negative affects over a specified time frame. Apart from these measures of components of happiness, there are measures of overall happiness¹. Some examples of commonly used questions can be found below.

- **Overall happiness:**

¹ Commonly used overall happiness measures are global self-report measures of happiness or life satisfaction. Although life satisfaction taps more (less) into the cognitive (affective) component, it is closely related to happiness, both conceptually and empirically. Conversely, it can be argued that the global self-report measures of happiness taps more into the affective experience.

Taking everything together, how happy would you say you are these days?.

How satisfied are you with your life in general?

- **Hedonic level of affect (affect balance): Bradburn 1969**

During the past few weeks, did you ever feel? (yes/no)

A Particularly excited or interested in something?

B So restless that you couldn't sit long in a chair?

C Proud because someone complimented you on something you had done?

D Very lonely or remote from other people?

E Pleased about having accomplished something?

F Bored?

G On top of the world?

H Depressed or very unhappy?

I That things were going your way?

J Upset because someone criticized you?

- **Contentment (Contentment with Life Scale ; Lavalley et al., 2007)**

Please indicate to what extent you agree or disagree with the following items :

A. I am very content with my life.

B. I am living my life to the fullest.

C. When I examine my life as a whole, I feel I am not meeting my aspirations. A

D. I feel dissatisfied because I'm not doing everything that I want to be doing in my life.

E. Nothing is currently lacking in my life.

Please note that not all of the questions that are used to gauge an individual's happiness fit the above definition. One example is the question whether you are happier than your peers of the same age, – an item on the much-used 'Subjective Happiness Scale (SHS)' by Lyubomirsky & Lepper (1999). The main disadvantage to such a question, is that you can feel happier than your peers, yet still be dissatisfied with your life, because you all are in a miserable situation. In addition, we generally do not know just how happy other people are.

The World Database of Happiness, on which we draw, makes use only of measures of happiness that have passed a check for face-validity (explained [here](#)). In this respect, our research synthesis differs from the recent meta-analysis by Moscoso and Salgado (2022), which includes findings that have been obtained with measures of happiness that did not pass the test for fit with the concept of happiness as given above in section 2.1

2.2 Work Performance and Productivity

Performance at work generally constitutes the successful execution of tasks and the outputs that an employee delivers from the inputs. At the aggregate level, it is the performance of an organization or nation. A main aspect of performance is productivity, which can be measured at the individual and aggregate level and is the main focus of this literature review.

2.2.1 Measures of Productivity at Work

In economics, productivity is typically defined as the amount of output can be produced with a given set of inputs and estimated by dividing the amount and quality of goods and services by the amount of resources invested in producing them (Prokopenko, 1987). Productivity involves not only the quantity of the outputs, but also their quality. Some commonly used indicators are as follows.

- **Objective Indicators**
 - *Production counts*: this includes objective quantitative production records, such as number of sales, number of academic publications, or success in sports competitions. These records can be related to a specific task or to output in general.
 - *Macro productivity* estimates, such as average labor productivity in a nation.
- **Subjective Ratings of Productivity at Work**
 - *Supervisor ratings* of work productivity: typically made in response to a question such as, 'Overall, how would you rate this employee's performance over the past year?' Next to such ratings of overall productivity at work there are also ratings of specific aspects of the employee's productivity, such as their communication with colleagues. Supervisor ratings often form part of periodic assessments.
 - *Self-ratings* of productivity at work: self-evaluations concern overall productivity as well as functioning on specific activities, such as the various efforts that an individual has made to help their organization be successful.

3 Method of This Research Synthesis

We considered the available research findings about the relations between happiness and productivity that have been gathered in the World Database of Happiness. Below, we explain not only how we obtained findings from this findings archive, but also how this source facilitated the presentation of these findings.

3.1 World Database of Happiness

The [World Database of Happiness](#) is an online ‘findings archive’, whose structure is presented in Figure 1. The archive holds electronic ‘finding pages’, which describe research findings in a standard format, using a standard terminology. An example of such a finding page is given in Figure 2. Each page has a unique internet address, allowing pages to be presented in review papers, such as this one. The goal of the archive is to facilitate research synthesis. For an explanation of this technique, see Veenhoven et al. (2022).

To date (August 2024), the archive consists of some 48,000 finding pages. These pages can be sorted in various ways, such as by subject, by research method, and by the people who were studied. In this paper, we used a selection of findings on [performance at work](#), focusing on productivity. As already intimated, the use of the World Database of Happiness implies that only findings fitting the definition of happiness given above will be presented.).

3.2 Gathering Research Findings

Scientific publications on happiness are gathered on a continuous basis so that they can be considered for inclusion in the World Database of Happiness – a process that is described in detail [here](#). Of the 16,800 publications that have been included in the database to date, we selected those reporting empirical studies in which the relation between happiness and productivity was assessed. We completed that standard search alongside an additional search that focused on the relation between happiness and productivity.

3.3 Studies

To date (August 2024), the World Database of Happiness includes 33 empirical studies on the relationship between happiness and productivity. Together, these studies yielded 197 correlational findings.

These 197 findings were observed in 27 different countries and regions. The people who were investigated include the general populations of countries, as well as particular groups, such as students, patients, and employees working in specific occupations. With regard to the occupations, 26% of the findings concern social services professionals, 15% concern directors and managers, and 9% concern academics. The remainder are made up of workers on shop floors, sales people, telephone operators, athletes, pilots, nurses, and other employees whose occupations were not reported. Of the various kinds of employees investigated, 35% were working in the public sector, while 15% were working in the private sector. The sectors of the other employees were not reported.

A total of 68% of the studies are purely cross-sectional, 18% are purely longitudinal, and 15% contain both cross-sectional and longitudinal findings. None of the studies

adopted an experimental approach. A total of 47% of the studies generated pure zero-order correlations, 15% generated pure partial correlations, and 38% generated zero-order as well as partial correlations.

We summarize all studies that have been incorporated into this research synthesis in Table 1.

3.4 Format of This Research Synthesis

We took advantage of two recent innovations (a) The first is the availability of an online findings archive (the World Database of Happiness), which presents descriptions of research findings in a standard format, using a standard terminology, on separate finding pages with unique internet addresses. (b) The second is the change in academic publishing that has occurred since the turn of the millennium, with research papers moving from printed paper copy to electronic text that can be read on screen, allowing links to be inserted in review papers like this one. This enables us to present research findings with a correlation coefficient or a plus or minus sign, while making the technical details available by means of links to the research report or to standardized summaries of separate findings in an online findings archive. In this way, large numbers of findings can be presented in tables that are easy to examine.

3.4.1 Presentation of the Findings in Tables

The structure of the tables in which we summarize the research findings is given in Table 2. All further tables in this paper follow the same format.

3.4.1.1 Research Design

Horizontally, we distinguished between research methods, including same-time correlations, over-time correlations, and experimental correlations. Vertically, we distinguished between levels of analysis: the micro level of individuals, at the top of the table, and the macro level of nations, at the bottom.

In all cases, the observed degree of association can be expressed by means of a zero-order correlation, such as the often-used Pearson correlation coefficient (r). Alongside such results from bivariate analysis, are a large number of results from multivariate analysis, in which the various effects of the possible intervening variables are controlled. These findings are expressed with statistics such as the partial correlation coefficient (r_{pc}), the standardized regression coefficient (Beta), or the unstandardized regression coefficient (b). Some of the findings are based on Instrumental Variable (IV) analysis.

3.4.1.2 Notation

We reported the *direction* of the observed correlations by means of + and – signs, and we used 0 to denote the absence of a correlation. The strengths of the relationships are expressed by means of correlation coefficients ranging between –1 and +1, such

as the above-mentioned r , rpc , and $Beta$. We do not report unstandardized regression coefficients (b) for strength size, because these differ in range and therefore cannot be compared in terms of their relative strength. The statistical significance ($p < .05$) is indicated by a sign or number **in bold**.

Further methodological differences are indicated in the tables as follows.

- We use ‘\’ to present correlations of different indicators of the same variable in one study.
- We use ‘/’ to present correlations obtained with different sets of control variables in one study.
- We use ‘|’ to present correlations obtained from different lags of time in one study.

We present a sign or number in **grey** when happiness was measured *after* measuring productivity, in order to investigate the effect of earlier productivity on later happiness.

3.4.1.3 Links

A sign or a coefficient represents a correlational finding. As noted above, all the signs and numbers in the tables are linked to the corresponding finding pages in the World Database of Happiness. By clicking on the hyperlink, the reader gets access to the online finding page that presents details about particular research findings and often a link to the research report.

3.4.1.4 Empty Cells

The reader will be surprised to see many empty cells in the tables and even an empty column for experimental studies. This is to show blanks in current knowledge. This review serves not only to summarize what we know now, but also to identify what we do not know yet. The advantages and disadvantages of this approach to research reviewing, as well as its differences from traditional research reviewing and meta-analysis, are discussed in [Veenhoven \(2021\)](#).

3.4.2 Organization of the Findings: Across Tables

The observed correlations between happiness and productivity at work are presented in the following tables: in the tables 2 we shows the correlations with *objective* indicators of productivity, while in tables 3 we display correlations with *subjective* ratings of productivity. Next, in the tables 4 and 5 we explored how these relationships between happiness and productivity at work differ across time, occupations and sectors.

In variant a of these tables we present all the findings using + and – signs, which indicate the *direction and significance* of correlation. In the variants b we present the

available finding on size of the correlations, which are less numerous. In Table 5b we present effect sizes over different time-lags.

4 Results

Having taken the preliminary steps above, we can now proceed to answer the research questions raised in Section 1.2.

4.1 Is Happiness Related to Productivity at Work?

We first examined the observed relations between happiness and indicators of productivity.

4.1.1 Correlation between Happiness and *Objective* Indicators of Productivity

In Table 2a, we present the available results; 24 findings are on differences in productivity between individuals, while 2 findings are on differences in productivity between nations.

Micro-level

At the micro-level, only cross-sectional studies are available. A total of 67% of the signs were positive, of which 69% in bold, implying that productivity at work tends to be significantly associated with happiness.

The correlation between happiness and *sales* appears to be positive but the correlation with *call time* in a call center appeared to be negative, suggesting that happy telephone operators took more time for customers. With regard to the negative associations, five of the seven were statically significant. Specifically, these negative correlations concerned employees at [a private call center](#), [professional soccer players](#), and members of the British general public, whose productivity was measured by means of the [wage](#) they earned. In the study on the British general public, no correlation between the happiness and productivity variables was found.

These positive correlations do not necessarily imply that happiness *causes* greater productivity at work, given that productivity at work can also boost happiness, which we discuss in greater detail in Section 5.3. An assessment of causality ultimately requires instrumental variable techniques or experimental studies, which are limited, as visualized by the empty columns in Table 2a. The five findings based on an IV analysis are indicative of a causal effects.

Macro level

At the macro level, one finding concerns the relation between changes in happiness and [production efficiency](#) in 20 European countries over a number of years. A positive correlation was observed, as shown in [Figure 3](#). In this case, a causal effect is more

likely to be involved, because there is a *correlated change* between the growth in productivity of nations, on the one hand, and a rise in the average person's happiness, on the other. The authors conducted a sophisticated analysis, not only to estimate the positive effects of happiness on productivity, but also to show that life satisfaction should be considered as an input to production and not as an output to production. Hence, despite the authors do not use traditional IV techniques, this provides evidence for a causal relationship between happiness and productivity. Likewise, a study on rise of [agricultural productivity](#) in 34 African nations found a relation with rise of average happiness over 15 years period.

In sum: Happiness goes typically together with productivity at work as measured with objective indicators, both at the micro level of individuals and the macro level of nations. Moreover, earlier happiness predicts later productivity.

4.1.2 Correlation Between Happiness and Subjective Indicators of Productivity

Happiness and Supervisor Ratings of Productivity

In Table 3a, we present findings on the correlation between happiness and subjective ratings of productivity. In the upper section of Table 3a, we report 128 findings on the relation between the happiness of employees and the ratings of their productivity by supervisors. Positive signs prevail, with 96% and 72% of these positive correlations being significant.

