

Spain's Index of Sustainable Economic Welfare. Are welfare and sustainability compatible?*

Índice de Bienestar Económico Sostenible de España. ¿Son compatibles bienestar y sostenibilidad?

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Abstract

The challenge of sustainability has driven the pursuit of alternative economic indicators, such as the Index of Sustainable Economic Welfare (ISEW). The indicator begins with consumption expenditure, and applies a series of additions and subtractions relevant to welfare and sustainability. This paper reflects on the first ISEW for Spain, comparing it against updated data for other key development indicators. It is demonstrated that decades of economic output growth have provided meagre benefits for the welfare of the average citizen. The uses and limitations of the ISEW are discussed, along with recent progress in the measurement and understanding of welfare, well-being and sustainability.

Keywords: welfare, sustainable, Gross Domestic Product, economics, public policy, transformation.

JEL Classification: B5, E2, I3, O4, Q54.

Resumen

El desafío de la sostenibilidad ha impulsado la búsqueda de indicadores económicos alternativos, como el Índice de Bienestar Económico Sostenible (ISEW). Este indicador comienza con el gasto en consumo, y a partir de ahí añade o sustrae, dependiendo de casos, otras variables que se consideran importantes para el bienestar y la sostenibilidad. El artículo reflexiona sobre el primer ISEW calculado para España, comparándolo con los datos de otros indicadores de desarrollo. Los resultados demuestran que, a pesar de décadas de crecimiento económico, los beneficios para el bienestar del ciudadano medio han sido escasos. Sobre esa base, se discuten los usos y limitaciones del ISEW, junto con los avances recientes en la medición y comprensión del progreso, el bienestar y la sostenibilidad.

Palabras claves: bienestar, sostenible, Producto Interior Bruto, economía, políticas públicas, transformación.

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1. Introduction

The key indicator of national development in the 20th century was Gross Domestic Product, or GDP, the now ubiquitous measure of economic production. Simon Kuznets originally developed GDP in the 1930s as a measure of national income, and cautioned against its use as a measure of welfare. Despite this, the pursuit of GDP growth became a central policy objective of economic and social development worldwide. Late in the 20th century, the ecological economist Herman Daly derived a useful analogy for the challenges that have arisen, and indeed accelerated in recent decades. His idea of "empty-world and full world economics" (Daly, 1991) described how the founding assumptions of neoclassical economics were formed in a relatively 'empty-world'. This empty-world involved a far smaller global economy, with a relatively low burden on the planet, in its associated rate of consumption of resources and production of wastes. Daly argued that continuing to prize economic growth is akin to behaving as if humanity still exists in this empty world. Yet decades of economic growth have led to the emergence of a 'full world,' with a multiplied aggregate human footprint, that now greatly exceeds the limits of what the earth can support.

Systemic global environmental problems have arisen from past patterns of economic development. The challenges of global heating (IPCC, 2018) and ecological breakdown (IPBES, 2019), hold broad scientific and political acceptance. Economics itself has begun to undergo a major shift, as the implications of sustainable development and related 'systems thinking' exert increasing influence. Indeed, the Intergovernmental Panel on Climate Change (IPCC) assessment reports, subjected to global expert and government review, have acknowledged the 'limits of economics in guiding decision-making' (Kolstad et al., 2014). The 'Fifth Assessment Report' noted that while economics can aggregate welfare, this is only one of several criteria that may be important. In the case of seeking to understand current well-being, social inequality is increasingly noted as problematic within countries (IPSP, 2018). It is also observed, by economists such as Joseph Stiglitz, that 'trickle-down economics' does not work (UNDP, 2003). The benefits of modernity are therefore incompletely shared, and also come with increasingly significant costs.

In responding to the need to understand these challenges, the search for indicators of welfare, well-being and sustainability has hastened. Yet this challenge is not a new one. One hundred and thirty years ago, Alfred Marshall recognised that there were limits to describing human well-being and behaviour through income. In *Principles of Economics* (Marshall, 1890), the pioneering neoclassical economist, argued for a wider field that would encapsulate not only wealth, but 'welfare'. The related preference satisfaction account came to dominate orthodox neo-classical economics (Roberts et al., 2015). Marshall noted the role of individual psychological resources, and of the immaterial 'goods' of nature and social relations, yet, recommended that economics study material welfare. This recommendation was an attempt to simplify welfare, in support of quantitative analysis. While this view of economics has come

to dominate, there remains an ongoing tension in the study of economic welfare (Fleurbaey, 2015), due to the continued dominance of resources and money. The challenges are many, spanning from constructing economic valuations useful to analysis, to deeper questions about what is it we seek to measure, and for what purpose and what value system underpins this?

