Relationship between socio-economic indicators and happiness using a cross-country analysis (2010-2019)

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"La felicitat no és mai completa perquè si no, no la podem buscar.

Però sí, sóc feliç."

ACKNOWLEDGMENT

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ABSTRACT

ENGLISH

This paper investigates the relationships between country happiness and socioeconomic factors, from a macro perspective. Even though differences among countries have arised in terms of happiness, most of them share fundamental similarities when talking about measuring the happiness of a society. The importance of analysing what determines happiness has increased its demand and has attracted researchers' attention because there is a need to understand the explanatory factors that promote the maximization of social welfare and an improvement of the quality of life beyond money in a country. As there exists differences across countries in relation to level of happiness, authors have highlighted the influence of economic and social determinants at a macroeconomic line and, in concrete, the ones correlated at some level with the nations' happiness.

To study the relationship it has been constructed a panel data from 2010 to 2019 including 22 countries chosen to analyse the distribution of happiness around the world. Data from twenty-six waves is drawn from the Organisation for Economic Co-operation and Development (OECD). The analysis allows us to answer the question about if and how the socioeconomic determinants affect the happiness level of a nation? And, furthermore, is the most accepted tool, the Happiness Index, a complete indicator of a country's happiness? The results reveal significant relationships between social and economical factors leading to the answer of the second question meaning new determinants should be included also in the trustable index. On the one hand, there is a positive effect on pension spending, overweight or obesity population, female-youth unemployment rate and effects of air pollution indicators. On the other hand, negative relationships have leaked to saving rate and alcohol consumption. The main limitation of this paper is not to have data set at the microeconomic level in the long and the magnitude of the panel data due to the time and availability.

CASTELLANO

En este artículo se investiga las relaciones entre la felicidad de un país y los factores socioeconómicos, desde una perspectiva macro. Aunque las diferencias entre países en términos de felicidad han crecido, la mayoría comparten similitudes cuando hablamos de medir la felicidad de una nación. La importancia de analizar qué determina la felicidad en una sociedad se ha vuelto un aspecto necesario, que ha llamado la atención de investigadores de comprender los factores explicativos que promueven la maximización del bienestar social y una mejora de la calidad de vida más allá del dinero en un país. Para poder explicar estas diferencias entre países, los autores han querido destacar la influencia de los factores económicos y sociales a un nivel macroeconómico, en concreto aquellos que de alguna manera están correlacionados con la felicidad de una nación.

Para estudiar la relación se ha construido un panel de datos de 2010 a 2019 que incluye 22 países, elegidos para analizar la distribución de la felicidad en todo el mundo. Los datos de veintiséis oleadas proceden de la Organización para la Cooperación y el Desarrollo Económicos (OCDE). El análisis nos permite responder a la pregunta sobre, ¿si y cómo los determinantes socioeconómicos afectan el nivel de felicidad de una nación?. Y, además, siendo la herramienta más aceptada, el Índice de Felicidad, ¿es un indicador completo para determinar la felicidad de un país? Los resultados revelan relaciones significativas entre los factores sociales y económicos que conducen a la respuesta de la segunda pregunta, lo que significa que se deben incluir nuevos determinantes en el índice confiable. Por un lado, hay un efecto positivo en el gasto en pensiones, la población con sobrepeso u obesidad, la tasa de desempleo entre mujeres y jóvenes y los efectos de los indicadores de contaminación del aire. Por otro lado, las relaciones negativas se han filtrado a la tasa de ahorro y el consumo de alcohol. La principal limitación de este trabajo es no tener datos establecidos a nivel microeconómico a largo plazo y la magnitud del panel debido al tiempo y disponibilidad de información.

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CATALÀ

En aquest article s'investiga les relacions entre la felicitat d'un indret i els factors socioeconòmics, des d'una perspectiva macro. Tot i que les diferències entre països relacionades amb el terme felicitat han incrementat, la majoria comparteixen similituds i trets fonamentals quan es calcula la felicitat d'una nació. La importància d'analitzar que determina la felicitat en una societat s'ha tornat un aspecte necessari, que ha cridat l'atenció dels investigadors de comprendre els factors explicatius que promouen la maximització del benestar social i una millora de la qualitat de vida més enllà dels diners en un país. Per poder explicar les diferències entre països, els autors han volgut destacar la influència dels factors econòmics i socials en l'àmbit macroeconòmic, en concret d'aquells que d'alguna manera estan correlacionats amb la felicitat d'una nació.

Per estudiar la relació s'ha construït un panell de dades 2010 a 2019 que inclou 22 països, elegits per analitzar la distribució de la felicitat a tot el món. Les dades de vint-i-sis onades procedeixen de l'Organització per a la Cooperació i el Desenvolupament Econòmics (OCDE). L'anàlisi ens permet respondre a la pregunta sobre, si i com els determinants socioeconòmics afecten el nivell de felicitat d'una nació? I, a més, sent l'Índex de la Felicitat, l'eina més acceptada, és un indicador complet per determinar la felicitat d'un país? Els resultats revelen relacions significatives entre els factors socials i econòmics que condueixen a la resposta de la segona pregunta, el que significa que s'han d'incloure nous determinants en l'índex fiable. D'una banda, hi ha un efecte positiu en la despesa en pensions, la població amb sobrepès o obesitat, la taxa d'atur entre dones i joves i els efectes dels indicadors de contaminació de l'aire. D'altra banda, les relacions negatives s'han filtrat a la taxa d'estalvi i el consum d'alcohol. La principal limitació d'aquest treball és no tenir dades establertes en l'àmbit macroeconòmic a llarg termini i la magnitud del panell causa del temps i disponibilitat d'informació.

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1. INTRODUCTION

The world is in continuous evolution but it does not mean it evolutes for the good. According to the United Nations, in 2011 the world's population was nearly 7000 billion people but more than one billion of individuals did not have access to enough food each day. Inequalities have increased over the last years, and there is something clear: "Negative feelings have been rising around the world, up by 27% from 2010 to 2018." (World Happiness Report, 2019). The differentiation between happiest and unhappiest nations has become wider, leading to an increase of needness knowing what is causing these divergences between countries. Even though there is not a way to make a forecast about the happiness of someone's life or a society, predictions can be assumed by understanding what determines a concept. In this case, the attainment of happiness and its determinants.

In the 1590s, the concept known as happiness made its first appearance. Happiness has become the true goal of a person's life: "77% of people in the developed world are happy but life was simpler." (Ipsos Mori Survey, 2014). Looking backward into our childhood lives, it lights up the conclusion that at the end, everything is connected to that goal. From the very beginning, your environment has promoted the idea that nearly everybody appreciates being cheerful. But, is it something we ought to interminably yearn to? In other words, can someone be happy even if the country of origin does not fight for happiness as a standard of living?

After four years involved in the business field, the authors became interested in filling a gap related to this huge sector that is evolving over the years. As mentioned previously, being happy has always been the major goal of the Earth's planet's individuals, leading specialists willing to study not only the concept of happiness concept but also what nations can do to help their citizens to overcome it. Last year of university is a before and after decision-making in students' lives. The motivation to elaborate this article is due to the fact that entering into the "adult world" gives dizziness, making the authors wonder if all the decisions needed to be done, that will provide happiness to lives, are only a matter of individual incentives or depend on the country's level objectives. Authors consider themselves lucky to have been able to study a degree focused on a worldwide level, where real cases and business examples have allowed the acquisition of an extensive abroad-international approach. Therefore, it has been a challenge to develop a

cross-country analysis of this magnitude and in addition, applying and providing into the scientific-business discipline everything learned during these past years.

Recently, happiness has been considered a relevant guidance for establishing policies and measuring effectiveness within a nation (Debnath, 2014). However, there is no way to construct a clear and coherent concept of what happiness really is; different human desires that when putting them together into a single concept conflict with each other (White, 2006). Finding out Finland has been ranked by the United Nations as the happiest country in the world three times in a row, called out our attention wondering what is behind the determination of that. However, how is it possible for a country with one of the highest sucide rates in the OECD, approximately 14.600 deaths per 100.000 inhabitants in 2017 to be the happiest place on earth? In light of the above, the authors become motivated to analyze and study what are the social and economical factors chosen to define levels of happiness and if there are indicators that can contribute to diminish these huge differences among countries.