A large number of longitudinal findings show that higher ratings of productivity by supervisors tend to be *preceded* by greater happiness. Next to better ratings of *overall productivity*, happiness predicts higher ratings of an employee's attentiveness, focus on achieving goals, facilitation of work, and team-building skills. The happier an employee is to begin with, the better his/her supervisor rates that employee's subsequent productivity. Not only did these positive over-time correlations remain firm over different periods of time, but they also persisted with different sets of control variables, such as age, gender, and years of education. As well as predicting higher productivity ratings, happiness also prompted *increased* productivity ratings over time.

What is more, three studies investigated the relationship between previous productivity and subsequent happiness, also finding positive correlations, be it smaller in size (shaded gray in Table 3a).

Happiness and Self-ratings of Productivity at work

In the lower section Table 3a, we report 20 findings relating to the correlation between happiness and self-ratings of productivity at work. Eighteen of these were positive, with eight being statistically significant. The two negative correlations were not significant. Self-reported engagement at work was significantly correlated with happiness, while

self-ratings of general productivity at work were not. Two longitudinal findings were positive, but the significance of these cases was not assessed.

In sum: The majority of correlations between happiness and productivity suggests that happiness is related to higher self-ratings of productivity.

4.2 How Strong Are the Correlations?

Effect sizes can be compared only for zero-order correlations, because partial correlations involve different controls and estimation techniques. The available Pearson correlation coefficients are listed on the variants b of the Tables 2, 4 and 5.

Size of Correlations in Cross-Sectional Research

In Table 2b, we see only two effect sizes for *objective* measures of productivity at work, both of which were substantial. In Table 3b, we can see that the same-time correlations between happiness and *supervisor ratings* of general productivity vary from +0.01 to +0.43, with an average of +0.30. The same-time correlations between happiness and an employee's *self-ratings* of general productivity range from -0.01 to +0.31, with an average of +0.14.

Size of Correlations in Longitudinal Research

The longitudinal column in Table 2b shows that the gain in efficiency of national production per unit of growth in life satisfaction ranges from 0 to 4%. In France, Germany, Poland, and Hungary, this impact exceeded 3%, but in Ireland, Sweden, Belgium, and Switzerland, it was less than 1%. As can be seen in Table 3b, longitudinal correlations between earlier happiness and later supervisor ratings of general productivity at work range from +0.18 to +0.52, with an average of +0.38. Reversed over-time correlations of the two variables vary from +0.18 to +0.27, with an average of +0.24. The average size of longitudinal correlations between happiness and attentiveness is +0.21. The size increases to +0.34 for emphasis on goals, to +0.33 for the facilitation of work, and to +0.35 for team-building skills.

In sum: The sizes of the correlations between happiness and productivity are generally positive and modest to considerable, both for correlations in cross-sectional and longitudinal studies.

4.3 Is the Relation Between Happiness and Productivity Short-lived?

In Table 4c, we present the findings that distinguished between time lags of different lengths. Such distinctions have been made only for correlations between earlier happiness and later productivity at work as measured using supervisor ratings. The many empty cells in the table illustrate the blanks in current knowledge on this subject.

We see that the correlation between earlier happiness and later ratings of the employee's productivity at work by supervisors tend to be stronger for longer time lags,

most so for rating of general productivity and for social functioning in the job. This increasing correlation can be interpreted as a 'sleeper effect': happiness fostering healthy developments which in interaction cumulatively add to productivity at work. Future research is necessary to verify this explanation. A slight decrease in strength of the correlation was found for *attentiveness* to managers suggestions. Possibly, a reversed effect of happiness on non-conformism plays a role here, which should also be verified in future research.

In sum: The correlation between happiness on later productivity at work is not short-lived.

4.4 Does the Correlation Between Happiness and Productivity at Work Differ Across Occupations and Sectors?

In Tables 5, we present the observed correlations between happiness and productivity at work sorted by occupation and sector. As shown in Table 5a, strong positive relations between happiness and *objective* productivity at work were observed among athletes, salesmen, and scholars. These findings are based on cross-sectional analyses.

Even so, in Table 5b, we find strong positive over-time correlations between earlier happiness and *subjective* ratings of subsequent productivity among directors, managers, and social services professionals, such as social welfare workers and criminal justice professionals. Less strong correlations between happiness and subjective ratings of productivity were observed among nurses, pathology laboratory personnel, and pilots.

As such, then, the relations between happiness and productivity tend to be strongest for leaders. Happiness facilitates leadership anyway (Lyubomirsky et al. 2005). Likewise, happy social services professionals are more likely to do well in their job, especially when their productivity is measured using subjective ratings. Happiness fosters empathy (Strayer 1980), which is essential in this work. At the same time, the number of studies is limited and future research has to further establish how the relationship between happiness and productivity varies across occupations and sectors.

At the bottom of Table 5b we see strong correlations among public servants, average same-time correlation is +.27 and average over-time correlation is +.25. Findings on this subject in the private sector are less numerous, with only two same-time correlations that average to +.14.

In sum: The correlation between happiness and productivity at work appears to differ across occupations. The effect of happiness on productivity at work appears to be most pronounced among people in leadership positions and among social workers. The effect also seems to be stronger in the public sector than in the private sector.

4.5 Is There a Difference in Correlation with Productivity at Work Between the Affective Component and the Cognitive Component of Happiness?

In Section 1, we noted that the research on the relation between job satisfaction on productivity at work has generally focused on cognitive evaluations. Then, in Section 2.1, we drew a distinction between two separate 'components' of happiness: an affective component (how well we feel most of the time) and a cognitive component (perception of getting from life what you want). This distinction between these separate elements of happiness raises the question as to whether there is a difference in the correlation of those components with productivity at work.

In order to explore possible differences we noted for all findings what measure of happiness had been used. We distinguished between a) measures of overall happiness, b) measures of hedonic level, c) measures of cognitive contentment and d) mixed measures of happiness, that is, measures that combine indicators of the above variants. The happiness measures used is reported in the right-hand column of the tables.

Among the 196 correlations in this research synthesis, 11% were assessed by means of a measure of overall happiness, 74% were based on a measure of hedonic level (typically affect balance scores) while only 1% involved a measure of cognitive contentment. Mixed measures of happiness underly 15% of the correlations; all questions that address both overall happiness and hedonic level of affect, such as questions on how happy one typically feels.

The strengths of correlations can best be compared *within* studies that used multiple measures of happiness. The only study of that kind by [Levy & Guttman \(1973\)](#) found quite similar correlations of self-rating of performance at work with a measure of affect level ($r = +.30$) and with a measure of overall happiness ($r = +.28$).

Comparison *across* studies reveals that the average correlation with supervisor ratings of productivity is equally strong for affect level ($r = +.30$) compared to overall happiness ($r = +.28$). Yet, the average correlation with self-rating of productivity at work is stronger for measures of hedonic level of affect ($r = +.30$) than for mixed measures ($r = +.08$). Only one study assessed the relation between self-rating of general productivity at work and the cognitive component of happiness and found no significant association ($r = +.03$ in [Caz & Tanyeri 2018](#)) and differs as such from the average correlation observed with measures of hedonic level of affect ($+ .31$) and measures of overall happiness ($+ .29$).

Correlations based on mixed measures of happiness were marginally lower than correlations based on pure measures of hedonic level in the cases of general productivity as measured by supervisor ratings ($r = +.28$ vs $+ .30$). In the case of self-ratings of productivity, average correlation with mixed measures of happiness was

+0.08 and while the correlation with pure hedonic level was +.31. In the case of self-rated engagement in work, the average correlation with mixed measures of happiness was +.34 while the correlation with overall happiness was only +.12. See [Table 3b](#).

In sum: The available findings strongly suggest that the affective component of happiness and overall happiness measures are related to productivity at work; there is currently no evidence for an association between the cognitive component of happiness and productivity.

4.6 Does Happiness Cause Greater Productivity at Work?

The above-mentioned correlations between happiness and productivity at work can be caused by 1) a third variable, such as health, which drives both happiness and productivity, 2) an effect of productivity on happiness and 3) an effect on happiness on productivity. The Happy Worker Thesis assumes a causal effect of happiness on productivity (3). Two of the studies used IV-methods or tried to account for reverse causality in another way (DiMaria et al., 2020).

Ideally, we need more (quasi-)experimental evidence for proving that effect. Yet, experimental studies on this subject are lacking as, yet, as visualized by the empty cells in Table 2. Two experiments by Oswald et al. (2015) showed a causal effect but did not use acceptable measures of happiness. In the first experiment, on students made feel happy were more productive on cognitive tasks than student made feel bad. However, the study used a measure of momentary mood instead of happiness as defined above in section 2.1.1. The second experiment was a natural experiment: students whose parents had recently divorced were found to perform less well in school than students who had experienced no such negative event. Again, momentary mood was used as an outcome, not happiness.

What other indications do we have for a causal effect of happiness on productivity at work?

Causal mechanisms

Above in section 1.1.3 we discussed the causal mechanisms that are likely to be involved in the observed effects of happiness on performance on various tasks. All these mechanisms are likely to apply on productivity at work.

Partial correlations remain positive

Correlations between happiness and productivity at work can be driven by a third factor, such as good health fostering both happiness and productivity, while there is no effect of happiness on productivity. Many of such possible spurious effects were checked in the partial correlations presented in Table 3b. Most of the correlations survived such controls as appears in the high average of partial correlations. Still, not all possible spurious effects have been checked for as yet.

Predictive power of happiness

Above in Table 4c we have seen that 1) present level of happiness predicted future level of productivity at work and 2) that change in happiness also predicted future change in productivity.

Moreover, the Instrumental Variable analysis by DiMaria et al. (2020) suggests that happiness is an input to productivity and not an output. This is also indicated in the study of [Wright & Staw](#) (1999), who found that the association between earlier happiness on later productivity is stronger ($r = -.46$) than the association between of earlier productivity and later happiness ($r = +.18$).

In sum: A causal effect of happiness on productivity at work is likely, but cannot be definitively proven as yet.

5 Discussion

Our findings reveal that happiness appears to have a considerable positive impact on productivity. This is consistent not only with the broaden-and-build theory of Fredrickson (2004), but also with the views of Wright, Cropanzano, and Bonett (2007), who argue that happiness depends on access to resources that facilitate better job performance. In this context, then, the following questions arise.

5.1 Why Would the Affective Component Be More Strongly Related to Productivity?

In Section 4.3, we observed that the correlation with productivity at work was stronger for the affective component of happiness than for overall happiness and the cognitive component of happiness. Why is that?

One reason that the affective experience has a stronger psychologically force than cognitive evaluation, known as the 'primacy of affect' (Zajonc 1984). This fits the dominance of affective experience in the appraisal of overall satisfaction with life (Kainulainen et al., 2018).

A related explanation is that the average level of affect is more indicative of wider flourishing. Affect, then, acts as our primary bio-psychological compass, while the cognitive evaluation that developed later in evolutions constitutes a secondary orientation mechanism (Veenhoven 2009).

One reason specific to the cognitive component is that contentment depends on social comparison (Kamilçelebi & Burger, 2024), meaning that it is a much more relative phenomenon than affective experience. Basically, contentment involves imagining that one is better in some way: better off than other workers, for instance, or better off now than previously. Such understandings, however, do not prompt greater investment in

work. At the same time, it has to be acknowledged that the evidence on the relationship between contentment and productivity is limited and more research is needed to compare the two components.

5.2 Why a Stronger Effect of Happiness Than Job Satisfaction?

In Section 1, we noted that job satisfaction dominated tests of the HPW thesis, also mentioning the evidence that job satisfaction had a smaller effect on productivity than overall happiness.

One possible reason for this difference is that job satisfaction is typically measured by means of questions that prompt a cognitive evaluation (Wijngaards et al., 2021), as opposed to one in terms of affect. In Section 5.1, we pointed out that cognitive experience is not as strong as affective experience in terms of influencing work performance. As such, we expect affective measures of job satisfaction – that is, how well employees feel when they are at work – to reveal a greater effect on productivity.