Prominent approaches that are evolving to improve understanding of welfare and sustainability include: the development of a separate satellite national accounts of environmental indicators, used to supplement the standard System of National Accounts (SNA) of economic activity; dashboards of different indicators of policy importance; and composite indicators, of what are sometimes termed 'adjusted GDP' (Stiglitz et al., 2009). These composite indicators usually commence with household consumption rather than GDP. The Measure of Economic Welfare (MEW), of the Yale economists, Nordhaus and Tobin (Nordhaus & Tobin, 1973), was a notable step in the pursuit of adjusted GDP. MEW began with national economic output, which would undergo a series of adjustments, for the addition of the value of leisure time and unpaid work, and the subtraction of an economic valuation of environmental damage. This approach was further developed by Daly and Cobb (1989), as the *Index of Sustainable Economic Welfare* (ISEW), and also as the related 'Genuine Progress Indicator' or GPI (Redefining Progress, 1995).

The objectives of this paper are to reconsider the ISEW in general, including the results of the first study of Spain in O'Mahony et al. (2018), and to reflect on more recent advances in how welfare and sustainability are understood. A discussion of the items that lead to change in the ISEW, from 1970 to 2012, enables a discussion of historic change in Spanish welfare. This is followed by comparison against key sustainability indicators of development, updated to the most recently available data released in 2020 and 2021. The paper then uses this as a platform to discuss the recent evolution in the understanding of welfare and progress more generally. Following the introduction, the paper is structured as follows; Section 2 gives a general introduction to the Index of Sustainable Economic Welfare. Section 3 presents and interprets the results of the Spanish ISEW, considering the specific items leading to change in the index, and compares it against trends in new data from a number of key indicators of development. Section 4 provides a discussion of progress under three headings: progress in welfare in Spain; progress in the general development of the ISEW index; and progress in understanding welfare, well-being and sustainability. Section 5 provides conclusions.

2. The Index of Sustainable Welfare, or 'ISEW'

In the words of Lawn (2005), the continued growth of the wealthier economies on the development paths that have been observed in recent decades, is both "ecologically unsustainable and existentially undesirable". This has become a widely accepted conclusion of sustainability science. In response, ecological economists, such as the famous innovator known as the 'barefoot economist,' Manfred Max-Neef, advanced discussion of a 'threshold hypothesis'. This asserted that when macroeconomic systems expand beyond a certain size, the additional benefits of growth are exceeded by their associated costs (Max-Neef, 1995). This prompted ecological economists to develop indices of welfare that could compare the costs and benefits of the historic growth patterns of different nations. The first of these was the Index of Sustainable Economic Welfare, estimated for the USA by Daly and Cobb (1989). This was followed by broadly similar indices in the form of the Genuine Progress Indicator, or GPI (Redefining Progress, 1995), and Sustainable Net Benefit Index, or SNBI (Lawn & Sanders, 1999). 'ISEW' and 'GPI' are sometimes used interchangeably (Kubiszweski et al., 2013). GPI and SNBI were essentially a re-naming of the ISEW, and the differences between the indices have reflected the availability of data and the preference researchers have for specific valuation methods (Lawn, 2003).

The ISEW is an aggregate measure of welfare, composed of economic values, that integrate a macroeconomic measure of consumption, and an adjustment for income inequality, with valuations of social impacts, environmental damage, environmental quality, and other items that are beneficial to welfare. A summary of the approach adopted in the Spanish ISEW from 1970 to 2012, in O'Mahony et al. (2018), is presented in Table 1. Consumer expenditure (B) is the base welfare measure of the index, and often the largest by size. This is then weighted by a measure of income distribution, such as the Gini coefficient (C), to modify the consumption indicator for income inequality. This inequality weighted consumption measure (D), is then subject to a series of additions and subtractions, to reflect items that contribute to, and harm welfare. To arrive at monetary values for each of these items, two approaches are used: i) data sources that are already in money values are inflated or deflated to a common base year, in this case $2010 \in$, or, ii) quantities of an item, presented as an annual flow of a cost or benefit, are multiplied by an appropriate cost per unit in estimates from other relevant studies. Notable additions include the value of unpaid domestic work, and government expenditures on infrastructure, health and education. A wide variety of social and environmental costs are subtracted from the index, in the form of defensive private expenditures, environmental degradation and the depletion of natural capital. Notable subtractions can include environmental degradation in the form of the cost of air pollution in the year experienced. Longterm costs include those of climate change and of natural capital depletion, where the latter is measured as the consumption of non-renewable resources, such as the fossil fuels coal, oil and gas.