Despite the lack of awareness within the literature, there is an "accepted" definition of happiness whose aim is to satisfy the desire to measure a country's happiness, therefore an index has been created. The World Happiness Report is the most accepted evidence and data to assess a societies' happiness. Created in 2012 due to the increase in demand understanding happiness and the lack of criteria provided by the governments. The happiness index across countries was developed by Gallup [1] with the Sustainable Development Solutions Network (SDSN) [2]. According to the report, even though it has been necessary to use data from other sources, the most relevant one has been the Gallup World Poll because of its global annual surveys and the open conclusions providing analytics and interest on ranking happiness. The aim of this report is to measure the happiness of a nation based on the perception of happiness among the societies of the countries studied. Based on the report, the happiness of a country is calculated taking into account the following indicators: (1) GDP per capita, (2) social support, (3) freedom to make life choices,(4) generosity, (5) perception of corruption, (6) healthy life expectancy. *"Happiness can change, and does change, according to the quality of the society in which people live"* (John F. Helliwell, World Happiness Report).

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[1] Known American company that provides analytics, counseling and advice firms that help leaders and organizations solve their most pressing problems with surveys around the world.

[2] Global scientific and technological expertise to promote practical solutions for sustainable development to implement the Sustainable Development Goals (SDGs) and the Paris Climate Agreement through education, research, policy analysis, and global cooperation.

Nevertheless, it is likely to think that the history of happiness has evolved with the chronological problems and events the society has experienced over the years. The quality of a country's government has considerable effects on the happiness average of nations (Helliwell, 2008; Ott, 2010), which brings the authors into the consideration that there are other variables determining the Happiness Index that have not been considered yet. Some existing studies have found other relationships to prove that the social and economical factors are determinants to modify the happiness of a country (Haller, 2006). Circumstances (political, social and economical) are directly related to what happiness is considered to be, that is why specialists have highlighted the influence of macroeconomic and sociodemographic factors of a country (Rodigues, 2010; Lane, 2017).

The main aim of this study is to fill a gap in the scientific literature by providing a wider analysis of the social and economical factors affecting happiness within a state. To fulfill this objective, the authors have created a dataset to compute a cross-country analysis based on the structure of the World Happiness Report to be able to compare the evolution of happiness during a period of huge economical and sociodemographic impacts where the effects of the economic crisis of 2008 will be observed (Reyes, 2010; Feldkircher, 2014; Kotz, 2009). A more specific analysis of the existing relationship between variables of the Happiness Index will be provided, considering other potential factors related to determinants that can influence the happiness of a country, such as unemployment rates and the educational spending. The final degree project will answer the arrasing questions such as: are the determinant variables of the Gallup World Poll enough to determine the happiness of a country? How the socio-economic determinants affect the levels of happiness? And, for instance, analyse the relationship between the pollution of a country with the ranking position of happiness.

The analyzed period of the analysis (2010-2019) has been chosen wisely based on the available years of the World Happiness Report and the Economic Cooperation and Development (OECD) to show the evolutive effects of the new social and economical determinants on the happiness of a nation.

In this way, a deeper analysis of the relationships between the factors and happiness will be understood. Moreover, the inaccessibility of the dependent variable (happiness index) justifies the period, because it has been collected only since 2012. However, as the explanatory variables used in the model have a wider availability it will allow an assumption of two previous years. All the data needed of the determinants has been obtained from OECD such as air pollution exposure, general government debt or unemployment rate.

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Moreover, the empirical strategy to proceed with the project is the creation of panel data because it is the most accurate model to analyse the 22 nation's environments due to the fact that macroeconomic movements showed the effects of countries' happiness and reported well-being (Tella, 2003). The preview results that authors expect are the following ones: On the one hand, positive relationships between the income per capita, the saving rate, the government spending on providing a strong education system, a good promotion on health-care services, a good education, a longer life expectancy, and the happiness of a nation in the long-term run. On the other hand, negative relationships on unemployment rate, taxes, government debt, mortality and suicide rates, alcohol consumption and obesity and pollution towards happiness.

The results of this final work are very important since the Index reflects a growing global demand for governments to pay more attention to happiness as a criterion for policy making. Moreover, happiness is becoming a more important and useful metric for guiding public policy and determining its effectiveness.

This final degree project will be structured as follows. In Section 2, it is presented as a theoretical framework, underlining the concept of happiness and its determinants. In Section 3, it is presented the objectives and hypothesis raised in the study, and in Section 4 will present the data overview and method used in this study. Empirical findings will be provided in Section 5 and the conclusions will be exposed in the last section.

2. THEORETICAL BACKGROUND

2.1 Delimitation of the concept "happiness"

For how can you write a history of something so mysterious, so intangible about this "thing", which is not a thing, this hope, this yearning, this dream? (McMahon, 2006). Immanuel Kant noted, "the idea of happiness is so indeterminate that even if someone wants to achieve happiness, he can never say definitely and reliably what he really wants and wants". However, the popularity of the word in scientific circles has not been improved by this misunderstanding of tongues. (Veenhoven, 2015).

The word 'happiness' has a long history, ever since antiquity featured in Western thought. (Veenhoven, 2015). Several definitions and uses for "happiness", "happy" and "happily" have been distinguished over the years. The primary ones tend to be the uses of emotions, mood, actions, attitude, and life (Chekola, 1974). Specialists define happiness as a feeling of comfortable pleasure, meaningful life satisfaction, and judging our life as "good enough" (Diener, 2000; Diener 2009). After decades, more evaluations and expectations come up about the concept: Is happiness an instantaneous feeling (Lyubomirsky, 2005), a self-assessment (Diener, 1985), meaning occurrences (Haybron, 2011), or reasoning well for a greater good (Shields, 2014)? Is happiness built on huge dreams or tiny moments (Brooks, 2015), wonderful successes or well performed daily tasks (Cohen, 2015)?

To understand and have the ability to explain this term there is a need of going back to the Far East in 600 BC with the Chinese schools of Confucianism, Mo Ti, Buddhism (Fung, 1985; Tam 2010). Followers of Confucianism and Mo Ti emphasize on a good quality of life and what makes people happy is a positive mindset. (Legge, 1971; Zhang, 2007; Tam, 2010). On the other hand, Taoism concentrated on the individual and asserted that any social relationship influences a person to be happy. However, other adherents disagreed on the knowledge and intellect development and that children are the most cheerful human beings (Zhang, 2007). The previous authors also state that Buddhism concentrated on the individual and established a term called Nirvana "a state of justice, which is characterized by complete inner harmony, enlightenment and the abrogation of all needs". With the beginning of the Greek Golden Age, Aristotle argued that happiness was the best possible thing for people to achieve, and confirmed that there is a need for money and resources to achieve it. Agreeing with Socrates, the achieving of happiness depends on the individual effort. (Annas,

1993; Lear, 1988; Tam, 2010; Ryff, 2006). Some time later, the Hellenistic period started where happiness was linked to feelings and a need for a new doctrine; Stoicism, Scepticism, and Epicureanism. In the first instance, the followers of Zeno of Citium believed that satisfaction is located in a very good mental state (Bergsma, 2007) but Epicurus' philosophy believed that happiness depended on being well surrounded by a quiet atmosphere to achieve happiness (Schoch, 2007). Even though the differences between these Eastern and Western times philosophies, all agree that through effort, anyone can achieve happiness by themselves, the most important belief was based on theology leading to the statement that happiness is an only after-death found (Schoch, 2007).

Entire world grasped the notion of happiness in different ways but agreed on the description of something positive. Nevertheless, not everyone agrees with the truth that happiness is the ultimate aim of human beings, but it is said to be one of the components of a good life. (Frey, 2002).

2.2. Delimitation of the concept "Happiness Index"

Making questions to people to know whether they are cheerful, or fulfilled with their lives, offers vital data almost to society. It can signal fundamental emergencies or covered up qualities. It can show a need to change. For this reason, in 2011, the UN encouraged the countries to measure the degree of joy and well-being and called bliss an essential human objective. Consequently, the World Happiness Index was created. The index is created by the answers of a quantitative survey that measures satisfaction, well-being and facets of sustainability and resilience is the happiness index. Parameters or key variables such as income, freedom, trust, healthy life expectancy, social support and generosity can be used to measure the happiness index or 'life ladder'. The responses are averaged to a single quantifiable value, which contributes further to the World Happiness Report (WHR) (Ahtesham, 2020).

WHR was first published as a fundamental text for the well-being and satisfaction of the UN in 2012, describing a new economic paradigm. This research identified the worldwide state of happiness, the causes of suffering and happiness, and the political ramifications illustrated by case studies. Each year, Gallup world survey data is used to construct the study and WHR is made available to the public via the website (Musikanski, 2017).

As above mentioned, Happiness Index is the most consensuated tool among the literature that aims to understand and promote individual happiness, group well-being, social justice, economic equality and environmental sustainability for the use of researchers, community

organizers and policy makers. Moreover, it was created to promote social change and to provide information freely available to community organizers, educators, researchers, students, organizations, government, and more.