Another possible explanation is that life satisfaction is more constitutive than mere job satisfaction, in terms of having a greater impact on an employee's physical as well as mental health, which, in turn, boosts performance at work. Yet, the literature could benefit from a more direct comparison between domain-specific measures and general measures of worker well-being.

5.3 Reversed Causality: How Could That Work?

Along with the evidence that previous happiness has an effect on subsequent productivity at work, we also found evidence for a bi-directional relationship, i.e., previous productivity predicting subsequent happiness. These few correlations are presented in shading in the tables – such as the effect of supervisor ratings of productivity on the happiness of employees. See Table 3a.

At the individual level, one explanation is that the feelings of accomplishment and, relatedly, higher self-esteem – that result from good productivity at work, can result in higher levels of individual happiness. On the other hand, though, the reverse is again true: low productivity at work can lead to feelings of frustration, resulting in low morale, which can negatively affect an employee's overall happiness. In addition, high productivity at work can generate more social connections and better relationships with others, which may further stimulate greater happiness.

At the macro level, a nation's growth in productivity is likely to provide citizens with more resources, such as higher incomes and better public services, as well as greater job security, all of which are likely to increase their happiness.

6 Conclusion

Our four research questions can be answered as follows:

- Happiness is moderately to strongly related to productivity at work.
- This relation between happiness and productivity at work seems to be not short-lived.
- The correlation between happiness and productivity at work differs across occupations and sectors. The productivity of managers and directors is the most strongly related to their happiness. The associations are also stronger for workers in the public sector.
- The correlation between happiness and productivity appears to be stronger for the affective component of happiness (how well one feels most of the time) than cognitive component of happiness (perception to get from life what one wants). Yet, evidence on the cognitive component is largely lacking and further research is necessary.
- There are strong indications for a causal effect of happiness on productivity at work, but more experimental studies have to be conducted to verify this claim.

Table 1: 32 Studies Included in This Synthesis of Research on Happiness and Productivity at Work.

People investigated	Place, Time, Number of observations	Productivity measure	Happiness measure	Source
General public				
16+ aged general public	United Kingdom, 1991-2009 N = 171690	Production counts	Overall happiness	Geale (2011)
18+ aged general public	Urban areas of Israel, 1973 N = 1830	Self-rating	Overall happiness Affect balance	Levy & Guttman (1975)
21-60 aged general public	Urban areas in the USA, 1963- 1964 N = 2787	Self-rating	Affect balance	Bradburn (1969)
18-65 aged general public	20 European countries, 2004-2010 N = 30000	Change in productivity in country	Overall happiness	DiMaria et al. (2020)
18+ aged general public	34 African nations 2006-2020 N = 350000	Change in agrarian productivity	Overall happiness	Khaled & Ben Afia (2024)
Special groups				

14+ aged patients and students	Hongkong, China, 1995 N = 236	Self-rating	Mixed measure	Lam et al. (1998)
Evening school students	California, USA; 2006 N = 87	Supervisor rating	Mixed measure	Jones (2006)
Occupational groups				
Scholars	Germany, 2010 N = 49	Production counts	Mixed measure, Affect balance	Dilger et al. (2013)
Academics	Turkey, 2013 N = 339	Self-rating	Contentment	Caz & Tanyeri (2018)
Pilots	Europe, 2016 N = 1147	Self-rating	Overall happiness	Demerouti et al. (2018)
Private pathology laboratory personnel	USA, 1990 N = 198	Supervisor rating	Affect balance	Cropanzano & James (1993)
Sales workers	UK, 2017 N = 12549	Production counts,	Mixed measure	Bellet et al. (2019)
Workers	Germany, 2015-2017 N = 439	Self-rating	Mixed measure	Frone et al. (2018)

Private sector employees	USA, 1990 N = 270	Supervisor rating	Affect balance	Moorman (1993)
Employees at a private call center	USA, 2017 N = 67	Production counts	Affect balance	Miner & Glomb (2010)
Managers	Spain, 2018 N = 245	Supervisor rating	Affect balance	Lado et al. (2021)
Managers	USA, 2004 N = 109	Supervisor rating	Affect balance	Wright et al. (2007)
Public sector managers	USA, 1997-1998 N = 59	Supervisor rating	Affect balance	Wright et al. (2002)
Directors from private sector and the Canadian federal government	Canada, 2005 N = 715	Self-rating	Affect balance	Zelenski et al. (2008)
Public sector supervisory personnel	USA, 1999 N = 45	Supervisor rating	Affect balance	Wright et al. (2004)
Social services personnel	USA, 1994 N = 78	Supervisor rating	Affect balance	Wright & Staw (1999)
Social welfare counselors	USA, 1998 N = 48	Supervisor rating	Affect balance	Wright et al. (2004)
Social welfare department employees	USA, 1994-1998 N = 81	Supervisor rating	Affect balance	Wright & Staw (1999)

Social welfare professionals	USA, 1992-1997 N = 60	Supervisor rating	Affect balance	Cropanzano & Wright (1999)
Social welfare workers	USA, 1995 N = 52	Supervisor rating	Affect balance	Wright & Cropanzano (1998)
Human services workers	USA, 1997 N = 47	Supervisor rating	Affect balance	Wright & Cropanzano (2000)
Human services personnel	USA, 1988-1989 N = 33	Supervisor rating	Affect balance	Wright et al. (1993)
Juvenile probation officers	USA, 1997 N = 37	Supervisor rating	Affect balance	Wright & Cropanzano (2000)
Criminal justice personnel	USA, 1996-1997 N = 76	Supervisor rating	Affect balance	Wright & Bonett (1997)
Female nurses	USA, 1990 N = 97	Supervisor rating Self-rating	Affect balance	Cropanzano & James (1993)
Shop-floor workers	Australia, south-eastern metropolitan areas, 1977 N = 1486	Self-rating of work performance	Overall happiness	Hedley (1981)
World Cup soccer players	Not reported, 1970-2014 N = 304	Production counts	Affect balance	Hopfensitz & Mantilla (2018)

Table 2A: 26 Research Findings on Correlation Between Happiness and *Objective* Indicators of Productivity at Work

Aspect of productivity at work	Research method								Happiness measure
	Cross-sectional			Longitudinal			Experimental		
	Zero-order	Partial	IV	Zero-order	Partial	IV	Zero-order	Partial	
Micro level studies									
Production counts									
• Sales		<u>+/- +</u>	<u>+</u>						Mixed measure
• Call time (in call center)	<u>=</u>		<u>=</u>						Hedonic level
			<u>=</u>						Mixed measure
• Number of academic publications		<u>+/-/+</u>							Hedonic level
		<u>+/-/+</u>							Mixed measure
• Success in sports competition		<u>+/-/-/+</u>							Hedonic level
• Test performance	<u>±</u>	<u>0</u>							Overall happiness
• Productivity measured with wage		<u>+/0</u>	<u>-/-/-</u>						Overall happiness

Macro level studies									
<i>Change in productivity in nation</i>				+/+	+				Overall happiness

Signs explained on [Appendix](#). Use control + click to see detail on an online finding page.

Table 2B: Observed Effect of Strengths of Zero-order Correlations Between Happiness and Objective Indicators of Productivity at Work

Aspect of productivity	Research method			Happiness measure
	Cross-sectional	Longitudinal	Experimental	
Micro level studies				
Production counts				
• Sales				
• Call time (at Call Center)	-0.27			Hedonic level
• Number of academic publications				
• Success in sports competition				
• Productivity measured with wage				
Test performance	+0.01			Overall happiness
Macro level studies				
Change in productivity in nations		0 to 4%		Overall happiness

Table 3A: 148 Research Findings on Correlation Between Happiness and Subjective Ratings of Productivity at Work

Aspect of productivity	Observed correlation with happiness						Happiness measure
	Research method						
	Cross-sectional		Longitudinal		Experimental		
	Zero-order	Partial	Zero-order	Partial	Zero-order	Partial	
Micro level studies							
Supervisor rating of work performance							
General work performance	<div><div><div>+</div><div>+</div><div>+</div><div>+</div><div>+</div><div>+</div><div>+</div><div>+</div></div><div><div>+</div><div>+</div><div>+</div><div>+</div><div>+</div><div>+</div><div>0</div></div></div>	<div><div><div>+</div><div>+</div><div>+</div><div>+</div><div>+</div><div>+</div></div><div><div>+</div><div>+</div><div>?</div></div></div>	<div><div><div>+</div><div>+</div><div>+</div><div>+</div><div>+</div><div>+</div><div>+</div><div>+</div></div><div><div>+</div><div>+</div><div>+</div><div>+</div><div>+</div><div>+</div><div>+</div><div>+</div></div><div><div>+</div><div>+</div><div>+</div><div>+</div><div>+</div><div>+</div></div><div><div>+</div><div>+</div><div>+</div><div>+</div><div>+</div><div>+</div><div>+</div><div>+</div><div>+</div><div>+</div></div></div>	<div><div><div>+</div><div>+</div><div>+</div><div>+</div><div>+</div></div></div>			Hedonic level
	<div><div><div>+</div><div>+</div></div></div>	<div><div><div>+</div><div>+</div></div></div>					Mixed measure
• Attentiveness	<div><div><div>+</div></div></div>		<div><div><div>+</div><div>+</div><div>+</div><div>+</div></div><div><div>+</div><div>+</div><div>+</div><div>+</div></div><div><div>+</div><div>+</div><div>+</div><div>+</div></div></div>				Hedonic level
	<div><div><div>+</div></div></div>						Hedonic level

• Engagement in work	<u>+</u>	<u>+</u>					Mixed measure
• Goal emphasis	<u>+</u>		<u>+</u> <u>+++</u> <u>+</u> <u>+++</u> <u>+++</u> <u>+++</u>				Hedonic level
• Organization of work	<u>+</u>		<u>+</u> <u>+++</u> <u>+</u> <u>+++</u> <u>+++</u> <u>+++</u>				Hedonic level
• Social functioning at work	<u>+</u> <u>0</u> <u>0</u>		<u>+</u> <u>+++</u> <u>+</u> <u>+++</u> <u>+++</u> <u>+++</u>				Hedonic level
<i>Self-rating of work performance</i>							
General work performance	<u>+</u>						Overall happiness
	<u>++</u>		<u>+</u>	<u>+</u>			Hedonic level
	<u>+</u> <u>-</u>						Contentment
	<u>++</u>						Mixed measure

• Engagement in work	+++±-						Overall happiness
	±	±±					Hedonic level
	±±						Mixed measure
• Social functioning at work	±						Hedonic level
Macro level studies							

Signs explained on [Appendix](#). Use control + click to see detail on an online finding page.