There have been major discussions on the theoretical basis of the ISEW. This took a leap forward in successive examinations by the Australian ecological economist, Philip Lawn (Lawn, 2003; Lawn, 2008; Lawn, 2013). Lawn derives the theoretical basis for ISEW/ GPI from Fisher's concept of 'psychic income' (Fisher, 1906). Early in the discussion of national income, Fisher proposed two central tenets. The first, similar to what most economists refer to as 'utility satisfaction,' concluded that it is the services enjoyed by consumers of goods which are of interest, and not of the sum of goods produced in a particular year. For the second, Fisher concluded that there are costs of what is lost in the economic process, and that this 'psychic outgo' needs to be factored in along with psychic income. This allows the estimation of 'net psychic income,' as the sum total of all the psychic income yielded from the economic process, less the sum of psychic outgo.

The standardisation of items, and of their valuation has also generated much discussion (Lawn, 2005). It is to this subject that the ISEW for Spain turned to in O'Mahony et al. (2018). This was a major study undertaken at the IMDEA Energy Research Institute, from 2013 to 2015, to reconsider the place of all of the items in the ISEW. This reconsidered all of the approaches used internationally in the estimation and monetary valuation of each item in the index. It also aimed to produce the first estimate of the index for Spain, from 1970 to 2012. Other studies, including Pais et al. (2019) who estimated the GPI for OECD countries, and Long and Ji (2019) who estimated the GPI of the provinces of China have since adopted the new methodologies proposed in this paper. A comprehensive set of supplementary materials accompanies O'Mahony et al. (2018), detailing the relevant theoretical discussion, and the data sources used for the calculation of each item in the Spanish index.¹

| | Item | Impact | Rationale | Methodology |
|---|--|---------|---|---|
| Α | Years | | Bound on scope | 1970 to 2012 |
| В | Consumer expenditure | + | Personal consumption measure | From national accounts |
| C | Income distribution inequality | | Effects of distributional inequality | Gini coefficient based on income |
| D | Weighted personal consumption expenditure | B/(1+C) | Consumption weighted by income distribution | Item B/(1+ Gini coefficient) |
| Е | Services of household labour | + | Value of domestic labour | Time spent on household and volunteer labour valued by shadow price of domestic worker |
| F | Services of consumer durable | + | Capital adjustment | 22.5% of value of stock of durable consumer goods |
| G | Services from public infrastructure | + | Non-defensive public expenditure | Government expenditure on roads |
| Н | Public expenditure on health and education | + | Non-defensive public expenditure | Half of government expenditures on health and education |

TABLE 1

SUMMARY OF THE APPROACH TO ITEMS IN THE ISEW FOR SPAIN

SOURCE: O'Mahony et al. (2018).

¹ The supplementary materials to O'Mahony et al. (2018) can be found online at: http://dx.doi.org/10.1016/j.ecolecon.2017.07.024

| 8 | SUMMARY OF THE AF | PROACE | H TO ITEMS IN THE I | SEW FOR SPAIN |
|---|---|--------|-------------------------------------|---|
| | Item | Impact | Rationale | Methodology |
| Ι | Expenditure on consumer durables | _ | Capital adjustment | National accounts of durable consumer goods |
| J | Private expenditure on health and education | _ | Defensive private expenditure | Half of private expenditures on health and education |
| K | Cost of commuting | _ | Defensive private expenditure | 30% of private transportation cost of vehicles and transport services |
| L | Cost of personal pollution control | _ | Defensive private expenditure | Defensive expenditures on pollution abatement and control |
| M | Cost of car accidents | _ | Defensive private expenditure | Road accidents by direct and indirect costs, with an actuarial valuation of willingness to pay to reduce risk |
| N | Cost of water pollution | - | Environmental degradation | Tonnes of water contaminants by Spanish treatment costs |
| 0 | Cost of air pollution | _ | Environmental degradation | Emissions of SO ₂ , NO _x , CO, PM ₁₀ and NMVOC by marginal social costs |
| Р | Cost of noise pollution | - | Environmental degradation | Noise of agglomeration, roads, trains and airports by individual cost |
| Q | Protection of wetlands | + | Natural capital conservation | Hectares of protected wetland by system cost |
| R | Loss of agricultural land | _ | Natural capital depletion | Loss by market value of agricultural land |
| S | Depletion of non- renewable energy | _ | Natural capital depletion | Primary fuel consumption by 'transition cost' |
| Т | Costs of climate change | - | Long-term environmental degradation | Emissions of the six Kyoto GHGs by the Social Cost of Carbon |
| U | Cost of ozone depletion | _ | Long-term environmental degradation | CFC production by damage cost |
| v | Net Capital Growth | + | Capital adjustment | Net capital stock by capital requirement |
| W | Change in net international position | (+/) | Capital adjustment | Net International Investment Position |

TABLE 1 (Cont.)