2.3 The determinants of happiness

Over the years, scientific research has analyzed the variables that define happiness from several different perspectives, segmenting happiness as a mixture of biological and behavioral components in culture. From the psychological side, happiness depends on the management of the feelings of an individual to encourage the growth of a country. (Cummins, 2012). Others, however, consider that well-being is based on a country's democratization, unemployment and even tax policies (Powdthavee, 2010). Previous studies indicate that there is a strong relationship in the pursuit of happiness within a nation between the adoption of constitutional policies and democratic foundations (Schubert, 2012).

2.3.1 Economic and Institutional factors

The expression "money can't buy happiness" is often used to express the notion that affluent people are not always happier than poor people. Despite the fact that this is "just a saying," recent research results on the relationship between satisfaction and financial capital back it up (Diener, 2008).

During all these years, the populaces of distinctive nations and totally different periods of time uncover contrasts in bliss. An self-evident reason for these contrasts in subjective well-being may be the financial conditions. Individuals living in a financially discouraged nation, with tall unemployment and swelling, are likely to be troubled (Frey, 2002).

There are some economic and institutional factors that influence the way the happiness index is behaving. In fact, Richard Easterlin in 1974 was the primary financial analyst to publish the article: "Does Economic Growth Improve The Human Lot? Some Empirical evidence". In this reading, it shows that in countries where people have higher incomes, they have a higher tendency to affirm that they are happier (Tella, 2006).

Perhaps one of the most famous questions in social science is how much does money really matter to our happiness? The relationship between happiness and income is confused. In life satisfaction calculations, there are different sources of bias associated with micro data estimation of the impact of income. There is a strong income-related attenuation bias and that income usually correlates positively with other things that we can often not control

effectively in our model, such as working hours and relative incomes, most of which are known in the literature to be negatively correlated with life satisfaction (Powdthavee, 2010).

At a point in time, those with more income are, on average, happier than those with less (Easterlin, 2001). Individuals belonging to the upper income classes show much greater subjective well-being in most countries than individuals with low incomes (Frey, 2002). The sometimes drastic rise in per capita incomes in recent decades has had little impact on happiness in general; national indexes of subjective well-being have remained largely unchanged over time (Blanchflower, 2000). In contrast to these longitudinal findings for single nations, per capita income levels and happiness are more strongly positively related across nations (Kenny, 2005). Money encourages personal and social behaviors that lead to our subjective well-being (Dunn, 2013), and saving can be perceived as a preventive experience: saving helps individuals grow positive characteristics and have positive subjective experiences, thus avoiding negative emotions (Seligman, 2000). This is done by the act of identifying the intentions that enable individuals to commit to a target. The incentive to save money is still rarely mentioned and so is its association with happiness. In addition, in the design (and well-being) perspective, the formats in which people can save money, such as saving accounts, piggy banks, or other investment strategies, have so far been insufficiently explored (Francisco, 2014).

The connection between the role of the Government and happiness has been a neglected subject in the literature. There are some studies that address the effects of social insurance and the welfare state on variables linked to well-being (MacKerron, 2011). In addition, municipal bond prices dropped, yields increased, and borrowing costs rose as the government faced high debt and budget constraints, forcing the government to cut spending. Such cuts are primarily focused on spending on public health. The higher the debt in a country with a long average life expectancy, the more likely it is to decrease government satisfaction. Credit growth, on the other hand, indirectly enhances society's generosity by stimulating economic growth. In a stable economy, people are more likely to increase prosocial spending, or spending money on others to fulfill their own desires (Li, 2019).

Looking specifically on taxation and happiness the number of studies is rather limited. From a theoretical point of view, taxes are, on the one hand, a withdrawal of personal income that can have a negative impact on subjective well-being. Taxes, on the other hand, are used to support public goods, which are then consumed by (parts of) the public. This consumption of public goods could produce rising levels of happiness (Akay, 2012). According to Helliwell and Huang (2008), government efficiency has a positive relationship with happiness. The

poor prefer to pay as far as income taxation is concerned, while the wealthy are not conditional on net income. This may be explained by the fact that, owing to the progressive system, the poor pay a comparatively small amount of taxes while benefiting disproportionately more from the consumption of public goods. When conditioned on gross income, both groups demonstrate a difficulty paying taxes, which rises linearly as one goes up the income scale.

As countries recover from the financial crisis, advice on the design of policies and initiatives that can promote access to employment and minimize dependence is becoming increasingly challenging. Not all PES[3] countries have programs for unemployment insurance that restricts the scope of activation policies. The presence of unemployment insurance services is inversely proportional to the country's level of growth (Kuddo, 2012). Happiness is improved by full employment and a generous and inclusive social safety net. These initiatives are arguably affordable not only in higher-income economies, but also in nations that account for much of the less-developed world's population (Easterlin, 2013).

Many studies document a large negative effect of unemployment on happiness. (Winkelmann, 2014). Unemployment is associated with severe unhappiness (Clark, 1994; Papps, 1998). This effect is not due to lower earnings, but to non-pecuniary tension, as the income level is kept constant. In terms of a trade-off, "most regression results suggest that a large amount of additional income will be needed to compensate people for not working." (Oswald, 1997). While a high unemployment rate may be a symbol of a struggling economy and a call for policy reform, it's important to note that unemployment causes a country's welfare to suffer well beyond the loss of income. Furthermore, one of the most important economic and social challenges facing countries whose labor markets have collapsed since 2008 is youth unemployment (Bell, 2011).

The challenges that young people face in seeking stable jobs not only reduce their income, but also increase their risk of engaging in risky activities, delay household and family development, and have a negative impact on their health and subjective well-being (Winkelmann, R. 2014).

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[3]Public Employment Services

The key economic tool in a government's hand for infusing the well-being of people is public expenditures. Governments may use this instrument to manipulate satisfaction by creating a decent social security system or investing in healthcare and education, for example. Building infrastructure, creating a good education system, and promoting health care facilities, among other things, can all help to increase happiness levels (Kamal, 2017).

The truth is that wellbeing is a resource that helps people to fulfill their full potential. Modern life, on the other hand, creates a great deal of tension, which has a negative effect on one's well being and general well-being. A lifetime of good health is a priceless gift. As a result, a good government should devote substantial resources to healthcare in order to contribute to citizens' happiness. As a result, several longitudinal studies have looked into the effect of government spending on citizen satisfaction. The empirical evidence on the relationship between health spending and happiness, on the other hand, is minimal (Satrovic, 2019).

Economic analysts are becoming particularly involved in the financial well-being of retirees. The policy consequences are important. For many retirees, pensions provide a significant percentage of income in retirement. Therefore, their generosity should affect happiness. Other pension characteristics besides generosity may also be influential. Indeed, one study finds that increased pension accruals lead to lower job satisfaction (Keith, 2005).

2.3.2 Sociodemographic factors

The literature reveals that sociodemographic must be considered part of the explanation of individual happiness or satisfaction with life (Brereton, 2008). All the data regarding determinants such as social inequalities and demographic aspects can affect the levels of happiness of the nation. The explanation of the relationships that compose happiness leads to the comprehension of concepts such as sustainability and quality of life (Musikanski, 2017). And it is because looking specifically, the acquisition of knowledge promotes the "self-confidence" and/or "self-estimation" of a person leading to an increase of happiness (Cuñado, 2012).

The role of education has a positive (and direct) effect on the happiness of a nation due to its relationship with the development of its economy. Nowadays, nations are realizing that economic success is directly related to the education system and the human capital (Pavel, 2012) and even though education is considered to be the determinant that drives competitiveness of a nation, the level of education is based on the social background (Boudon, 1974). Furthermore, a study made by the OECD, in 2016, about the policies to improve the management of educational resources reveals that the quality of a country's

education corresponds to a complex structure based on effectiveness and efficiency of the management of educational resources, the challenges of that matter and the impact on the society which lead to the nation's enrichment. However, even though the happiness of a nation resides on the happiness, it does not depend on the educational level: primary, secondary or tertiary (Cuñado, 2012).

Some researchers as AE Clark (2017) have stated that compulsory education increases life satisfaction, and during the educational life, students have considered themselves as in a moderate happiness stage. In fact, people that spend more time in the library and live in outside-country places live happier (Casinillo, 2020). Based on Oishi et al. (2011), the positive taxation relationship with happiness has revealed its association with subjective well-being due its influence related to the satisfaction given by education and other public goods (Frey, 2009; Luechinger, 2009; Raschky, 2009). Other researchers have demonstrated indirect relationships between higher levels of happiness and higher education. It is assumed that people with better quality education have higher income and labour status due to the more probability to access firstly to a job position. (Cuñado, 2012).