Table 3B: Observed Effect Strengths of Zero-order Correlations Between Happiness and *Subjective* Ratings of Work Performance

Aspect of productivity	Observed correlation with happiness			Happiness measure
	Research method			
	Cross-sectional	Longitudinal	Experimental	
Micro level studies				
Supervisor ratings of work performance				
General productivity	<u>+0.26 +0.25 +0.43 +0.32 +0.37</u> <u>+0.37 +0.40 +0.33 +0.32 +0.29</u> <u>+0.34 +0.43 +0.32 +0.34 0</u> Average. = +0.30	<u>+0.27 +0.45</u> <u>+0.48+0.40+0.48</u> <u>+0.46+0.48+0.18</u> <u>+0.36+0.37+0.32+0.37+0.33</u> <u>+0.29+0.25+0.38</u> <u>+0.36+0.27+0.18+0.21+0.17</u> <u>+0.26</u> <u>+0.45+0.39+0.47+0.35+0.48</u> <u>+0.38+0.40+0.51+0.42+0.5</u> <u>2</u> Average= +0.45		Hedonic level
	<u>+0.27 +0.28</u> Average = +.28			Mixed measure
● Attentiveness	<u>+0.19</u>	<u>+0.30 +0.35+0.30+0.28</u> <u>+0.09+0.03+0.10</u> <u>+0.19+0.23+0.21</u>		Hedonic level

		<i>Average = +0.21</i>		
• Engagement in work	<u>+0.24</u>			Mixed measure
• Goal emphasis	<u>+0.32</u>	<u>+0.46</u> <u>+0.38</u> <u>+0.37</u> <u>+0.40</u> <u>+0.41</u> <u>+0.28</u> <u>+0.47</u> <u>+0.38</u> <u>+0.33</u> <u>+0.22</u> <u>+0.31</u> <u>+0.21</u> <u>+0.17</u> <i>Average. = +0.34</i>		Hedonic level
• Organization of work	<u>+0.31</u>	<u>+0.44</u> <u>+0.45</u> <u>+0.35</u> <u>+0.44</u> <u>+0.24</u> <u>+0.42</u> <u>+0.36</u> <u>+0.47</u> <u>+0.34</u> <u>+0.16</u> <u>+0.38</u> <u>+0.17</u> <u>+0.10</u> <i>Average. = +0.33</i>		Hedonic level
• Social functioning at work	<u>+0.32</u> <u>0</u> <u>0</u> <i>Average = +0.16</i>	<u>+0.41</u> <u>+0.52</u> <u>+0.35</u> <u>+0.47</u> <u>+0.46</u> <u>+0.32</u> <u>+0.17</u> <u>+0.42</u> <u>+0.36</u> <u>+0.24</u> <u>+0.44</u> <u>+0.23</u> <u>+0.18</u> <i>Average. = +0.35</i>		Hedonic level

General productivity	<u>+0.29</u>			Overall happiness
	<u>+0.31</u>			Hedonic level

	+0.06 -0.01 <i>Average = +.03</i>			Contentment
	+0.01 +0.16 <i>Average. = +0.08</i>			Mixed measure
• Engagement in work	+0.06 +0.47 +0.05 +0.05 -0.09 <i>Average = +0.12</i>			Overall happiness
	+0.20 +0.47 <i>Average = +0.34</i>			Mixed measure
• Social functioning at work	+0.13			
Macro level studies				

Table 4A: 30 Research Findings on the Correlation Between Happiness and *Objective* Indicators of Productivity at Work *Split by Occupation and Sector*

Productivity at work	Observed relation with happiness						Happiness measure
	Research method						
	Cross-sectional		Longitudinal		Experimental		
	Zero-order	Partial	Zero-order	Partial	Zero-order	Partial	
Split by occupation							
Salesmen	=	=					Hedonic level
		+ \ + + + / + + \ -					Mixed measure
Scholars		+ \ + \ +					Hedonic level
		+ \ + \ +					Mixed measure
Athletes		+ \ + \ - \ +					Hedonic level
Split by sector							
Public sector							
Private sector	=	=					Hedonic level
		+ \ + + / + + \ - +					Mixed measure

Signs explained on [Appendix](#). Use control + click to see detail on an online finding page.

Table 4B: Observed Effect Strengths of Zero-order Correlations Between Happiness and *Objective* Indicators of Productivity at Work
Split by Occupation and Sector

Productivity at work	Observed relation with happiness			Happiness measure
	Research method			
	Cross-sectional	Longitudinal	Experimental	
Split by occupation				
Salesmen	-0.27			Hedonic level
Scholars				
Athletes				
Split by sector				
Public sector				
Private sector	-0.27			Hedonic level

Table 4C: Strengths of Zero-order Correlations Between Happiness and Later *Subjective* Ratings of Productivity at Work *Split by Length of Time Lag*

Aspect of later productivity	Correlation with earlier happiness		Happiness measure
	Correlation with later LEVEL of productivity	Correlation with later CHANGE in productivity	
Micro level studies			
Supervisor ratings of productivity			
General productivity	<u>1-year later: r = +.40</u> <u>2-years later: r = +.48</u> <u>Same time: r = +.33</u> <u>1-year later: r = +.35</u> <u>2-years later: r = +.40</u> <u>3-years later: r = +.45</u> <u>4- years later: r = +.39</u> <u>4,5 years later: r = +.47</u> <u>Same time: r = +.25</u> <u>1-year later: r = +.48</u>	<u>2-years later: Beta = +.49</u>	Hedonic level
• Attentiveness	<u>1,5 years later: r = +.35</u> <u>2-years later: r = +.30</u> <u>3-years later r = +.28</u>		Hedonic level

• Engagement in work			
• Goal emphasis	1,5 years later: r = +.40 2-years later: r = +.37 3-years later r = +.38		Hedonic level
• Organization of work	1,5 years later: r = +.40 2-years later: r = +.37 3-years later r = +.38		Hedonic level
• Social functioning at work	1,5 years later: r = +.47 2-years later: r = +.35 3-years later r = +.52		Hedonic level
<i>Self-rating of productivity at work</i>			
General productivity			
• Engagement in work			
• Social functioning at work			
<i>Macro level studies</i>			

Table 5A: 257 Research Findings on the Correlation Between Happiness and Subjective Ratings of Productivity at Work *Made by Supervisors and Self*

Productivity at work	Observed relation with happiness						Happiness measure
	Research method						
	Cross-sectional		Longitudinal		Experimental		
	Zero-order	Partial	Zero-order	Partial	Zero-order	Partial	
Split by occupation							
Social services workers/ Social welfare workers/ Human services personnel/ Criminal justice personnel/ Juvenile probation officers	<div>+++++</div> <div>+++++</div> <div>± 0</div>	<div>+++</div>	<div><div>+</div>+++++</div> <div><div>+</div><div>+</div>++</div> <div>+++++</div> <div>+++++</div> <div><div>+</div><div>+</div><div>+</div><div>+</div><div>+</div><div>+</div><div>+</div><div>+</div><div>+</div><div>+</div></div> <div>+++++</div> <div><div>+</div><div>+</div><div>+</div><div>+</div><div>+</div><div>+</div><div>+</div><div>+</div></div> <div>+++++</div> <div>+++++</div> <div>+++++</div> <div>+++++</div> <div>+++++</div> <div>+++++</div> <div>+++++</div> <div>+++++</div> <div>+++++</div> <div>+++++</div> <div>+++++</div> <div>+++++</div> <div>+++++</div> <div>+++++</div> <div>+++++</div> <div>+++++</div> <div>+++++</div> <div>+++++</div> <div>+++++</div> <div>+++++</div> <div>+++++</div> <div>+++++</div> <div>+++++</div> <div>+++++</div> <div>+++++</div> <div>+++++</div> 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Laboratory personnel	<u>±</u>	<u>±?</u>					Hedonic level
Academics	<u>± ±</u>						Contentment
Pilots	<u>± ± ± ± ±</u>	<u>0</u>					Overall happiness
Nurses	<u>± ±</u>	<u>± ± ±</u>					Hedonic level
\	<u>± ± ± ± ±</u> <u>± ± ± ± ±</u> <u>± ± ± 0 ±</u>	<u>± ± ± ± ± ±</u>	<u>± ± ± ± ± ± ± ± ± ± ± ±</u> <u>± ± ± ± ± ± ± ± ± ± ±</u> <u>± ± ± ± ± ± ± ± ± ± ±</u> <u>± ± ± ± ± ± ± ± ± ± ±</u> <u>± ± ± ± ± ± ± ± ± ± ±</u> <u>± ± ± ± ± ± ± ± ± ± ±</u> <u>± ± ± ± ± ± ± ± ± ± ±</u> <u>± ± ± ± ± ± ± ± ± ± ±</u> <u>± ± ± ± ± ± ± ± ± ± ±</u>	<u>± / ± ± ± ± ±</u>			Hedonic level
	<u>± ±</u>						Contentment
Private sector	<u>± ± ± 0 0</u>	<u>± / ± ± ?</u>					Hedonic level

Signs explained on [Appendix](#). Use control + click to see detail on an online finding page.

Table 5B: Strengths of Zero-order Correlations Between Happiness and Subjective Ratings of Productivity at Work *Split by Occupation and Sector*

Productivity at work	Observed correlation with happiness			Happiness measure
	Research method			
	Cross-sectional	Longitudinal	Experimental	
Split by occupation				
Managers/Directors	+0.26 +0.37 +0.37 +0.43 Average = +0.36	+0.45		Hedonic level
Social services workers/ Social welfare workers/ Human services personnel/ Criminal justice personnel/ Juvenile probation officers	+0.25 +0.32 +0.40 +0.33 +0.32 +0.29 +0.34 +0.31 +0.32 +0.32 +0.32 +0.34 +0.19 0 Average = +0.29	+0.27 +0.46 +0.41 +0.44 +0.30 +0.48 +0.40 +0.48 +0.52 +0.35 +0.47 +0.35 +0.30 +0.28 +0.41 +0.28 +0.47 +0.38 +0.37 +0.40 +0.45 +0.39 +0.47 +0.35 +0.48 +0.38 +0.40 +0.51 +0.42 +0.52 +0.36 +0.37 +0.32 +0.37 +0.33 +0.29 +0.25 +0.38 +0.36 +0.27 +0.18 +0.21 +0.17 +0.26 +0.38 +0.33 +0.22 +0.45 +0.35 +0.44 +0.46 +0.32 +0.17		Hedonic level

		<u>+0.24</u> <u>+0.42</u> <u>+0.36</u> <u>+0.47</u> <u>+0.34</u> <u>+0.16</u> <u>+0.42</u> <u>+0.36</u> <u>+0.24</u> <u>+0.46</u> <u>+0.48</u> <u>+0.18</u> <u>+0.44</u> <u>+0.23</u> <u>+0.18</u> <u>+0.31</u> <u>+0.21</u> <u>+0.17</u> <u>+0.38</u> <u>+0.17</u> <u>+0.10</u> <u>+0.09</u> <u>+0.03</u> <u>+0.10</u> <u>+0.19</u> <u>+0.23</u> <u>+0.21</u> Average = +0.33		
Pilots	<u>+0.13</u> <u>+0.06</u> <u>+0.47</u> <u>+0.01</u> <u>+0.05</u> Average = +0.14			Overall happiness
Academics	<u>+0.06</u> <u>-0.01</u> Average = +.03			Contentment
Shop–floor workers	<u>+0.05</u> <u>-0.09</u> Average = -.02			Overall happiness
Split by sector				
Public sector	<u>+0.25</u> <u>+0.32</u> <u>+0.40</u> <u>+0.33</u> <u>+0.32</u> <u>+0.29</u> <u>+0.34</u> <u>+0.31</u> <u>+0.32</u> <u>+0.32</u> <u>+0.32</u> <u>+0.34</u> <u>+0.37</u> <u>+0.37</u> <u>+0.19</u> <u>0</u> <u>+0.06</u> <u>-0.01</u> Average = +0.27	<u>+0.27</u> <u>+0.46</u> <u>+0.41</u> <u>+0.44</u> <u>+0.30</u> <u>+0.45</u> <u>+0.48</u> <u>+0.40</u> <u>+0.48</u> <u>+0.52</u> <u>+0.35</u> <u>+0.47</u> <u>+0.35</u> <u>+0.30</u> <u>+0.28</u> <u>+0.41</u> <u>+0.28</u> <u>+0.47</u> <u>+0.38</u> <u>+0.37</u> <u>+0.40</u> <u>+0.45</u> <u>+0.39</u> <u>+0.47</u> <u>+0.35</u> <u>+0.48</u> <u>+</u> <u>0.38</u> <u>+0.40</u> <u>+0.51</u> <u>+0.42</u> <u>+0.52</u> <u>+0.36</u> <u>+0.37</u> <u>+0.32</u> <u>+0.37</u> <u>+0.33</u> <u>+</u>		Hedonic level

		<u>0.29 +0.25 +0.38</u> <u>+0.36 +0.27 +0.18 +0.21 +0.17 +</u> <u>0.26 +0.38 +0.33 +0.22</u> <u>+0.45 +0.35 +0.44</u> <u>+0.46 +0.32 +0.17</u> <u>+0.24 +0.42 +0.36</u> <u>+0.47 +0.34 +0.16</u> <u>+0.42 +0.36 +0.24</u> <u>+0.46 +0.48 +0.18</u> <u>+0.44 +0.23 +0.18</u> <u>+0.31 +0.21 +0.17</u> <u>+0.38 +0.17 +0.10</u> <u>+0.09 +0.03 +0.10</u> <u>+0.19 +0.23 +0.21</u> Average = +0.25		
Private sector	<u>+0.43 0.0 -0.27</u> Average = +0.05			Hedonic level