SOURCE: O'Mahony et al. (2018).

SUMMARY OF THE APPROACH TO ITEMS IN THE ISEW FOR SPAIN Impact Rationale Item Methodology Х ISEW Total ISEW Aggregated indicator Y Population **Total Population** From national accounts

Total GDP

Final welfare indicator

Comparative indicator

TABLE 1 (Cont.)

GDP per capita SOURCE: O'Mahony et al. (2018).

ISEW per capita

GDP

Ζ

AA

AB

3. The ISEW for Spain from 1970 to 2012

3.1. Overview of the Spanish ISEW

By definition, ISEW studies seek to establish the long-term patterns, sufficiently back in time to arrive at more robust conclusions on the outcomes of development. As the first study of its kind for Spain, this involved significant research to attain a suitable data set, over a sufficiently long period. The study of O'Mahony et al. (2018) covers the period from 1970 to 2012, a period in which less interpolations or extrapolations are required to address data gaps. It details a sufficiently long time period that can encompass very different political and economic conditions in Spain. This includes the final years of the Franco dictatorship up to 1975, moving to democracy in 1978, accession to the European Community in 1986, and also the deep economic recession known as 'la crisis'. This began in 2008 with the global financial collapse, and in Spain, continued for five years until 2013.

3.2. Comparing change in ISEW per capita with GDP

Following the 'threshold hypothesis' of Max-Neef, ISEW and GPI studies have consistently found wide divergence between GDP per capita and ISEW per capita. Studies suggest that the hypothesis stands across the wide variety of nations which have historically been studied (Kubiszewski et al., 2013), across 20 countries of the American continent (Menegaki and Tiwari, 2017) and also in a recent investigation of 28 OECD nations in Pais et al. (2019). In the case of Spain, this conclusion holds, there is a considerable difference between the two indicators. Figure 1 below illustrates the results of the ISEW calculation for Spain, in O'Mahony et al. (2018), in constant 2010 euros, for ISEW per capita and GDP per capita. The ISEW is broadly similar to GDP from 1970 until 1985, when the indices begin to diverge. With accession to the European Community in 1986, GDP per capita grows rapidly,

From national accounts

Total ISEW/population

Total GDP/population



while the ISEW per capita lags this change, and only commences a relatively slow rise in 1999. As the international economic recession arrives in Spain, in 2008, GDP per capita experiences a sharp drop, while the ISEW per capita shows a small reduction. The overall pattern, across the entire period, suggests that when social and environmental costs and benefits are accounted for, the contribution of economic growth to average welfare in Spain has been meagre. Despite a major increase in GDP per capita, observed over more than forty two years in this study, the ISEW per capita is relatively stagnant.

3.3 Specific items in the ISEW and attribution of results

In order to develop a deeper understanding of what is influencing the change in the ISEW, it is useful to consider the patterns in key periods of change, that are apparent from trends in the ISEW per capita. This includes an increase from 1999 to 2007, and also the decrease during the economic recession and the associated public austerity campaign, observed in the period from 2008 to 2012. All of the following item results are in million \in , in 2010 values, to give real rather than nominal change, allowing direct comparison. The improvement in the ISEW per capita from 1999 to 2007 can be attributed to the higher private consumption expenditure, increasing by +162,752 million euros (from \notin 498,004 million to \notin 660,756 million), an increase in the contribution of household labour by +45,051 million euros, and also in government investment through public expenditures on health and education, by +17,728 million euros. This period

also showed drops in the costs of air pollution, by -7,055 million euros, and of road accidents, by -5,192 million euros. Items that acted to decrease the index during this period included: rising income inequality, which led to a welfare reduction of -36,239 million euros; and also increases in the cost of climate change (-17,068 million euros); of energy depletion (-14,749 million euros); and of commuting (-4,981 million euros).