Veenhoven (2008) has also studied the influence of health within happiness. Direct and indirect relationships have been found in relation to the physiological and physical health of a person. For instance, mental distress on physical health such as depression and anxiety have demonstrated a negative impact on happiness but positive effects regarding mental health are beneficial for the happiness stage of a citizen (Zautra, 2003). The literature reveals that regarding the relationship between happiness and health it does not only concern the absence of illness but also to a wider quality-of-life (Seedhouse, 1996). However, on the other hand, some researchers have shown that ongoing health education can be prejudicial because it prevents people from pleasant things such as smoking and drinking (Warburton, 1994, 1996).

The theoretical background shows that drinking is a social concept that differs between nations based on what is socially accepted due to the negative effect that alcohol has on aspects of everyday life causing physical and psychological health problems (World Health Organization, 2001). Based on Carol Lee Graham (2008), drinking is one of the things that constitute a "[privileged] area where a choice approach is limited and happiness surveys can shed light". However, others also consider alcohol as a part of a set of enjoyable activities related to high well-being becoming an undefined relationship (Rehm,2004).

Regarding obesity, it has been tested by researchers that the higher the body weight when part of a social group, the lower the damage on the level of happiness explaining a negative effect on the subjective happiness of individuals (Pinhey, 1997; Katsaiti, 2012). Graham (2008) explains that the level of unhappiness, as a consequence of the weight, is based on the social acceptance and stigma divergences between countries. Another point of view is that happiness can be a sum up of daily decision-making as for example the consumption of fast food (Chang, 2010).

The scientific community has been studying life expectancy as another social indicator considered a determinant of happiness of a nation (Veenhoven, 1996). There is a negative relationship between the longevity of a citizen's life and the individual-level of happiness due to an indirect relationship to the public health expenditures (Bjornskov, 2008). Nevertheless, other researchers compeel the well-being of a nation can not be measured assuming life expectancy as part of the equation (Johns, 2007).

As an antonym concept, mortality can be also considered as a potential social factor determining happiness of a country. Based on the literature, unhappiness causes health issues which can lead to death; but not to the association of all types of mortality (Liu, 2016). Despite that, other authors conclude that statistically there is no relationship when applying changes to the physical activity and disease and medical conditions (Koopmans, 2010; Barreto, 2009). What is clear is that societies nowadays are getting older due to the effects of happiness on mortality levels (Guven, 2009). In relation to death causes, suicide rates have become relevant scientific indicators (Daly, 2010) and researchers as Bray (2006) have highlighted the inverse relationship within the life satisfaction of an individual. Furthermore, Weerasinghe (1994) mentioned that: "...connection between happiness and suicide is far from certain. More research is needed."

Pollution also affects the level of happiness because it can lead to a decline of air-quality due to the relationship established with the implicit monetary value of improved environmental quality (Welsch, 2006). In addition, positive relationships have been found between the disposition to settle for environmental measures and the impact of pollution over mortality and a countries' productivity (Levinson, 2020). Environmental conditions are considered by researchers a relevant part when measuring the subjective well-being of a society (Brereton, 2008; Cuñado, 2012). In relation, it has been studied how green and natural environments, based on air-quality pollution, influence in a favorable way the physical and mental health (MacKerron, 2013; Zhang, 2017). For instance, there are studies

that show that PM2.5, PM10, and NO2 in higher concentration levels cause a decline in happiness among young people (Lin, 2019).

2.4 Conclusions of the theoretical background

Research on happiness is important since the ultimate objective of most human beings is to be happy (Ipsos Mori Survey, 2014). Wellness research is important because it applies to many areas of life, such as understanding human behaviour and explaining empirical findings that vary from traditional economic theories. Moreover, it is very useful to help to determine which constitutions enable individuals to increase their life satisfaction (Frey, 2000).

The theoretical framework presented in the previous points explains the potential determinants of happiness and its outcomes on a nation's happiness. This study pretends to observe which are the socioeconomic factors and its evolution in relation to the happiness index of each nation analysed. Even though the demand for understanding happiness has increased, a more consensus idea of how the well-being of a nation must be measured is missing (Helliwell, 2012). Based on the abovementioned literature, a clear pattern of all the authors mentioned above has shown up. Relationships between happiness, on both social and economic levels, have already been analysed but there is no contrasted and empirical idea of how previously analyzed relationships really affect each nation's global happiness index. As a result, the authors of the final project want to fill the gap by bringing a new study and vision that reflects a wider relationship and cause-effect between the happiness index and the new determinants chosen.

Therefore, the modeling strategy responds to the intention to capture the effect of the indicators with highest impact on each country to determine the pattern and measurement of the World's Happiness Index in an even more complete way. Those determinants are aggregated in terms of sociodemographic and economic and institutional factors.

Based on what authors have learnt thanks to the literature, the following patterns are going to be analysed. In Table 1, it is organized a summary of the determinants analyzed by this study and included in the macroeconomic analysis.

Table 1. Summary of the determinants of happiness included in the modeling strategy.

SOCIODEMOGRAPHIC FACTORS	Air Pollution Exposure Air Pollution Effects	● Heinz Welsch, 2006 ● Finbarr Brereton, …, 2008 ● Juncal Cuñado, …, 2012 ● George MacKerron, …, 2013 ● Xin Zhang, …, 2017 ● Arik Levinson, 2020
	Education: (1) Adult Education Level (2) Mathematics Performance (PISA) (3) Reading Performance (PISA) (4) Science Performance	● R Boudon, 1974 ● Frey et al., 2009 ● Luechinger, 2009 ● Luechinger and Raschky, 2009 ● Oishi et al., 2011 ● AP Pavel 2012 ● J Cuñado and de Gracia, F. P., 2012 ● AE Clark, …, 2017 ● LF Casinillo, …, 2020
	Life Expectancy at 65	● R Veenhoven, 1996 ● H Johns, …, 2007 ● C Bjornskov, 2008
	Overweight or Obese Poputlation	● TK Pinkey, …, 1997 ● C Graham, 2008 ● Chang & Nayga, 2010 ● MS Katsaiti, 2012
	Alcohol Consumption	● World HEalth Organization, 2001 ● Rehm, …, 2004 ● MC Auld, 2005 ● Carol Lee Graham, 2008
		● Blanchflower, 2000 ● RA Easterlin, 2001

ECONOMIC AND INSTITUTIONAL FACTORS	Infant Mortality Rates	● Bruno S. Freu, 2002 ● Kenny, 2005 ● N Powdthavee, 2010
	Suicides Rates	● Weerasinghe, 1994. ● Bray, 2006. ● Daly, 2009. ● Oswald, 2010.
	Gross National Income	● RA Easterlin, 2001 ● Bruno S.Frey, 2002 ● Kenny, 2005 ● N Powdthavee, 2010 ● Blanchflower, 2000
	Saving Rate	● Dunn & Norton, 2014 ● Francisco, Cascais & Desmet, 2014
	Insurance Spending	● MacKerron, 2011
	General Government Debt	● Li, T., Zhong, J., & Xu, M., 2019
	Tax on Personal Income Tax Revenues	● A Akay, …, 2012. ● Helliwell, ..., 2008
	Unemployment Rate Unemployment Long-Term Rate	● Clark and Oswald, 1994 ● Papps, K. & Winkelmann R., 1998 ● Winkelmann, R., 2014
	Family Benefits Public Spending	● Kamal, 2017

	Youth Unemployment Rate	● Bell, D. N., …, 2011 ● Winkelmann R., 2014
	Health Spending Social Spending Pension Spending	● Kamal, 2017 ● Satrovic, …, 2019
	Social Benefits to Households	● Keith A. Bender, 2005

Source: Elaborated by the authors.

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3. OBJECTIVES AND HYPOTHESES

The study's main aim will be studying the relationships between the happiness of a nation and which are the socio-economic determinants that should be added to the index made by the World Happiness Report to provide a wider understanding of what promotes well-being within a society. And, answering the following questions: Do the socio-economic indicators aggregated have a relationship towards happiness? Furthermore, a secondary objective is to create a new dataset to answer the research question.

Based on the intensive research carried out, authors have realized that an increasing tendency of demand to understand what determines the happiness of a country is happening. The World Happiness Index is the most consensuated tool to determine a country's happiness, but it only includes six variables: (1) GDP per capita, (2) social support, (3) freedom to make life choices, (4) generosity, (5) perception of corruption, (6) healthy life expectancy. Taking consciousness of the complexity of this concept, how is it possible that such a few indicators are covered in? In order to fill the gap of the research questions and predict it from the theoretical background, the following hypotheses are highlighted to be solved by focusing on other sociodemographic and economic factors that are highly probable to be related. The main objective of doing these statements is to determine how the level of happiness of a nation can be affected by other relevant indicators at a country level to provide an improvement of the method used in the actual index.