Figure 1: Start Page of the World Database of Happiness

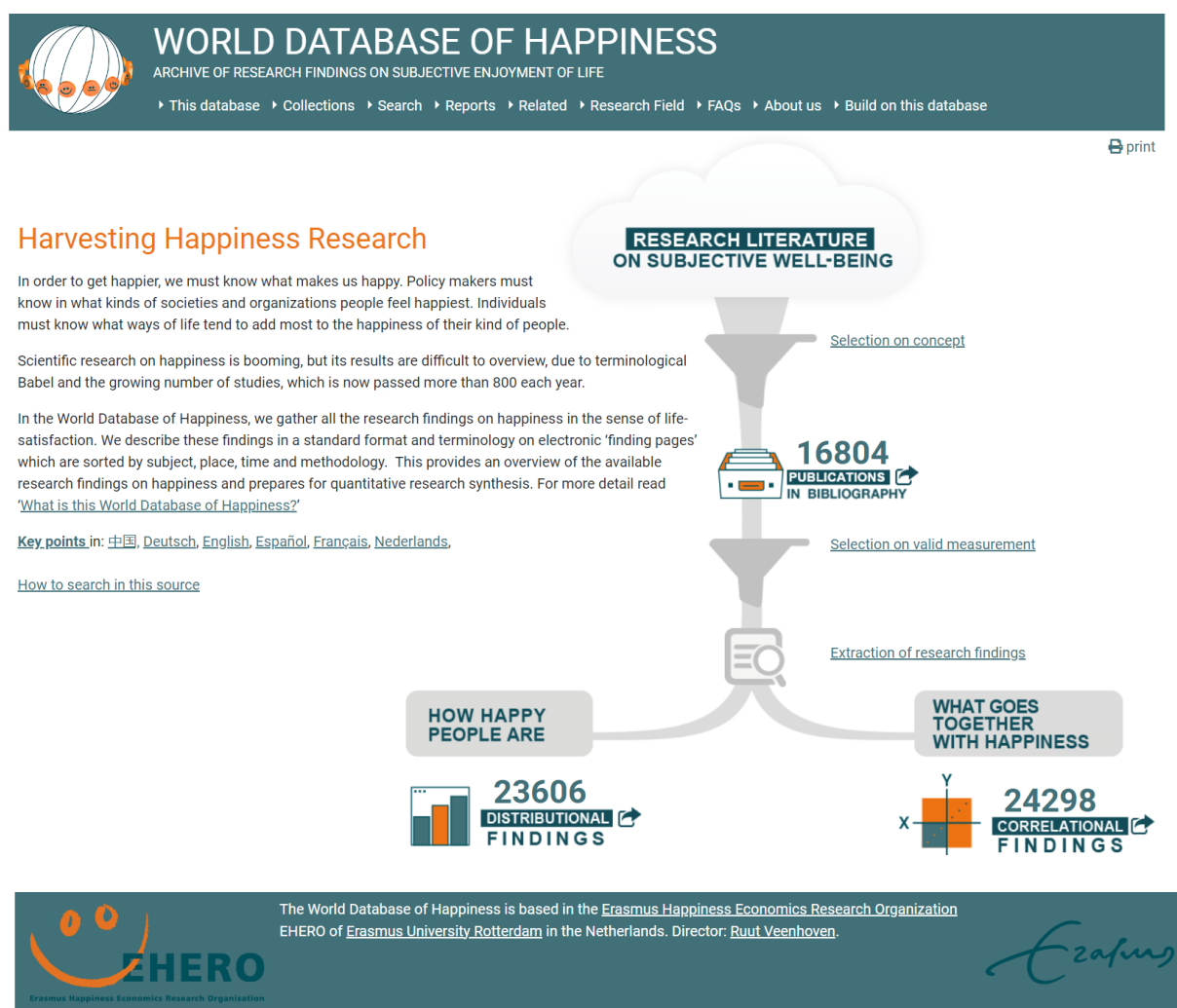


Figure 2: Example of a Finding Page in the World Database of Happiness



WORLD DATABASE OF HAPPINESS

ARCHIVE OF RESEARCH FINDINGS ON SUBJECTIVE ENJOYMENT OF LIFE

[This database](#)
[Collections](#)
[Search](#)
[Reports](#)
[Related](#)
[Research Field](#)
[FAQs](#)
[About us](#)
[Join us](#)

[print](#)

Study [Bellet et al. \(2019\): study GB 2017](#)

Public	Sales workers, UK, followed 6 month 2017
Survey name	Unnamed study
Sample	
Respondents	N = 12549
Non Response	63%
Assessment	Questionnaire: Computer Assisted Web Interview (CAWI)

Correlate

Authors's Label	Sales performance
Our Classification	WORK: PERFORMANCE >> Current work-performance WORK: PERFORMANCE >> ... >> Production counts
Remarks	Detailed individual-level administrative data from the firm.
Distribution	Mean = 25.57; SD = 19.55
Related specification variables	work task
Operationalization	The number of weekly sales, which including new sales to a new or existing customer and re-contracting sales.

Observed Relation with Happiness

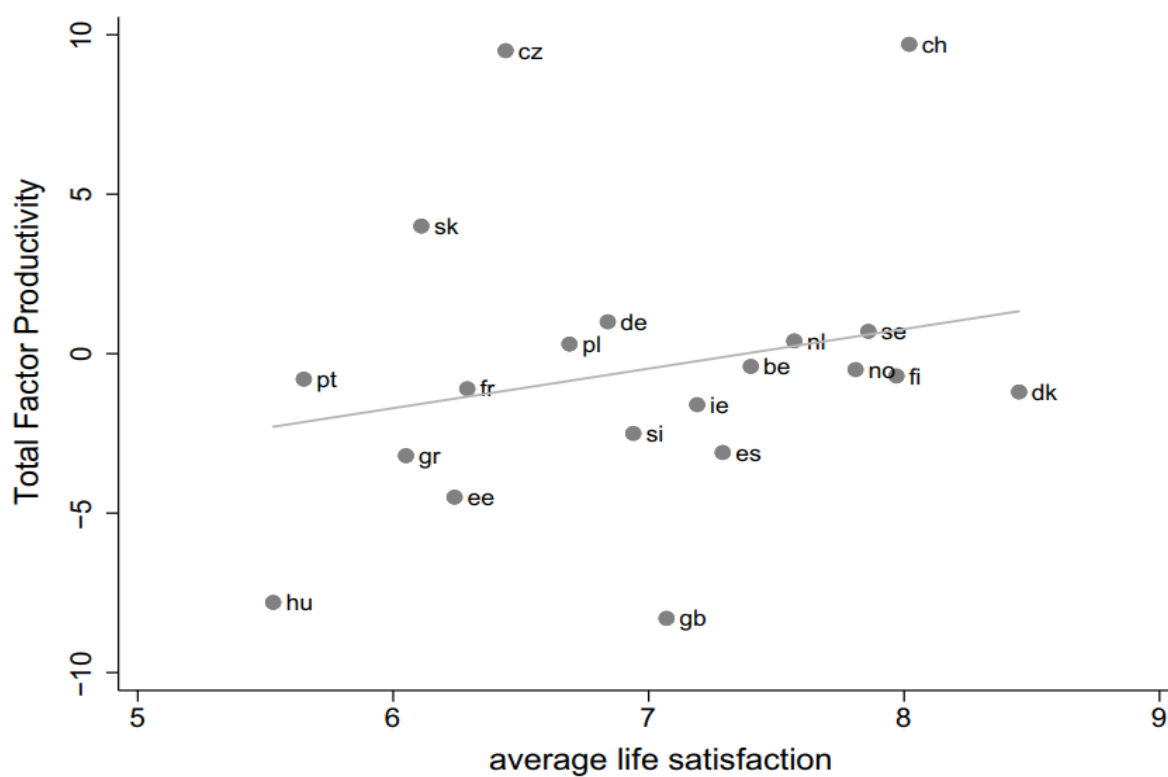
Happiness Measure	Statistics	Elaboration / Remarks
M-FH-cw-sqr-f-5-a	b-fix = +0.04 p < .01	Weekly happiness (1-5) by weekly sales - very happy +6% (01) - happy +4% (01) - neutral (reference) - unhappy -5% (01) - very unhappy -6% (01) 13% difference in productivity between very happy and very unhappy weeks



The World Database of Happiness is based in the [Erasmus Happiness Economics Research Organization](#)
 EHERO of [Erasmus University Rotterdam](#) in the Netherlands. Director: [Ruut Veenhoven](#).



Figure 3: Correlation Between Gain in Productivity and Average Happiness in 20 European Nations



Source : [Di Maria et al. \(2020\)](#)

Appendix A

Meaning of signs and colors used in the finding tables:

- + = positive correlation, significant
- + = positive correlation, not significant
- = negative correlation, significant
- = negative correlation, not significant
- +/+ = negative correlations obtained with different sets of control variables
- +/- = positive on one indicator of this variable, negative on another
- +|+ = positive significant and positive insignificant on different lags of time
- +:- = positive on one measure of happiness, negative on another
- 0 = absence of correlation
- ? = undetermined relation

Sign in shading = happiness was measured after indicators of rating of productivity

Links:

All these signs involve a link to an online finding page with full detail in the [World Database of Happiness](#). Use control + click to view such a page.

Part 2: Testing the Relationship Between Total Factor Productivity and Subjective Well-being

1 Introduction

Over the past decades, there has been increasing attention on the economic consequences of subjective well-being (Fang et al., 2024). Here, subjective well-being can be defined as *'the degree to which an individual judges the overall quality of his/her own life-as-a-whole favorably'* (Veenhoven 1984: 22), which is the result of two aspects. The first is an evaluative one (i.e., a self-reported assessment of how a person's current life is comparing to the most ideal life he or she has in mind. The second is an emotional one (i.e., the extent that a person is generally experiencing positive feelings as opposed to negative feelings). The focus of this paper is on the relationship between subjective well-being and productivity at the regional level in Europe.

Productivity, is defined as the amount and quality of outputs divided by the amount and quality of resources invested in producing them (Prokopenko, 1987), and reflects how much output can be produced given the resources available. In simple words, it is a measure of how efficiently things are done. Total Factor Productivity is one the main indicators of productivity and is regarded as one of the main causes of economic growth. Total Factor Productivity (TFP) reflects the efficiency of the production process and it is considered one of the leading indicators of economic performance of countries and regions. Over the past decades, the economic literature devoted considerable attention to the analysis of TFP and its causes, including how national and regional conditions affect total factor productivity (see e.g., Klenow & Rodriguez-Clare, 1997; Hall & Jones, 1999; Caselli, 2005).² The degree of knowledge creation (R&D), the availability of transmission channels, human capital, the quality of political and economic institutions, and the physical location of countries are some of the pivotal factors driving TFP differences across countries and regions (Isaksson, 2007). In Europe, TFP differences between countries seem to be primarily driven by human capital, information and communication technologies, and cost savings (Gehring et al., 2016) as well as innovation and technology spillovers (Radicic et al., 2023).

There are several reasons to believe that there is an association between subjective well-being and productivity. High levels of subjective well-being may decrease the

² In this literature, it has generally been found that spatial productivity can be attributed to differences in TFP and not to differences in factor endowments (Easterly & Levine, 2001).

amount of time people spend worrying about negative aspects in their lives, thus freeing mental resources required for productivity (Oswald et al., 2015). Broaden-and-build theory (Fredrickson, 2001) posits that experiencing positive emotions signals a safe environment, which in turn broadens individuals' thought-action repertoires and helps them build enduring personal resources.