The downturn in ISEW per capita from 2008 to 2012 sees: a decrease in personal consumption expenditure and increasing inequality (-50,622 million euros); increasing loss of farmland (averaging -7,161.4 million euros per annum); a decline in expenditure on consumer durables; and a decline in public expenditure on health and education (-7,798 million euros). Items that act to soften the decrease in the index include: a continued increase in the value of household labour (+11,146 million euros); and declines in the cost of energy depletion (by 10,709 million euros); the costs of climate change (by 5,913 million euros); the cost of air pollution (by 5,051 million euros); and the cost of road accidents (by 2,963 million euros).

For deeper understanding of the trends in the overall ISEW, specific items are now discussed. Weighted personal consumption (item D) increased steadily, peaking in 2007 before the recession. While growth in the economy drives consumption, the effect of income inequality has varied. The Gini coefficient (Item C) peaks at 0.37 in 1973, dropping to a minimum of 0.24 in 1988, and returning to 0.35 in 2011. This acts as a drag on welfare, and illustrates the impact of policy choices over decades. While the post-Franco years show some success in reducing inequality, this rises as growth proceeds, and also increases during the recession. This shows that the benefits of economic growth were incompletely shared, and suggests that policy decisions during the recession deepened this pattern further.

The most significant adjustment to the index is the benefit provided by the value of household labour (E). While time spent per day on home and family care declined since 1970, other factors were influential. This included an increase in population numbers, but also in the participation rate, which is likely due to cultural modernisation in gender roles. The next largest positive in the index is the contribution of public health and education (H). This steeply declined from 2010, as austerity policies attempted to reduce the government deficit.

While recognising the positive contributions of the items above, a number of items can be seen to harm welfare, and act as a drag on the index, including the following major factors: income distribution (C); the cost of energy depletion (S); and the costs of climate change (T). The periods of growth in GDP per capita can be seen to drive demand for energy and also related emissions of greenhouse gases. However, as per the outcome with inequality, it is important to note that policy can have a major impact on how the driver of economic growth affects these items, all of which are linked by the level and the form of energy demand. O'Mahony and Dufour (2015) looked at the drivers of energy and carbon emissions in Spain from 1990 to 2011, and showed that economic growth acted to increase energy demand and carbon emissions. This study noted some policy success in decarbonising energy, to reduce carbon emissions, through increased renewable energy and switching to gas.

However, the study also found that the energy intensity of the economy was slow to improve, and attributed this to increased transport activity by private car and air, and decline in the technical efficiency of industry. The full estimates of all items are included as Appendix A1 and A2, in order to validate the results detailed above.

3.4. Comparison of long-term trends in the development indicators of 'progress' for Spain

In the interest of understanding national 'progress,' through historical trends in key development indicators, a similar approach to that of Kubiszewski et al. (2013) is applied here. The analysis compares change in ISEW per capita for Spain with data assembled for: Ecological Footprint per capita; Life Satisfaction; the Human Development Index (HDI); the Gini coefficient; and GDP per capita. In this analysis, the percentage change in each indicator is calculated, using 1990 as the base year, set to 100. A brief explanation of each indicator and the source of data follows.

The *Ecological Footprint per capita* is an indicator from sustainability science of the demands of humanity on nature. It measures the quantity of biologically productive land and water, in global hectares, that are required to provide the goods and services demanded, and to absorb the waste generated. Because trade has globalised ecological footprints beyond national borders, the footprint considers all of consumption, averaged across the citizens of each country by converting to per capita. Data for this indicator is obtained from the Global Footprint Network (2021).

Life Satisfaction is a subjective psychological measure of the average citizens satisfaction with life in general. The data is obtained from the World Database of Happiness (Veenhoven, 2020).

The *Human Development Index* is a composite indicator of income per capita, life expectancy, and education attained. It was developed by the United Nations Development Programme (UNDP) to measure development that includes both social and economic progress. Data is found in UNDP (2020a).

The *Gini coefficient* is an economic measure of income inequality, where zero indicates perfect equality, and one indicates maximum inequality. Updated data on the Gini coefficient, and of real GDP per capita in constant prices are obtained from the World Bank (2021).