Drawing on the conclusions of the aforementioned research it is expected to find significant relationships and determinants of happiness. Furthermore, 12 empirical hypotheses will be proposed and verified.

H1. *There is a positive relationship between the income per capita and the happiness of a nation in the long-term run.* Hagerty and Veenhoven (2006) and Inglehart et al., (2008) stated that if there is enough reliable available data for a long period of time, a higher income per capita is reflected in the average happiness across developed countries.

H2. *Individuals who save are more likely to develop positive traits and have positive subjective interactions, increasing happiness*. According to Seligman & Csikszentmihalyi, (2000).

H3. *Higher unemployment has a negative relationship with the happiness country's index.* Drawing on the aforementioned statement, literature reveals the existence of a happiness drop when the rate of unemployment is high (Winkelmann, 2014; Clark, 1994; Papps, 1998).

H4. *Government spending on providing a strong education system, and promoting health-care services, among other things, can all lead to a higher degree of happiness* (Kamal, 2017).

H5. *Paying taxes has a negative relationship with happiness.* Authors like Helliwell and Huang (2008) found in their study that poor and rich people when conditioned on gross income, both groups demonstrate a difficulty paying taxes, which rises linearly as one goes up the income scale.

H6. *Government debt lowers the happiness of its citizens.* The higher the debt in a country with a long average life expectancy, the more likely it is to decrease government satisfaction according to (Li, 2019).

H7. *Education has a positive influence on a country's happiness.* According to AP Pavel, 2012, it is because of its association with the growth of a country's economy Moreover, it is believed that people with higher-quality education have higher income and employment status because they have a greater chance of finding a job first (Cuñado, 2012).

H8. *The longer the life expectancy, the higher the happiness.* Furthermore**,** C Bjornskov (2008) found in his research that the individual-level of happiness increases the longer they live due to the indirect relationship to health spenidnign.

H9. *Unhappiness increases when mortality rates and suicide increase.* Drawing on the aforementioned literature, it is expected to find, lower levels of well-being the higher the mortality rates due to its direct relation to health issues (Liu, 2016). According to C Guven & R Saloumidis (2009), societies are getting older due to incremental happiness. There is an inverse relationship between the suicides rates and life satisfaction (Bray, 2006).

H10. *An increase in alcohol consumption of a country will decline the level of well-being of a society.* Even though literature shows that these variables can be considered as part of the enjoyable activities related to high well-being (Rehm, 2004), authors like MC Auld (2005) have highlighted the direct relation between the two variables.

H11. *The higher the body weight, the lower the damage on the level of happiness explaining a negative effect on the subjective happiness of individuals.* According to (Pinhey, 1997; Katsaiti, 2012).

H12. *Higher levels of pollution cause a decrease in happiness among young people.* In the studies of Wen-Hsu Lin (2019) and Heinz Welsch (2006) it is explained that **c**ontamination influences the degree of bliss since it can prompt a decrease of air-quality because of the relationship set up with the certain financial estimation of improved ecological quality.

The following table shows a summary of the hypotheses that are going to be tested.

Table 2. Summary of the hypotheses of the study.

HYPOTHESES	VARIABLE	EFFECT ON THE DEPENDENT VARIABLE	AUTHORS
Hypothesis 1	Gross national income	+	● Hagerty and Veenhoven, 2006 ● Inglehart et al., 2008
Hypothesis 2	Saving	+	● Seligman and Csikszentmihalyi, 2000
Hypothesis 3	Unemployment rates	-	● Clark and Oswald, 1994 ● Papps, K. & Winkelmann, R., 1998 ● Winkelmann, R., 2014
Hypothesis 4	Government Spending on Health, Social and Pension Systems	+	● Kamal, 2017 ● Satrovic, …, 2019
Hypothesis 5	Taxes	-	● Helliwell and Huang, 2008
Hypothesis 6	Government Debt	-	● Li T., …, 2019

		29	
Hypothesis 7	Education	+	● AP Pavel, 2012 ● Cuñado, J., & de Gracia, F. P., 2013
Hypothesis 8	Life expectancy	+	● C Bjornskov, 2008
Hypothesis 9	Mortality and Suicide Rates	-	● C Guven & R Saloumidis, 2009 ● B Liu, …, 2016
Hypothesis 10	Alcohol Consumption	-	● Rehm, …, 2004 ● MC Auld, 2005
Hypothesis 11	Obesity	-	● TK Pinhey, …, 1997 ● MS Katsaiti, 2012
Hypothesis 12	Pollution	-	● Heinz Welsch, 2006 ● Wen-Hsu Lin, …, 2019

Source: Elaborated by the authors.

4. METHODOLOGY AND DATA

4.1 Methodology

The most accurate method of analysis to be used for the analyses is panel data. It is a procedure that enables multiple behaviors among countries over a period of time. According to Hsiao (1985, 1995, 2007), panel data sets for economic research possess several major advantages over conventional cross-sectional or time-series data sets. Moreover, it typically provides a large number of data points to the researcher, increasing degrees of freedom and decreasing collinearity among explanatory variables. Hence it enhances the efficiency of econometric estimates. Furthermore, compared to a single cross-section or time series data, it has a larger ability for capturing the complexity of unit behavior. Constructing and testing more complex behavioral hypotheses, for example. Controlling the influence of omitted factors is also important.

Being shown in other papers (Graham, 2004; Wang, 2019), there is a parallel demonstration, considering the purpose of this scientific research is to understand which variables affect the Worldwide Happiness Index to compute the years of the economic crisis.

The model will analyse the data from countries (individuals) for several years (time) and therefore make regressions that take into account that each observation belongs to a specific year in a particular country.

$$y_{it} = \beta X_{it}^1 + \alpha_1 + \varepsilon_{it^1}$$

Analysing the formula of the dataset, it can be observe the following variables, where y_{it} is the dependent variable (Happiness Index) over time *(t)* for each country *(i)*, X_{it}^1 being the vector of the independent determinants (economical and sociodemographic variables). The ε_{it^1} is considered as the error term for the regression expression.

Considering this type of analysis, a decision must be taken from the two existing frameworks, the fixed-effect (FE) and the rational random effect (RE) model. Decisions-making will be based on the assumption that the selected model by the comparison between random effects contrasted with the fixed effects (JA Hausman, 1978).

4.2 Data overview

To proceed with the final degree, it will be required the abilities and workforce of two researchers to do the costly collection of data and therefore, develop the detailed macro analysis due to the extensive implication to bring them into action.

The final research is composed of multiple analyses meaning the panel data is composed of macro data extracted from the OECD. Data is available from 2010 to 2019 and collected for each of the 22 countries [4]*; selected based on the accessibility to their database in order to obtain more realistic results and analyse the wider differentiations between the nations. The important feature of the data is that all the economical variables have 2008 as the common base year and in US dollars, in order to include layers of the analysis concerning the economic trends to allow a better comparison between current and past execution. For instance, eradicating inflation's effects.

The dataset of the new variables will be compared to the World Happiness Index, which defines the happiness of a country including: (1) GDP per capita, (2) social support, (3) freedom to make life choices, (4) generosity, (5) perception of corruption, (6) healthy life expectancy.

As exhibited in Section 2, the consensus idea from research and relevant studies is the clear relationship between the economic and social factors with the evolution of happiness within a nation. Considering the literature exposed in the theoretical background, this final project has been considered as explanatory variables related to sociodemographic factors. On the one hand, the economical indicators are gross national income, saving rate, insurance spending, general government debt, tax on personal income, tax revenues, family benefits, public spending, pension spending, social spending. On the other hand, the social variables are the unemployment rate, unemployment long-term rate, youth unemployment rate, youth unemployment rate, health spending, social benefits to housholds, suicide rates, infant mortality rates, alcohol consumption, life expectancy at 65, mathematics performance,

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[4]Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Israel, Italy, Luxembourg, Netherlands, Poland, Portugal, Spain, Sweden, Switzerland and the United States.

reading performance, science performance, adult education level, air pollution effects and air pollution exposure.

Table 3 summarizes the statistics for variables included in the analysis.

Table 3. Summary of statistics.