Feeling good makes people more curious and open to innovation, new social contacts, feedback, training, and so on. As a result, people who feel well build more sustainable resources than unhappy people, such as more knowledge and skills, a better career, a stronger social network, and better health, which all contribute to greater productivity at work.³ In addition, following motivational theories and the PERMA (positive emotions, engagement, relationships, meaning and accomplishment) model (Seligman, 2011), employees who experience positive emotions may be more motivated to perform (Wright & Staw, 1999) and have a higher likelihood to achieving a sense of accomplishment, which in turn can foster productivity (Donaldson et al., 2022).

There is now ample evidence that subjective well-being is associated with higher productivity at the individual level. In a recent research synthesis by Fang et al. (2024), it is shown that most studies on subjective well-being and productivity report a positive association between the two measures. Although there is some evidence for a causal effect of subjective well-being on productivity (see e.g. studies by Oswald et al. (2015) and Bellet et al. (2024)), Fang et al. (2024) conclude that more (quasi)-experimental studies are needed to verify this claim. In addition, not all studies report positive effects of subjective well-being on productivity, which draws attention to the research question: under which conditions does subjective well-being foster productivity? Other literature reviews that focused on mental health (e.g., De Oliveira et al., 2023) and domain-specific subjective well-being measures, such as job satisfaction and engagement (e.g., Harter et al., 2020; Isham et al. 2021), come to similar conclusions. At the same time, there is only limited evidence for the relationship between subjective well-being and productivity at the aggregate level (DiMaria et al., 2020; Peroni et al., 2022).

Initially most studies on TFP focused on estimations at the country-level due to data limitations. However, there is now burgeoning literature on TFP differences between European regions. This development is partly fueled by current regional EU Cohesion policies that emphasizes the importance of technological progress, innovation and knowledge externalities (McCann & Ortega-Argilés, 2015) to achieve productivity gains. In particular, TFP would be important to improve regional economic development and to reduce economic disparities between EU regions and promote

³ In this regard, Tenney et al. (2016) argue that subjective well-being is particularly indirectly related to individual and organizational performance via increased health, self-regulation, motivation, creativity, positive relationships and lower absenteeism and turnover rates.

social cohesion (European Commission, 2010).⁴ By now, several empirical studies on TFP differences across regions have pointed out that there is a considerable gap in TFP between West-European and East-European regions (Beugelsdijk et al., 2018; Kijek & Matras-Bolibok, 2020; Kostarakos, 2023), which can be explained by the educational level of the workforce (Männasoo et al., 2018), knowledge endowments (Capello & Lenzi, 2015; Cortinovis & Van Oort, 2019), technological progress (Rehman & Nunziante, 2023), institutional quality (Rodríguez-Pose & Ganau, 2022), and openness of the regional economy (Cortinovis & Van Oort, 2019; Siller et al., 2021).

1.1 Subjective Well-being and TFP at the Regional Level

Although the above-mentioned regional economics literature does not address the relationship between subjective well-being and TFP, there are several channels through which promoting subjective well-being could contribute to a higher TFP at the regional level (Llena-Nozal et al., 2019). First, higher subjective well-being could boost TFP through human capital formation, given that well-being fosters creativity and social connectivity at work (Fredrickson, 2001; Seligman, 2011). Likewise, subjective well-being could improve the performance of public servants. Second, greater subjective well-being has been linked to social and economic stability through reduced social unrest (Arampatzi et al., 2018; Witte et al., 2020), increased tax morale (Cicizeno & Pizzuto, 2022), and caring about society's problems (Kushlev et al., 2020).

A handful of studies at the national level examined the relationship between subjective well-being and TFP. Using representative data from the European Social Survey (ESS) and AMECO macro-economic data for 20 European countries, DiMaria et al. (2020) found that subjective well-being is positively associated with labor productivity and should be considered an input rather than an output of production. In addition, Peroni et al. (2022) focus on job satisfaction and subjective well-being in 30 European countries and found that industries with higher worker well-being levels have also higher labor productivity levels (+5%) and labor productivity growth (+6%). At the same time, the study by Rasheed et al. (2011) finds a positive relation between life satisfaction for the United States, but not for other countries in their sample.

In this study, we build on the existing literature on subjective well-being and TFP using data on 228 European regions from 2008-2021. Data on subjective well-being is obtained from the Gallup World Poll, while data on TFP is obtained from the European Commission's Joint Research Centre (Kostarakos, 2023). Our results show that subjective well-being is associated with significantly higher TFP levels across 228 European NUTS-2 regions. Although our results hold when controlling for reverse causation using Lewbel IV estimation, they should primarily be interpreted as

⁴ In line with the literature on national differences in productivity, it has been shown that TFP differences primarily drive productivity differences between European regions (Beugelsdijk et al., 2018; Kostarakos, 2023).

conditional associations, since we cannot rule out the possibility that higher productivity could generate higher subjective well-being.

The remainder of this paper is organized as follows. Section 2 describes the empirical strategy and data. Section 3 presents the empirical findings. Conclusion and discussion follow in Section 4.

2 Empirical Strategy

2.1 Measuring TFP

We calculate the levels of TFP for NUTS-2 regions using a standard sources-of-growth (or, growth accounting) approach as detailed in Solow (1957). A similar approach has also been followed by Beugelsdijk et al. (2018) and Kostarakos (2023), where the starting point of the estimation is a Cobb-Douglas production of the form:

$$Y_{it} = A_{it} K_{it}^{\alpha_{it}} (h_{it} L_{it})^{1-\alpha_{it}}$$

where Y_{it} denotes the level of real gross value added (GVA) at constant prices in region i and period t , h_{it} is the human capital index, L_{it} is the number of hours worked and K_{it} is the level of physical capital stock (in constant prices). Lastly, α_{it} denotes the region-specific, time-varying share of capital income. Using equation (1), the level of TFP A_{it} can be directly obtained as:

$$A_{it} = \frac{Y_{it}}{K_{it}^{\alpha_{it}} (h_{it} L_{it})^{1-\alpha_{it}}}$$

We estimate A_{it} for 228 regions covering the time period between 2008-2021. Data on output (GVA in 2015 prices) and two factors of production namely, labor (hours worked) and physical capital stock (in 2015 prices), are readily available in Eurostat and the Annual Regional Database of the European Commission's Directorate General for Regional and Urban Policy (ARDECO). However, the human capital index and the factor income shares need to be calculated.

To estimate the human capital index, we build on the work by Beugelsdijk et al. (2018) and use the following procedure. First, we obtain data on the share of the regional population aged 25-64 by level of educational attainment, and use Barro and Lee's (2013) approach to convert these data into average years of schooling. Second, we convert the years of schooling into a human capital index using a standard Mincerian human capital function. Specifically, following Hall and Jones (1999) and Caselli (2005) the Mincerian function takes the form:

$$h_{it} = e^{\varphi(s_{it})}$$

where h_{it} denotes human capital in region i and period t , s_{it} are the average years of schooling and $\varphi()$ is a piecewise linear function.⁵

Rather than assuming the standard value of 1/3 for the capital share (and 2/3 for the labor share), we opt for calculating the factor shares using National Accounts data. The labour share of income can be easily calculated using data on the compensation of employees and GVA. Specifically, the labour share is defined as

$$1 - \alpha_{it} = \frac{\text{Compensation}}{\text{GVA}}$$

The capital share, α_{it} , is then residually calculated. Please note that in the calculation of the levels of TFP we use Divisia indices (two-year averages) of the factor shares, i.e.:

$$\widetilde{\alpha}_{it} = \frac{\alpha_{it} - \alpha_{i,t-1}}{2}$$

Although in the regional economics literature regional TFP has also been estimated using a fixed effects approach (e.g., Cortonovis & Van Oort, 2019; Ouwehand et al., 2022), a drawback of this method is that it assumes that the factor shares in the Cobb-Douglas production function are homogeneous across regions and unobserved common factors are insufficiently accounted for (Kostarakos, 2023). The advantage of the deterministic approach that is utilized in this paper is that it allows for region-specific Cobb-Douglas production functions as well as time-varying factor elasticities. It is important to note that the limited data available at the regional level prevents us from employing a more complex and detailed production function, one that could, for instance, differentiate between tangible and various forms of intangible capital assets.

Figures 4A and 4B show the distribution of TFP (2021) and annual TFP growth (2008-2021). The highest TFP levels are reported in Luxembourg, Denmark (Copenhagen), Sweden (Stockholm) and Belgium (Brussels), while the lowest TFP can be found in Bulgaria and Greece. Regions in Hungary, Poland and Romania experienced the largest TFP growth, while Groningen in the Netherlands experienced the largest TFP decline, which can mainly be explained by the fact that the Netherlands officially stopped drilling in the region's giant gas field.

⁵ Specifically, the function is defined as: $\varphi = 0.134 * s, s \leq 4$, or $\varphi = 0.134 * 4 + 0.101 * (s - 4), 4 \leq s \leq 8$ or $\varphi = 0.134 * 4 + 0.101 * 4 + 0.068 * (s - 8), s \geq 8$.