Similar to the multi-country findings of Kubiszewski et al. (2013), Figure 2 shows that the trends in the indicators are heterogeneous. Including the ISEW per capita from 1970 to 2012, and updates to the other indicators, it can be seen that economic growth is not driving significant improvements in what could be defined as 'progress'. GDP per capita has increased significantly from 1970 to 2019, and has acted as a major driver to increase the Ecological Footprint, damaging the environmental sustainability of Spanish development. This is consistent with the patterns of development in other affluent western nations, which amplify production and consumption, in development pathways that are both resource and waste

intensive, and therefore more environmentally destructive (EEA, 2019; Fleurbaey et al., 2014). The Ecological Footprint appears to have decoupled from economic growth, at a similar time to 'la crisis', and has yet to recover. This could suggest that some progress in improving the environmental sustainability of growth has been made recently. The trend is yet too short to form conclusions that are more definitive.

Trends in Life Satisfaction suggest that there has been little progress in improving the subjective satisfaction of the average individual since measurements began in 1985. Despite a small recovery since the recession, the overall pattern shows that neither major increases in GDP per capita, nor the parallel minor increases in the ISEW per capita, have translated into improvements in citizen satisfaction –when measured as happiness with life overall. An increase in the Gini Coefficient reflects an increase in income inequality. The Gini Coefficient has varied somewhat independently of economic growth –GDP per capita– over the period. This suggests that other factors, possibly through distributional policies of taxation and social welfare, may have had a major influence on income inequality. The Human Development Index shows a steady increase since its introduction in 1990. Spain shows an improvement in life expectancy and education indices, though much of the increase in HDI, as a composite indicator, can be attributed to economic growth (UNDP, 2020b).



SOURCE: Own elaboration.

4. Discussion of 'progress'

4.1. Discussion of progress in Spanish welfare

The Index of Sustainable Economic Welfare for Spain suggests that the 'psychic income' of the average citizen has received scant benefit, despite decades of growth in GDP per capita, by +156% between 1970 and 2007. Sensitivity analysis in the original study suggests that the findings are robust, and are not attributable to how the index is estimated -see O'Mahony et al. (2018). The trends in the items that make up the index show the impact of economic growth, driving up personal consumption, but also driving up related environmental pressures and inequality. The second part of this story are public policy decisions with major implications for items that are significant to welfare. The index allows the pursuit of growth to be critiqued, but also the policy choices that have been made at the same time. Together, these determinants have supported growth in private consumption over decades. However, a risky growth strategy led to the economic recession, and the freeing of capital, that partially led to GDP growth, but also increased inequality. Inequality was further deepened by policy choices after the beginning of the recession, as it favoured public austerity. These two determinants, in the form of economic growth, and public policy choices, are also significant drivers of the costs of climate change, energy depletion, air pollution and road accidents. While economic activity drives demand, public policy can significantly alter demand and the form it takes. For the largest adjustment to the index, in the form of the increasing contribution of household labour, this can be attributed to population increase, to personal choice, or to cultural changes. Yet, even in this case, public policy and economic growth can be directed towards increasing the free time available to citizens, to dedicate to family and home care, by reducing working hours or providing universal basic income.

The synthesis study of global ISEW/GPI studies in Kubiszweski et al. (2013) showed heterogeneous trends across countries, but limited improvement in global welfare after 1978, and the Spanish ISEW study is consistent with this conclusion. The index reinforces the widely accepted conclusion that the development patterns of industrialised countries, in recent decades, are demonstrably unsustainable while also of limited benefit to human well-being (Fleurbaey et al., 2014). In an era of climate breakdown, ecological crisis and growing inequality, it is crucial to recognise the hollowness of economic growth in industrialised countries, but also the ability of policy and governance to shift to new paths. Earlier debates in sustainability circles, influenced by environmental economics, focussed on using economic growth to increase welfare, and to spur social and technological changes towards sustainability. Yet a broad shift has now occurred to acknowledge that this reformist approach is not sufficient. There is an urgent need for transformative sustainable development pathways, supported by public policy and bottom-up social change. This fundamental process of transforming the development path can lead to very different outcomes in the long-term (IPSP, 2018; IPCC, 2018; Kirby & O'Mahony, 2018; EEA, 2019). Within this approach, economic growth becomes not a goal, but only a means to an end. There is a clear case to shift the objectives of national progress to well-being, sustainability and balance (O'Mahony & Luukkanen, 2020). If the ISEW can assist in this process of reflection and re-orientation of development paths, then it is of clear benefit.