VARIABLES	OBS	STANDARD DEVIATION	MEAN	MIN	MAX
Gross National Income	220	12567.98	44041.05	20087	74202
Saving Rate	220	3.912029	7.055227	0.03	16.84
Insurance Spending	220	7643.116	8053.195	1868	51204
General Government Debt	220	35.87974	82.77905	9.39	156.85
Tax on Personal Income	220	4.188621	9.323123	3.299	26.349
Tax Revenues	220	954.7048	514.3523	6.5	5243.8
Family Benefits Public Spending	220	825.35	2299.268	610	3941
Pension Spending	220	3273.335	8749.964	3555	16240
Social Spending	220	3.976788	10.1754	4.255	23.384
Unemployment Rate	220	3.999762	7.789727	2.02	26.12
Long-Term Unemployment Rate	220	13.96599	34.32709	5.71	61.74
Youth Unemployment Rate (Males)	220	9.782156	18.75786	5.37	56.23
Youth Unemployment Rate (Females)	220	10.04217	17.40077	4.75	54.6
Health Spending	220	1758.542	4178.869	1362.9	11071.7
Social Benefits to Households	220	3903.873	14019.39	5266	20168
Suicide Rates	220	3412.067	11796.36	4900	23400
Infant Mortality Rates	220	946.8592	3366.818	1100	6100
Alcohol Consumption	220	2062.68	9679.545	2700	12800

Life Expectancy at 65 (Males)	220	1.442486	18.02391	14.1	20.2
Life Expectancy at 65 (Males)	220	1.203733	21.39182	18.1	24
Maths Performance	220	16.88741	499.3683	447	541
Reading Performance	220	14.7847	498.9591	470	536
Science Performance	220	18.10115	502.9306	455	554.01
Adult Education Level	220	12.2966	20.47695	6.14	68.08
Air Pollution Effects	220	198.7599	285.3146	56.84	858.21
Air Pollution Exposure	220	5080.961	12257.47	5334	27365
Overweight or Obese Population	220	4.515926	19.03877	10.1	29.7

Source: Elaborated by the authors.

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5. RESULTS

This section reports evidence about the tendency and existing relationships of the explanatory variables over the independent variable to prove or deny the hypotheses stated in Table 2. The results obtained regarding the socio-economic determinants are shown in Table 4, where all the regressions computed are summarized. The strategic modeling of the project consists of an estimation model between 2009 and 2019, where the twenty-five waves are considered the endogenous variables, analyzed by random effects due to the results provided with the aid of the Hausman test.

Observing Table 4, there are few explanatory variables that have a significant effect on the independent variable. Those determinants are saving rate, pension spending and overweight or obese population.

In relation to the other social and economical variables without any relationship, a deeper analysis has been made to understand the reasons for this non-correlation and other possibilities to explain that. To do so, it is necessary to look at the results obtained regarding the coefficients and the standard errors, if they are considerable or not. Based on these, most of the variables, except for the life expectancy at 65, indicate little evidence of an existing connection to the happiness index because of small results (nearly to 0). In the case of the life expectancy at 65 variable, there is no clear association in this model as a matter of the collected sample which probably means that if more countries are included, conclusive outcomes will show up.

The aforementioned information leads the authors to not be able to corroborate or contradict the hypotheses of the final project regarding the gross national income, unemployment rate, taxes, government debt, education, life expectancy, mortality and suicides rates, alcohol consumption and pollution**.** In whatever way, authors have decided it is important to observe Table 4 to make a prediction, based on the symbol of the coefficients, to determine if the hypotheses stated could be denied or confirmed. Analysing the results, all the hypotheses regarding the gross national income (**H1**; Hagerty, 2006; Inglehart et al., 2008), government debt (**H6**; Li, 2019), education excluding the maths performing (**H7**; Cuñado, 2012), the life expectancy of the population (**H8**; C Bjornskov, 2008), mortality and suicides rate (**H9**; Liu, 2016; C Guven & R Saloumidis, 2009; Bray, 2006) and alcohol consumption (**H10**; Rehm,

2004) are predictably confirmed based on the research literature. The only three exceptions are taxes (**H5**; Helliwell and Huang, 2008) unemployment (**H3**; Winkelmann, 2014; Clark, 1994; Papps, 1998) and pollution (**H12**; Wen-Hsu Lin, 2019; Heinz Welsch, 2006). The results are not conclusive because one of the variables corroborates the statements and the other one no.

Once explained the ones without association, a detailed examination will be computed. Referring to the saving rate variable (**H2**), an increase of 1% in savings reduces the happiness index by -1.06 points, on average, keeping the rest of the factors constant. These results demonstrate a negative relation between the saving rate and the level of a nation's happiness, as an opposite outcome studied by Seligman & Csikszentmihalyi (2000) where "*individuals who save are more likely to develop positive traits and have positive subjective interactions, increasing happiness.*"

Positive effects are observed in pension spending, an increase of 1 percentage point in pension spending causes an increase of 0.002 points in the happiness index, on average, keeping the rest of the factors constant. Additionally, positive effects are shown in overweight or obesity population indicators also; an increase of 1% of the population aged 15 years or over implies an increase of 1.04 points in the happiness index, on average, keeping the rest of the factors constant. These results confirm part of the fourth **(H4)** in which is predicted a positive relationship between the government spending and the degree of happiness (Kamal, 2017) even though social and health spending do not have a significant relationship. However, the results also show a denying evidence of hypothesis eleven **(H11)** predicted based on what has been studied by the literature (Pinhey, 1997; Katsaiti, 2012) "*the higher the body weight, the lower the damage on the level of happiness explaining a negative effect on the subjective happiness of individuals.*"

Table 4. Coefficients of the happiness index for the regressions.

VARIABLES	FIXED EFFECTS (FE)	RANDOM EFFECTS (RE)
	Happiness Index	Happiness Index
Gross National Income	0.0003185 (0.0005073)	0.0002611 (0.000467)
Saving Rate	-1.010572*** [5] (0.4514903)	-1.059657*** (0.4275405)
Insurance Spending	-0.0001369	-0.0003648

	(0.0003983)	(0.0003659)
General Government Debt	-0.1002517 (0.0767973)	-0.0994727 (0.0697957)
Tax on Personal Income	0.2106632 (0.4247853)	0.1963404 (0.400816)
Tax Revenues	-0.0005524 (0.0034419)	-0.0007391 (0.00324)
Family Benefits Public Spending	-0.0013383 (0.0027978)	-0.0019036 (0.0026316)
Pension Spending	0.0028069*** (0.0013524)	0.0022612** (0.0013156)
Social Spending	0.0174753 (1.427613)	0.2744572 (1.326714)
Unemployment Rate	0.0095114 (1.210452)	-0.892633 (1.131619)
Long-Term Unemployment Rate	-0.0356756 (0.1375249)	-0.0202057 (0.1292678)
Youth Unemployment Rate (Males)	0.1385999 (0.6687323)	0.4621378 (0.6480365)
Youth Unemployment Rate (Females)	-0.1820804 (0.5668027)	-0.0628616 (0.5526336)
Health Spending	0.0026059 (0.0032845)	0.0020455 (0.0030872)
Social Benefits to Households	-0.001802 (0.0013764)	-0.0014965 (0.0013208)
Suicide Rates	-0.0003915 (0.0006214)	-0.0004501 (0.0005683)
Infant Mortality Rates	-0.0021545 (0.0020903)	-0.0005596 (0.0018981)
Alcohol Consumption	-0.001913** (0.0010185)	-0.0013944 (0.0009312)
Life Expectancy at 65 (Males)	-2.294751 (4.650989)	-1.262618 (4.187061)
Life Expectancy at 65 (Males)	-0.4564717 (4.742711)	-2.735691 (4.313222)
Maths Performance	-0.1416369 (0.2099127)	-0.0740082 (0.1998132)

Reading Performance	0.0673734 (0.1728498)	0.0556751 (0.159989)
Science Performance	0.1387864 (0.2090257)	0.0793744 (0.1980892)
Adult Education Level	0.1773399 (0.1907518)	0.1462262 (0.1760601)
Air Pollution Effects	0.0103377 (0.0268492)	-0.0171827 (0.0248236)
Air Pollution Exposure	-0.0000187 (0.0007991)	0.0004784 (0.000723)
Overweight or Obese Population	0.7479611 (0.53218)	1.03763** (0.4772796)

Source: Elaborated by the authors.

After the computation of the main regression analysis and concluding that few indicators have correlation with the happiness level of a nation, authors have decided to carry out new comparisons by groups in order to check if there are other relationships that have remained hidden as a result of the size of the data panel.

In Table 5, it can be seen the results obtained based on these regressions organized by different social and economical topics mentioned in the theoretical background: **economic variables** (gross national income, saving rate general government debt, tax on personal income, tax revenues and social benefits to households), variables related to **education** (adult education level, maths performance, reading performance and science performance), **investments** on basic society systemsn (insurance spending, family benefits public spending, health spending, pension spending and social spending), **labour** variables (unemployment rate, long-term unemployment rate, youth unemployment rate), **live level** variables (infant mortality rates, life expectancy at 65, suicides rates, alcohol consumption and obesity population) and finally, variables related to **pollution** (air pollution exposure and air pollution effects).