Figure 4A: TFP in European regions, 2021

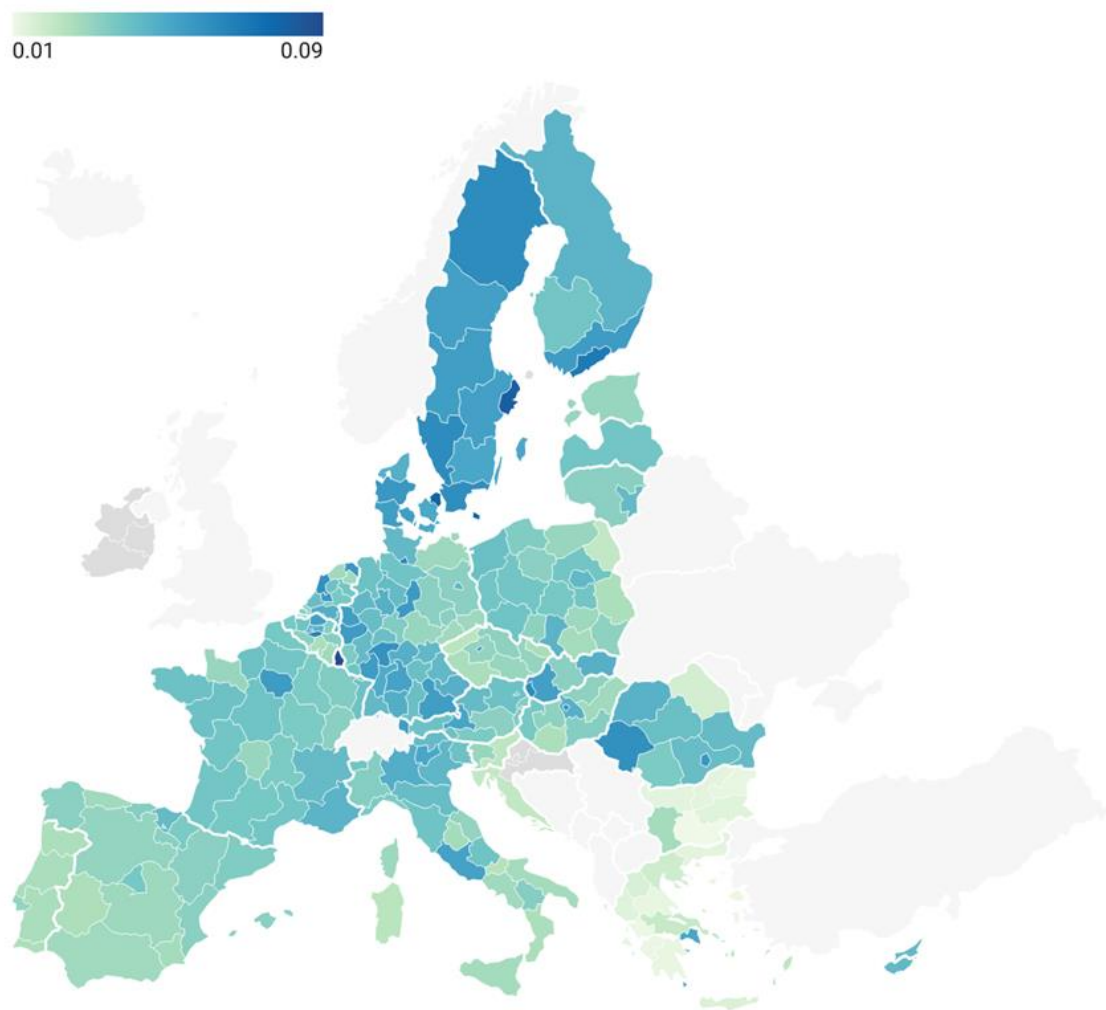
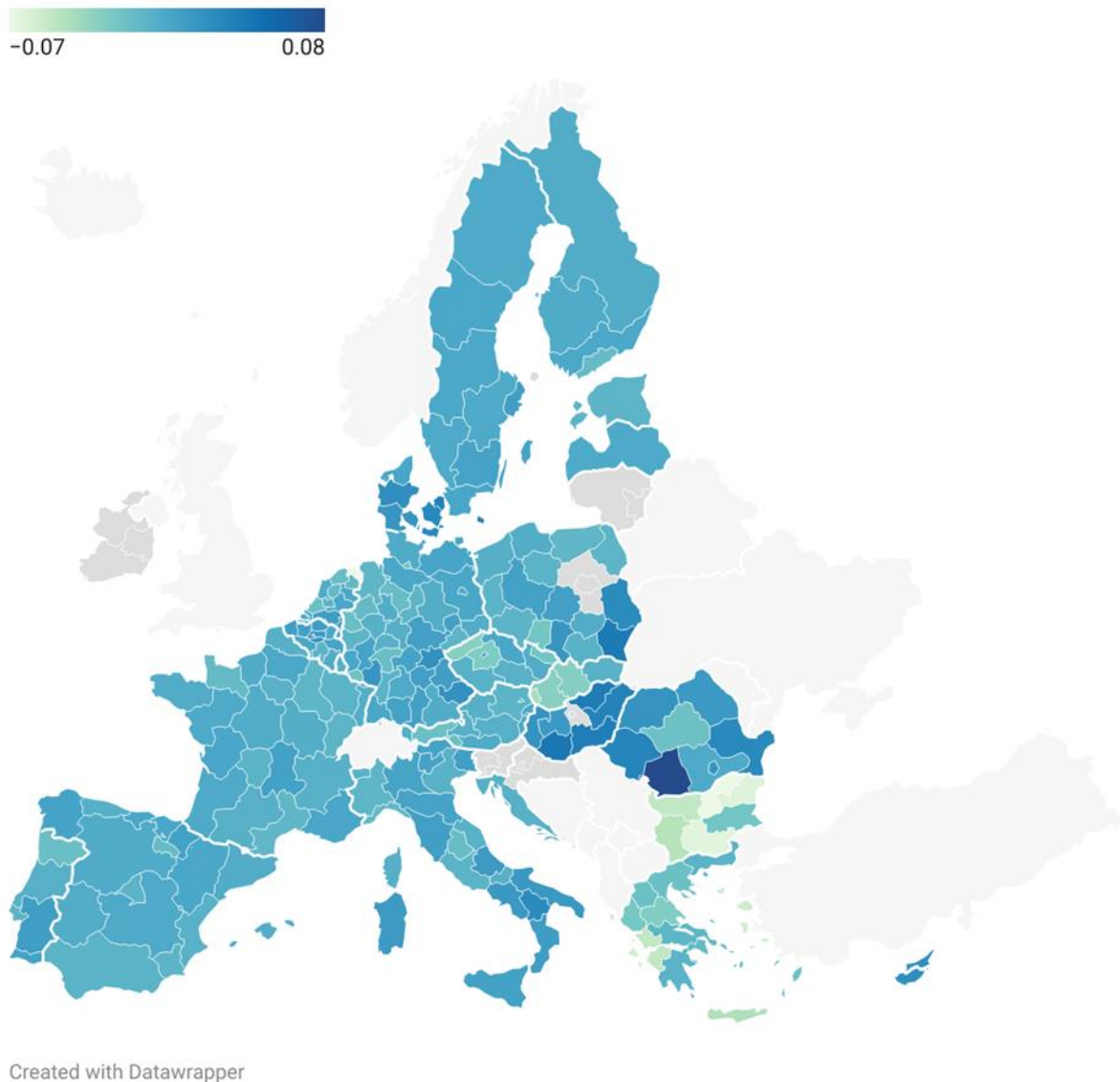


Figure 4B: TFP Growth in European regions, 2008-2021



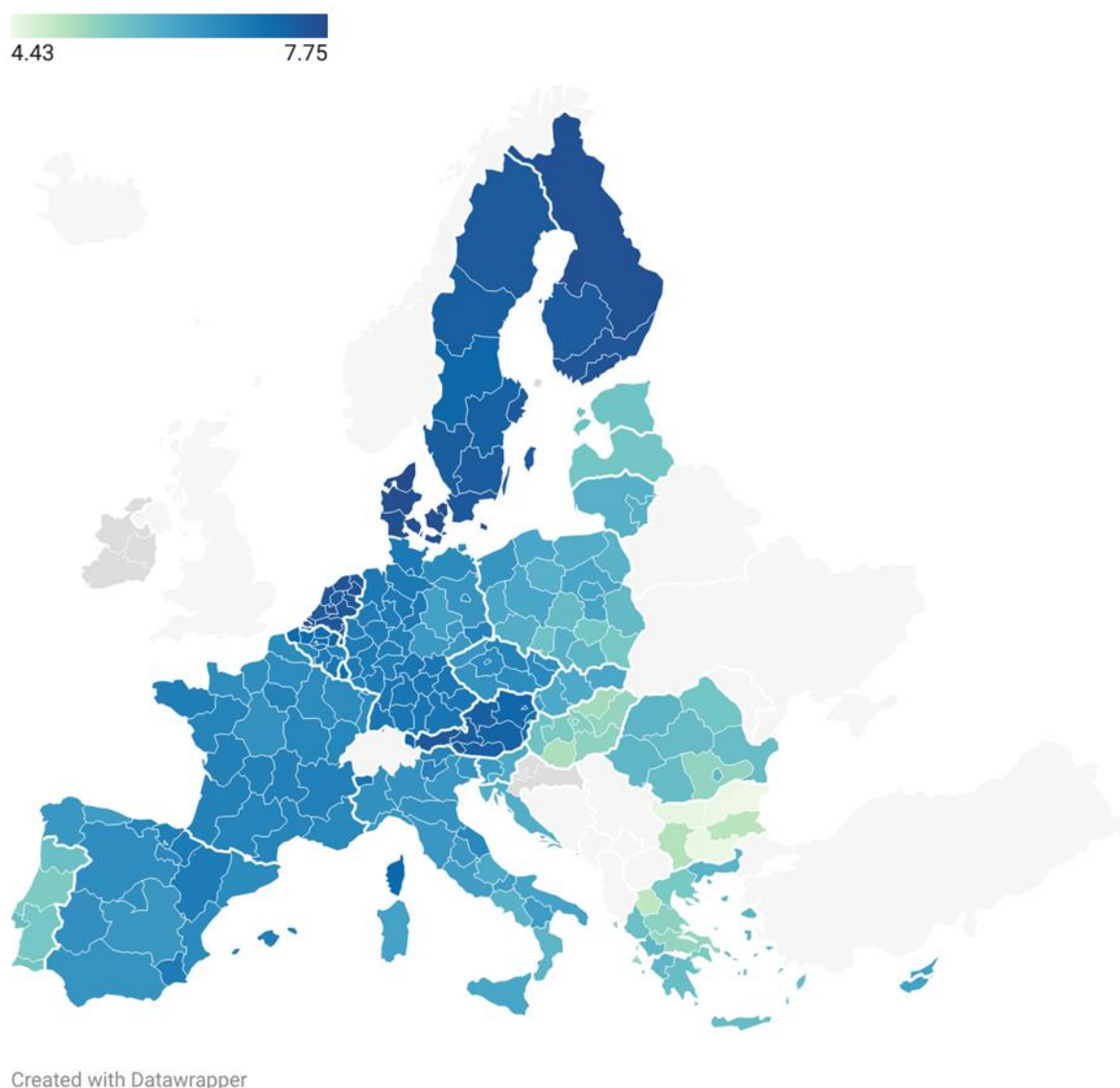
2.2 Measuring Subjective Well-being

Subjective well-being at the regional level is measured using the life evaluation measure obtained from the Gallup World Poll, which annually surveys a nationally representative sample of individuals in more than 160 countries. In most European countries, the interviews are conducted over the phone and the sample size is typically 1,000 respondents per country per year.

Specifically, life evaluation is measured using the Cantril Ladder (Cantril, 1965), which asks respondents to answer the following question: *"Please imagine a ladder with steps numbered from zero at the bottom to ten at the top. Suppose we say that the top of the*

ladder represents the best possible life for you and the bottom of the ladder represents the worst possible life for you. If the top step is 10 and the bottom step is 0, on which step of the ladder do you feel you personally stand at the present time?”. This subjective well-being measure is in line with the definition of subjective well-being applied in this paper (*the degree to which individuals judge the overall quality of their lives favorably*) and has been the focus of most work on subjective well-being in economics (Clark, 2018).

Figure 5: Life Evaluation in EU Regions: Average from 2008 to 2021



Source: Gallup World Poll

Since it may take time for subjective well-being to exert its effect on TFP of a NUTS-2 region (Siller et al., 2021), we include the average life evaluation over the period 2008-2021 in our regressions. The pooling of different survey waves also helps to overcome the problem that the yearly data from the Gallup World Poll is representative at the

national level and not necessarily at the regional level. Figure 5 shows the distribution of subjective well-being in European regions. Regions with the highest average subjective well-being can typically be found in Scandinavia, the Netherlands, and Austria, while regions with the lowest average subjective well-being can be found in East European regions.

2.3 Control Variables

We control for several variables that can possibly confound the relationship between TFP and subjective well-being, including economic structure, institutions, economic geography and infrastructure (see also Beugelsdijk et al., 2018; Siller et al., 2021; Ouwehand et al., 2022). For most control variables, we estimated averages for the period between 2008-2021.

Economic structure: there can be considerable productivity differences across sectors and, hence, TFP differences between regions can be driven by sectoral composition. We control for the share of employees in agriculture, fishing and mining and the share of employees in manufacturing. We account for general TFP-enhancing activities by including the amount of R&D investment per inhabitant as control variable, as these activities generate positive spillover effects (e.g. Jaffe et al., 1993). In addition, wages are controlled for as regions with higher wages are characterized by higher TFP levels (Peroni et al., 2022).

To account for regional differences in the quality of institutions, we utilize the European Quality of Institutions Index from the Regional Competitiveness Index. These data originate from the Quality of Governance indicators of the University of Gothenburg (Charron et al., 2012). The Quality of Institutions Index indicates how a regional government delivers its policies, and consists of three elements: quality and accountability of government services, corruption and impartiality of governance. In addition, we control for confidence in national institutions using the answers to 4 questions included in the Gallup World Poll. The questions ask respondents whether they have confidence in their (1) military, (2) judicial system and courts, (3) national government, and (4) honesty of elections.

In terms of differences between regions in economic geography, we control for the presence of agglomeration economies by including a population density variable as well as variables related to accessibility by air and accessibility by road and rail from the regional competitiveness report. Finally, we control for differences in climates, price levels and political history, by including three macro-geographical dummies in all regressions: Western Europe, Eastern Europe, and Southern Europe, where Northern Europe is the reference category. An overview of all variables included in the analysis can be found in Table A1. Like our subjective well-being variable, most control variables are constructed (where possible) as the averages over the period between 2008-2021.