4.2. Discussion of progress in the index

Returning to the two major issues noted for ISEW/GPI studies, the theoretical foundation and the standardisation of valuation methods, as discussed earlier, an advancement in the theoretical basis of ISEW/GPI has been achieved in the discussions of Lawn. An important area for the consideration is the potential for confusion between current welfare and future sustainability. While Fisher (1906) sought to measure 'psychic income' –experienced in a particular year– the extended version of Fisher's income, in Lawn (2008), includes the 'uncancelled costs' of lost natural capital services that are consumed in the economic process, as per Daly (1979). Long-term environmental damage, through the impacts of climate change, are one of these uncancelled costs, and therefore fall clearly within the scope of the index.

The second topic of discussion, the standardisation of valuations, has been a controversial topic since Neumayer (1999). Neumayer raised major questions about approaches to valuations, within a decade of the first ISEW study by Daly and Cobb, in 1989. Fleurbaey and Blanchet (2013) have pointed out the important contribution of the ISEW/GPI, through the inclusion of resource depletion in the calculation.

The ISEW for Spain sought to directly address these debates, and may have assisted in achieving a standardisation of approach. The recommend approaches have since been applied in studies such as Pais et al., (2019) on the OECD, and Long and Ji (2019) on the provinces of China. O'Mahony et al., (2018) focussed particularly on improving the key estimations of the *costs of energy depletion* and the *costs of climate change*, deriving innovative approaches, original in the literature, and applicable to other nations².

O'Mahony et al. (2018) also omitted net capital growth (Item V), change in net international position (Item W) and the cost of ozone depletion (Item U). The omission of items V and W are in line with Lawn (2013), who argued that neither of these items are compatible with the Fisherian concept of income. Item U was omitted as ozone depletion is of declining importance in sustainability, and also due to a related lack of appropriate data. A famed global policy success from the cooperative United Nations process, the *Montreal Protocol*, achieved a phase out of substances that deplete the ozone layer. This success is represented not just in declining global ozone emissions, but also in less study. The costs of ozone depletion became an

² The study also derived a new approach for water pollution.

unfashionable topic for research, and consequently, up-to-date estimations of the costs of ozone related damages are no longer available. This prompted the omission of this cost from the index, and constitutes a conservative assumption on long-term environmental costs applicable in an ISEW³.

The modification of the index, as decades pass, is consistent with the recommendation of Bagstad et al. (2014). In that paper, it is discussed how it is necessary to revisit the component list in these studies, to ensure that it represents the range of benefits and costs to welfare that are currently recognised in the breadth of social science, environmental and economic literature. Neither sustainability nor human welfare or well-being are static, but are constantly changing in extent, quality, priority and perception, and this flux requires an ongoing process of reflection on indicators and measurement.

It has been recommended in the New Zealand GPI, to avoid conflation of welfare and sustainability, to restrict the study to welfare (Patterson et al., 2019). In this approach the long-term sustainability related measures of reduced or depleted stocks are excluded. The approach places welfare as analogous to 'well-being,' and aims to restrict measurement to current welfare, to a flow in a particular year, rather than a stock over a number of years. There are a number of difficulties with this approach. Firstly, the concept of economic welfare, since Marshall (1890), has only offered an indirect approximation of human well-being, and conflating welfare with well-being is becoming more problematic (see section 4.3). Secondly, as described by Lawn (2005), consumption exhibits both stock and flow characteristics. Not all goods are consumed within the year of purchase, and it is the services of these goods that are chiefly desired, in keeping with Fisher's concept of income (Fisher, 1906)⁴. Thirdly, it appears ethically partisan to borrow from the future without noting this as a cost. So while this approach may be neater from an accounting perspective, it is ethically troubling in the context of the unfolding sustainability crises, that now threaten the well-being, and even the survivability, of future generations and the natural world.

4.3. Discussion of progress in understanding welfare, well-being and sustainability

Two issues that receive less attention in the indicators debate are that of the relationship of consumption to well-being, and the objectives and audience of the indicator. On the relationship of consumption to well-being, Lawn (2003) has noted the problematic nature of consumption, and suggested a sensitivity analysis

³ Vigilance remains necessary, despite initial signs of recovery, it will take decades for the ozone layer to recover. The *Montreal Protocol* was adopted in 1987 and signed by all countries since then. It has led to a dramatic decline in global ozone-depleting emissions, but there is a time lag to seeing reduced concentrations in the atmosphere. The costs of impacts are consequently still of relevance to sustainability.