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[5]The asterisk represent the significative relationships between the dependent and independent variables based on the P-value: 0.01*** (99% remarkable); 0.05** (95% remarkable) and 0.10* (90% remarkable).

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To proceed with this new regressions analysis, it has been computed again the Hausman Test for each of the social and economic topics revealing random effects are ones used to analyse the regressions, again.

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To proceed with this new regressions analysis, it has been computed again the Hausman Test for each of the social and economic topics revealing random effects are ones used to analyse the regressions, again.

Observing Table 5, updated results are shown about the explanatory variables that have significant effect on the dependent variables. With this developed model, variables like pension spending and overweight or obese population are still part of the remarkable-relationships side of the equation but now, youth unemployment rate (females), alcohol consumption and air pollution effects have becomed signfiicant indicators for the happiness index.

Referring to the youth unemployment rate (**H3**), an increase of 1 percentage point in female-youth unemployment rate increases the happiness index by approximately 0.69 points, on average, keeping the rest of the factors constant. These results demonstrate a positive relation between the youth unemployment rate and the level of a nation's happiness,

as an opposite outcome studied by Winkelmann (2014), Clark (1994) and Papps (1998) that revealed the existence of a happiness drop when the rate of unemployment is high. Additionally, positive effects are shown in the air pollution effects indicator also; an increase of 1% of mortality per 1000000 inhabitants or over implies an increase of 0.0006 points in the happiness index, on average, keeping the rest of the factors constant. Concluding, the last predicted hypothesis (**H12**) is denied based on the fact that the theoretical background states a decrease of happiness the higher the level of pollution (Wen-Hsu Lin, 2019;Heinz Welsch, 2006) which is not reflected in the analysis.

Negative effects are observed in alcohol consumption, an increase of 1 Litres/capita for people aged 15 and over causes a decrease of 0.0012 points in the happiness index, on average, keeping the rest of the factors constant. These results show a corroboration evidence of the hypothesis ten (**H10**) predicted based on what has been studied by Rehm (2004), denying at the same time what authors like MC Auld (2005) have highlighted about the direct relation between the two variables because it is considered as an enjoyable activity.

Thanks to these new regressions, new significant results have been revealed making this final project degree more complete.

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Table 5. Coefficients of the happiness index for regressions by topics.

TOPIC	VARIABLES	FIXED EFFECTS (FE)	RANDOM EFFECTS (RE)
ECONOMIC	Gross national income	-0.0000482 (0.0000903)	-0.000034 (0.0000844)
	Saving Rate	-0.4514514 (0.284534)	-0.393325 (0.2702855)
	General government debt	-0.0170303 (0.032417)	-0.011169 (0.0305874)
	Tax on personal income	-0.2106953 (0.2292562)	-0.1295203 (0.2129926)
	Tax revenues	0.0006452 (0.001049)	0.000756 (0.0009876)
EDUCATION	Adult education level	-0.107969 (0.0923065)	-0.0708499 (0.0871522)
	Maths performance	-0.1615075 (0.1179463)	-0.1034818 (0.1112776)
	Reading performance	0.1767976 (0.1321687)	0.0987069 (0.1223997)
	Science performance	0.0501589 (0.0729891)	0.0423563 (0.0709085)
	Insurance spending	-0.0000729 (0.000223)	-0.0001306 (0.000211)

INVESTMENT	Family benefits public spending	-0.0019455 (0.0017257)	-0.0022274 (0.0016128)
	Pension spending	0.00079*** (0.0003371)	0.0006662*** (0.0003227)
	Social spending	-0.0184387 (0.6314171)	0.1354476 (0.6031136)
	Health spending	-0.0000948 (0.0008426)	-0.0000645 (0.0008018)
LABOUR	Unemployment rate	-0.5264245 (0.6666826)	-0.3908933 (0.6236798)
	Long-term unemployment rate	0.0268348 (0.0708147)	0.0007795 (0.0666595)
	Youth unemployment rate (Males)	-0.4936709 (0.4006454)	-0.4663787 (0.3780017)
	Youth unemployment rate (Females)	0.7391914*** (0.2908279)	0.6856243*** (0.2806717)
LIFE LEVEL	Social benefits to households	0.0003944 (0.0002492)	0.0003582 (0.0002327)
	Suicides rates	-0.0001947 (0.0003585)	-0.0002046 (0.0003269)
	Infant mortality rates	-0.0001688 (0.0010116)	0.000152 (0.000897)
	Alcohol consumption	-0.0011245***	-0.001156***

Relationship between socio-economic indicators and happiness using a cross-country analysis (2010 - 2019).

		(0.000539)	(0.0005172)
	Life expectancy at 65 (Males)	-1.035401 (1.685684)	-0.7306689 (1.547347)
	Life expectancy at 65 (Females)	0.7421527 (1.839021)	0.6900666 (1.690219)
	Overweight or obesity population	0.33496 (0.2541341)	0.3935455** (0.2345118)
POLLUTION	Air pollution exposure	-0.0029894 (0.008261)	-0.007898 (0.0076938)
	Air pollution effects	0.0005178 (0.0003253)	0.0005933** (0.0003078)

Source: Elaborated by the authors.

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6. CONCLUSIONS

This empirical study to analyse the potential correlation between social and economic determinants and the happiness index provided by Gallup Poll and the United Nations. To add to the literature, this study conducts a quantitative analysis using the panel data method, which has allowed the authors to analyze data on countries over a long-time period. After computing the regression models, the results obtained have permitted the possibility to answer the research question of the investigation: "How the level of happiness of a nation can be affected by other relevant indicators and is it plausible to improve the method used in the actual index?", objectives setted and hypotheses predicted.

Succeeding with the main regression and regressions by topics computed, the corroboration of six of the twelve predicted hypotheses has been done reaching conclusive results to overcome the goal of this project. However, it is important to highlight that with the small sample size, caution must be applied, as the findings might not be transferable to all the market.

Based on the theoretical background, the research presents twenty-five socio-economic factors that are probable to determine the happiness of people of a country. The outcomes presented give the literature a spotlight of the importance of six factors based on the significant relationship, figuring out that there are few explanatory variables included in the model that have a significant effect on the independent variables. Saving rate, pension spending, youth unemployment rate (female), alcohol consumption, and overweight or obese population are the ones verifing the relevance of the author's topic chosen.

The main regression model lights up corroborate findings on the hypothesis of pension spending but denies the expected one regarding the saving rate. Firstly, people who save more at the same time are those who are deprived of other goods that can give happiness such as going on vacation, going out to dinner, among others (**H2**). Secondly, a positive contribution of pension spending in the level of a country's happiness is found. A country that grants higher pensions is a country that rewards more for work done compared to other countries, which means that anyone will always be happier in that place where they are rewarded and valued more for doing the same work (**H4**). Thirdly, positive effects are shown in overweight or obesity population indicators also, where people that eat in a more frequent way, are revealed to be happier (**H11**; obesity population).

Afterward the few remarkable connections between the dependent variable and independent variables, a second regression by general topics revealed new relationships that remained hidden because of the magnitude of the analysis. These results exposed the denying hypothesis about the youth unemployment rate and the effects of air pollution effects, but corroborated the alcohol consumption theory. In relation to the female-youth unemployment rate (**H3**) it has been revealed to be an opposite outcome to the literature because the existence of happiness increases when the rate of unemployment is high, in the female population. Additionally, positive effects are shown in the air pollution effects indicator denying the hypothesis (**H12**) based on the fact that the theoretical background. Finally, negative effects are observed in alcohol consumption, confirming evidence of the hypothesis ten (**H10**) predicted based on the fact that alcohol is considered a health problem basis and denying the opposite contraposition when alcohol is considered an enjoyable activity.

Because of the nature of the research questions and the large amount of data required, this study relied heavily on quantitative methods. The availability of data was the study's main limitation, as the range of determinants that could affect people's happiness was quite broad. In light of the above, and also due to the short-time period to develop the investigation, has led the authors to choose less variables and in consequence, not all the expected results have come to conclusion. Furthermore, when working with aggregate data, it becomes an easy repercussion to overlook certain hidden effects regarding the significant relationships. Due to these aforementioned restrictions, the construction of panel data over a long period of time has also limited the analysis, therefore the outcomes. A variety of conditions within the industry demonstrated the topic's complexity and the research was hampered by the labyrinthine. Moreover, it could have been interesting to compare it and contrast the results with a micro analysis of individual observations.