2.4 Econometric Estimation

We specify a simple reduced-form model to examine the relationship between subjective well-being and productivity across regions:

$$\ln A_i = \alpha_0 + \vartheta SWB_i + \theta X_i + \varepsilon_i$$

In which A_i is the TFP in 2021, SWB is the average level of subjective well-being level over the period 2008-2021 and X is a vector of control variables accounting for factors that potentially affect TFP beyond traditional production factors. Please note that because the production factors, including human capital, are already included in the estimation of TFP, they are excluded from the model above. Overall, we have relevant information on 228 NUTS-2 regions.⁶

Endogeneity concerns related to reverse causality or omitted variable bias, including potential lagged effects, might affect the estimates of equation (2). Traditional IV estimation, however, is limited by the scarcity of valid instruments: all the variables that can affect subjective well-being are also likely to be correlated with TFP, and vice-versa. Regions where TFP is higher might provide conditions that increase subjective well-being. Our specification partly addresses this concern because it is implausible that TFP in 2021 affects the average subjective well-being of the previous 13 years. Nonetheless, to address endogeneity concerns in general, we turn to an alternative estimation method: an IV approach that uses heteroskedasticity-based instruments for cross-sectional data, known as the Lewbel IV estimator (Lewbel, 2012). This estimator generates internal instruments, similar to the difference generalized method of moments (GMM) and system GMM used in panel data research (Arellano and Bond, 1991), to identify the impact of subjective well-being on the dependent variable (i.e., regional TFP levels).

Next to a regression of the TFP level, we also specify and estimate OLS and Lewbel IV models for the annual TFP growth rates. We regress TFP growth on the levels of subjective well-being and the controls (see also Peroni et al., 2022):

$$\Delta \ln A_i = \alpha_0 + \ln A_{i2008} + \vartheta SWB_i + \theta X_i + \varepsilon_i$$

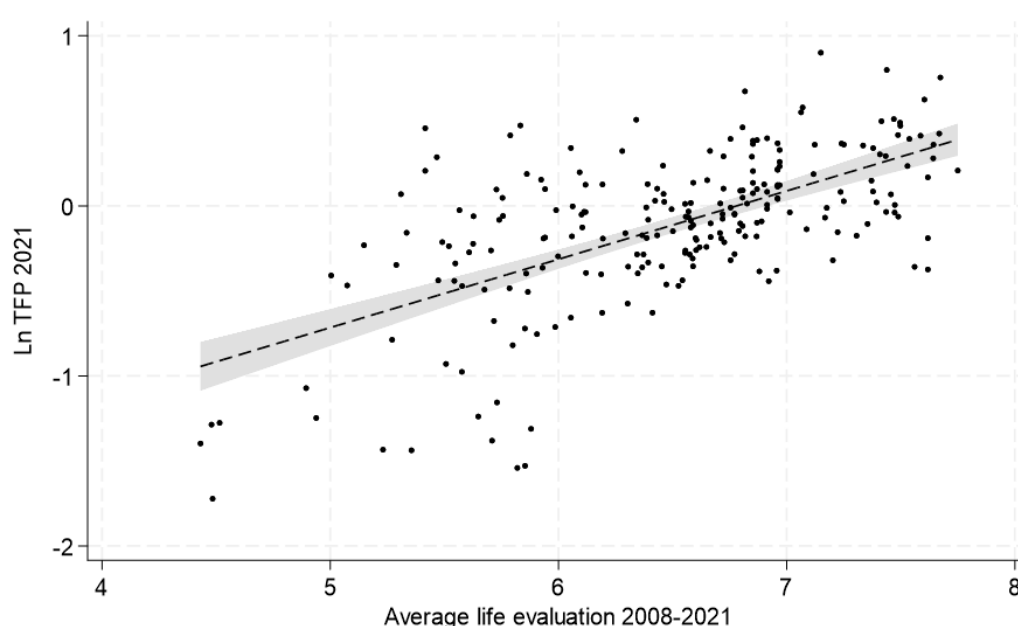
In these regressions, we also control for the initial level of TFP. The initial level of TFP is included in empirical models of TFP growth to capture convergence mechanisms and starting conditions of the region.

⁶ We do not have all relevant information for the following NUTS-2 regions: FI20 (Åland), ES63 (Ceuta), ES64 (Melilla), FRA1 (Guadeloupe), FRA2 (Martinique), FRA3 (French Guiana), FRA4 (La Réunion), FRA5 (Mayotte), and all NUTS regions in Ireland and Croatia. In addition, for Germany and France, subjective well-being data was aggregated to the NUTS-1 level given limited number of respondents per NUTS-2 region.

3 Empirical Results

Figure 6 and Table 6 show the results from the regressions of subjective well-being on TFP. In line with our expectations, we find a positive and significant effect of subjective well-being on TFP, also after controlling for economic structure, institutional quality, and economic geography. A 1-point increase in average SWB score is associated with an increase in TFP by about 27%. We emphasize that a 1-point increase in subjective well-being is substantial and it would take a considerable amount of time to materialize. Most of our control variables have the expected signs. In particular, regional R&D expenditures and population density drive TFP levels.

Figure 6: Relationship Between Level of TFP and Life Evaluation



Our results hold when re-estimating our model using the Lewbel estimator (Column 6, Table 6). Given that the Lewbel model captures the local average treatment effects instead of average treatment effects, the inflation of the subjective well-being coefficient hints at regional heterogeneity: TFP in some regions is affected strongly by subjective well-being, and less so in other regions. Table 7 presents the regression results for models where the dependent variable is the annual TFP growth (2008-2021) and we control for the base level of TFP in 2008. The subjective well-being coefficient remains positive and significant across all specifications, also when we control for reverse causality. Controls mostly have the expected signs. These findings show that a positive statistically significant association exists between subjective well-being and TFP growth at the regional level for European regions. Specifically, a 1 point higher life evaluation score is associated with a 1 percentage point higher annual growth rate. In other words, regions where people are on average happier, are also characterized by higher levels of TFP and TFP growth.

Table 6: Regression of the Level of TFP on Subjective Well-being

	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	OLS	OLS	OLS	OLS	Lewbel
Subjective well-being	0.015*** (0.004)	0.009** (0.004)	0.015*** (0.005)	0.015*** (0.004)	0.010** (0.005)	0.049*** (0.013)
Ln TFP in 2008	-0.019*** (0.005)	-0.021*** (0.006)	-0.019*** (0.005)	-0.024*** (0.006)	-0.025*** (0.005)	-0.032*** (0.007)
% Agriculture employment		0.000 (0.000)			0.001** (0.000)	0.001** (0.000)
% Manufacturing emp.		0.000 (0.000)			0.000* (0.000)	0.000 (0.000)
Ln R&D Expenditures		0.002 (0.002)			-0.001 (0.002)	0.002 (0.002)
Ln household income		0.017** (0.008)			0.028*** (0.009)	
Quality of institutions index			0.001 (0.004)		0.002 (0.004)	-0.002 (0.005)
Confidence in institutions			-0.000 (0.000)		-0.000 (0.000)	-0.001** (0.000)
Accessibility air (ln)				0.002	0.002	0.001

				(0.001)	(0.001)	(0.001)
Accessibility rail and road (ln)				0.000	0.002	-0.002
				(0.003)	(0.004)	(0.002)
Ln Population density				0.077***	0.088***	0.068**
Kleib.-Paap rk LM (p-value)						0.00
Kleibergen-Paap rk Wald F						20.40
Stock-Yogo weak ID test CV 10%						11.59
max IV relative bias						
Kleib.-Paap rk LM (p-value)						0.00
Kleibergen-Paap rk Wald F						20.40
Stock-Yogo weak ID test CV 10%						11.59
max IV relative bias						
Hansen J test (p-value)						0.659
Macroregion dummies	YES	YES	YES	YES	YES	YES
Observations	228	228	228	228	228	228
R2	0.46	0.57	0.47	0.58	0.62	

Robust standard errors in parentheses for OLS estimations; standard errors for Lewbel estimates.

*p<0.10, **p<0.05, ***p<0.01

Table 7: Regression of Average Annual TFP Growth Rate on Subjective Well-being

	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	OLS	OLS	OLS	OLS	Lewbel
Subjective well-being	0.015*** (0.004)	0.009** (0.004)	0.015*** (0.005)	0.015*** (0.004)	0.010** (0.005)	0.049*** (0.013)
Ln TFP in 2008	-0.019*** (0.005)	-0.021*** (0.006)	-0.019*** (0.005)	-0.024*** (0.006)	-0.025*** (0.005)	-0.032*** (0.007)
% Agriculture employment		0.000 (0.000)			0.001** (0.000)	0.001** (0.000)
% Manufacturing emp.		0.000 (0.000)			0.000* (0.000)	0.000 (0.000)
Ln R&D Expenditures		0.002 (0.002)			-0.001 (0.002)	0.002 (0.002)
Ln household income		0.017** (0.008)			0.028*** (0.009)	
Quality of institutions index			0.001 (0.004)		0.002 (0.004)	-0.002 (0.005)
Confidence in institutions			-0.000 (0.000)		-0.000 (0.000)	-0.001** (0.000)

Accessibility air (ln)				0.002 (0.001)	0.002 (0.001)	0.001 (0.001)
Accessibility rail and road (ln)				0.000 (0.003)	0.002 (0.004)	-0.002 (0.002)
Ln Population density				0.002* (0.001)	0.003** (0.001)	0.003 (0.002)
Kleib.-Paap rk LM (p-value)						0.02
Kleibergen-Paap rk Wald F						9.56
Stock-Yogo weak ID test CV 10% max IV relative bias						9.08
Hansen J test (p-value)						0.272
Macroregion dummies	YES	YES	YES	YES	YES	YES
Observations	220	220	220	220	220	220
R2	0.16	0.21	0.16	0.20	0.27	

Robust standard errors in parentheses for OLS estimations; standard errors for Lewbel estimates.

*p<0.10, **p<0.05, ***p<0.01

4 Discussion and Conclusion

This article contributes to the existing evidence on the consequences of subjective well-being by utilizing a new database that combines subjective well-being and TFP data (Kostarakos, 2023) for European regions. We find, overall, a positive association between subjective well-being and productivity. Specifically, regions with higher levels of subjective well-being experience, on average, higher levels of TFP and TFP growth. A 1-point difference in life evaluation between regions is associated with a difference of 27% in TFP and a 1 percentage point higher annual growth rate.

This study has various limitations that should be addressed in future research. First, the coverage of SWB data is less than fifteen years and annual representative data at the regional level is not available. This prevents us from conducting a panel data analysis. A solution here could be to combine and harmonize different surveys including the Eurobarometer, European Social Survey and European Values Survey (Tomescu-Dubrow et al., 2023). Second, the relationship between SWB and TFP may be heterogeneous in that it can differ across industries, where SWB may be particularly conducive in knowledge-intensive industries and activities in which social skills are important. This was already echoed in early work on the service-profit chain (Heskett et al., 1997). Third, our research does not address the different mechanisms that are at play. For example, employee well-being could enhance productivity through increasing creativity, but also through better cooperation in teams (Fredrickson, 2001). These different mechanisms should be scrutinized in future research.

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Table A1: Control Variables Included in the Analysis

Variable	Description	Source
% Agriculture employment	Share of employment in agriculture, fishing, and mining, 2008-2021 average	Eurostat
% Manufacturing employment	Share of employment in manufacturing, 2008-2021 average	Eurostat
Ln R&D Expenditures	Natural log of total R&D expenditures, 2008-2021 average	Eurostat
Quality of institutions index	Quality of institutions index	Charron et al. (2012); University of Gothenburg QOG database
Confidence in institutions	Confidence in institutions based on questions asking whether respondents have confidence in (1) military, (2) judicial system and courts, (3) national government, and (4) honesty of elections (Answers: Yes/No), 2008-2021 average	Gallup World Poll
Income (ln)	Disposable income per inhabitant, average over the period 2008-2021	Eurostat
Accessibility air (ln)	Natural log of daily number of passenger flights in 2014	European Competitiveness Index
Accessibility rail and road (ln)	Natural log of average of two variables: share of population in a 120 km radius accessible by road rail within 1h30 and share of population in a 120 km radius accessible by road within 1h30 in 2016	European Competitiveness Index
Ln population density	Natural log of population density, average over the period 2008-2021	Eurostat