The research's limitations point to issues that will need to be addressed in the future. For example, government research should strive to be at the forefront of this change. Moreover, other studies could be made to increase the richness of the study like performing a quantitative analysis adding more countries in order to have a bigger sample, and thus, more significant results.

To sum up, it has been very enriching to be part of the whole development of this final degree research and to overcome all the challenges and obstacles encountered along the way. In conclusion, the importance of this topic is emphasized and the motivation to continue studying is what determines the happiness of a country. After conducting the analysis, the results show that the equation that calculates a country's happiness, provided by Gallup Poll

and the United Nations, is not entirely complete, given the complexity of the happiness concept. Therefore, it should be kept updated in order to contribute a better understanding of the ranking of states. Although it has not been able to corroborate or deny all the hypotheses, it is shown that new variables, both social and economic, should be part of what is understood as the level of happiness of a nation.

Table 6. Summary of the hypotheses with the results found.

HYPOTHESES	VARIABLE	EFFECT ON THE DEPENDENT VARIABLE		AUTHORS
		EXPECTED	FOUND	
Hypothesis 1	Gross national income	+	/	● Hagerty and Veenhoven, 2006 ● Inglehart et al., 2008
Hypothesis 2	Saving	+	-	● Seligman and Csikszentmihaly i, 2000
Hypothesis 3	Unemployment rates	-	/ Youth Unemploym ent rate (F) +	● Clark and Oswald, 1994 ● Papps, K. & Winkelmann, R., 1998 ● Winkelmann, R., 2014
Hypothesis 4	Government Spending on Health, Social and Pension Systems	+	+	● Kamal, 2017 ● Satrovic, …, 2019

Hypothesis 5	Taxes	-	/	● Helliwell and Huang, 2008
Hypothesis 6	Government Debt	-	/	● Li T., …, 2019
Hypothesis 7	Education	+	/	● AP Pavel, 2012 ● Cuñado, J., & de Gracia, F. P., 2013
Hypothesis 8	Life expectancy	+	/	● C Bjornskov, 2008
Hypothesis 9	Mortality and Suicide Rates	-	/	● C Guven & R Saloumidis, 2009 ● B Liu, …, 2016
Hypothesis 10	Alcohol Consumption	-	-	● Rehm, …, 2004 ● MC Auld, 2005
Hypothesis 11	Obesity	-	+	● TK Pinhey, …, 1997 ● MS Katsaiti, 2012
Hypothesis 12	Pollution	-	+	● Heinz Welsch, 2006 ● Wen-Hsu Lin, …, 2019

Source: Elaborated by the authors.

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ANNEX

Table 7. Definition and expressions of explanatory variables.

NAME OF THE VARIABLE	DIGITS	DEFINITION	EXPRESSED IN	SOURCE
Air pollution exposure	poll	Air pollutant that poses the greatest risk to health globally.	Perspectives: Exposure to PM2.5 Expressed: % of population	Air quality and health: Exposure to PM2.5 fine particles - countries and regions
Air pollution effects	effec	Fine particulate matter (PM2.5) can be inhaled and cause serious health problems including both respiratory and cardiovascular disease, having its most severe effects on children and elderly people.	Perspectives: Mortality Expressed: Per 1.000.000 inhabitants	Air quality and health: Mortality and welfare cost from exposure to air pollution
Social benefits to households	house	Social benefits may be further broken down into two key components: pensions benefits and non-pensions benefits.	Perspectives: In cash Expressed: % of GDP	National Accounts at a Glance
Adult Education Level	adult	This indicator looks at adult education level as defined by the highest level of education	Perspectives: below upper-secondary, upper secondary,	Education at a glance: Educational attainment and

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		completed by the 25-64 year-old population.	tertiary education Expressed: % of 25-64 years old	labour-force status
Mathematics Performance	maths	Mathematical literacy of a 15year-old to formulate, employ and interpret mathematics in a variety of contexts to describe, predict and explain phenomena, recognising the role that mathematics plays in the world.	Perspectives: Total (Boys, Girls) Expressed: Mean Score	PISA: Programme for International Student Assessment
Reading Performance	read	Measures the capacity to understand, use and reflect on written texts in order to achieve goals, develop knowledge and potential, and participate in society.	Perspectives: Total (Boys, Girls) Expressed: Mean Score	PISA: Programme for International Student Assessment
Science Performance	sci	Scientific literacy of a 15 year-old in the use of scientific knowledge to identify questions, acquire new knowledge, explain scientific phenomena, and draw evidence-based conclusions about	Perspectives: Total (Boys, Girls) Expressed: Mean Score	Source: PISA: Programme for International Student Assessment

		science-related issues. The mean score is the measure.		
Life Expectancy at 65.	exp65	Average number of years that a person at that age can be expected to live, assuming that age-specific mortality levels remain constant	Perspectives: Women, Men Expressed: Years	Health status
Overweight or Obese Population	ovweight	Defined as the inhabitants with excessive weight presenting health risks because of the high proportion of body fat.	Perspectives: Measured Expressed: % of population aged 15+	Non-medical determinants of health
Alcohol consumption	alcoh	Defined as annual sales of pure alcohol in litres per person aged 15 years and older.	Perspectives: Total Expressed: Litres/capita /aged 15 and over)	Non-medical determinants of health
Infant Mortality Rates	inf	Defined as the number of deaths of children under one year of age, expressed per 1 000 live births.	Perspectives: Total Expressed: Deaths per 100.000 live births	Health status
Suicide Rates	sui	Deaths deliberately initiated and performed by a person in the full knowledge or expectation of its fatal	Perspectives: Total Expressed: Per 100.000	Health status

		outcome.	persons	
Gross national income	gni	Gross domestic product, plus net receipts from abroad of compensation of employees, property income and net taxes less subsidies on production.	Perspectives: Total Expressed: US dollars/capita	Aggregate National Accounts, SNA 2008
Saving Rate	sr	Difference between disposable income (including an adjustment for the change in employment-related pension entitlements) and final consumption expenditure.	Perspectives: Total Expressed: % of GDP	Aggregate National Accounts, SNA 2008
Insurance Spending	insru	Ratio of direct gross premiums to GDP, represents the relative importance of the insurance industry in the domestic economy.	Perspectives: Total Expressed: % of GDP	Insurance activity indicators
Long-Term Unemployment Rate	ult	People who have been unemployed for 12 months or more. The long-term unemployment rate shows the proportion of these long-term unemployed among all unemployed.	Perspective Total Expressed: % of unemployed	Labour Market Statistics: Unemployment by duration: incidence

General government debt	debt	Gross debt of the general government as a percentage of GDP.	Perspectives: Total Expressed: % of GDP	National Accounts at a Glance
Tax on personal income	taxper	Taxes levied on the net income (gross income minus allowable tax reliefs) and capital gains of individuals.	Perspectives: Total Expressed: % of GDP	Revenue Statistics: Comparative tables
Tax revenues	taxrev	Share of a country's output that is collected by the government through taxes.	Perspectives: Total Expressed: % of GDP	Revenue Statistics: Comparative tables
Family benefits public spending	fam	Public spending on family benefits, including financial support that is exclusively for families and children.	Perspectives: Total Expressed: % of GDP	Social expenditure: Aggregated data
Youth Unemployment Rate	uyou	Number of unemployed 15-24 year-olds expressed as a percentage of the youth labour force	Perspectivess: Boys Girls Expressed: % of youth labour force	Labour: Labour market statistics
Unemployment Rate	u	People of working age who are without work, are available for work,	Perspectives: Total	Source: Labour: Labour market

		and have taken specific steps to find work.	Expressed: % of labour force	statistics
Health Spending	health	Measures the final consumption of health care goods and services (i.e. current health expenditure) including personal health care (curative care, rehabilitative care, long-term care, ancillary services and medical goods) and collective services (prevention and public health services as well as health administration), but excluding spending on investments.	Perspectives: Total (Government/Compulsory, Voluntary and Out-of-pocket) Expressed: % of GDP	Health expenditure and financing: Health expenditure indicators
Pension Spending	pens	All cash expenditures (including lump-sum payments) on old-age and survivors pensions.	Perspectives: Public Expressed: % of GDP	Social Expenditure: Aggregated data
Social Spending	soc	It comprises cash benefits, direct in-kind provision of goods and services, and tax breaks with social purposes. Benefits may be targeted at low-income	Perspectives: Public Expressed: % of GDP	Social Expenditure: Aggregated data

	households, the elderly, disabled, sick, unemployed, or young persons.		

Source: Elaborated by the authors with information from OECD.

Degree in Business Administration and Innovation Management