⁴ Lawn (2005) gives the example of a light bulb, where the service provided for by one single long-life light bulb –that may last several years– is the same is that provided for by a number of short-life light bulbs –that expire quickly, possibly in a fraction of a year.

of excluding some categories such as 'cigarettes and tobacco' (Lawn, 2005). Yet, the varying contribution of different consumption categories to human well-being remains a nascent field of research, which requires further development (Stanca & Veenhoven, 2015). However, there are deeper unresolved philosophical issues in the conflation of the welfare measure of consumption with well-being. Van der Slycken and Bleys (2019) discuss how the psychic income of Fisher (1906) stresses the psychic or experiential nature of income, related to the subjective satisfactions in the human psyche. This is broadly consistent with Marshall's welfare that underpins neoclassical economics (Marshall, 1890), but this position is subject to growing

Discussion of the damaging effects of consumption has been persistent since the Ancient Greeks, who considered that it can undermine the balance of the individual, and threaten society (Dodds, 1997). 'Over-consumption' is now widely acknowledged as a global 'mega-driver' of inequality, and of sustainability crises across planetary boundaries, through the consumption of resources and production of wastes (Fleurbaey et al., 2014). Marshall himself described the 'law of diminishing marginal utility' to describe a reduction in utility for each additional unit of consumption. The consequences of excessive or inappropriate consumption for the individual can even involve damage to physical and mental health. The combination of these systemic impacts, of the current patterns of consumption –from individual, to society and the natural world– are a serious challenge to assuming well-being is analogous to consumption, or to consumption expenditure. This renders both Marshall's welfare and Fisher's psychic income, as increasingly difficult to defend, suggesting that other concepts of well-being need prioritisation.

Another valid criticism of ISEW/ GPI studies arose from the Commission on the Measurement of Economic Performance and Social Progress (CMEPSP), generally referred to as the Stiglitz-Sen-Fitoussi Commission. The Commission noted that while the ISEW charges welfare for the depletion of, or damage to, environmental resources, this is only one part of the answer to the questions of sustainability (Stiglitz et al., 2009). The Commission noted that what is needed is an assessment of the distance from sustainability targets, as measures of overconsumption, and of underinvestment on the other side of the inequality coin. This leads to questions about what the objectives of the indicator are, and to what audience it is directed? This more strategic communications and political discussion was alluded to by Lawn (2005), in noting that the chief argument for the alternative label of 'Genuine Progress Indicator' is that it has more public appeal. The ISEW and GPI can offer a hybrid of welfare and sustainability measurement that can generate greater public discussion, and on that basis, it appears to offer a valuable function in communication, and in challenging the hegemony of non-adjusted measures of welfare or production, such as GDP. However, single issue economic and sustainability measures, and dashboards of indicators, will also continue to be necessary, if not dominant. The Spanish ISEW illustrates the useful insights from a hybrid measure, but it cannot fully replace other indicators of progress, due to the limitations outlined above. As

opposition.

described in O'Mahony et al. (2018): "The ISEW is a measure of welfare that uses sustainability accounting methods when estimating costs, but it is not an indicator of whether welfare is actually sustainable" (p. 300).

5. Conclusion

The Index of Sustainable Economic Welfare was developed by ecological economists to challenge the hegemony of economic growth as the yardstick of progress. While understanding economic output is important to understanding the economy, at best, it can only contribute limited insights into understanding 'progress,' and little into priority policy dimensions such as human well-being and sustainability.

The Spanish Index of Sustainable Economic Welfare, or 'ISEW', in O'Mahony et al. (2018) is the first of its kind developed for Spain. It suggested that when economic welfare is corrected for social and environmental costs and benefits. despite decades of growth in Gross Domestic Product (GDP), the welfare of the average citizen has changed little. The contribution of household labour, in care of the home and of the family, shows a major positive contribution to national welfare, that is excluded from traditional economic measures. Yet, when welfare is corrected for costs such as inequality, the depletion of non-renewable energy, and of climate change, the improvement in the measure of welfare from 1970 to 2012 is meagre. It has been concluded that the historical development paths of the wealthy industrialised countries, including Spain, have key responsibility in driving the defining sustainability challenges of our time, through climate and ecological breakdown, and in inequality (Fleurbaey et al., 2014). The dominant 20th century approach to development, of pursuing economic growth, along with piecemeal policies to improve welfare and environmental efficiency, are delivering paltry outcomes. Current development paths come with costs that damage present welfare, and embed immense risks for the future, in both climate and ecological breakdown. Taking these conclusions together, the finding of the ISEW is startling, and must prompt deep reflection on the type of national development paths that are pursued, and to whom they benefit.

This paper has considered updates in the global literature on the ISEW, and in the understanding of welfare and sustainability more generally. It demonstrates that if ISEW and GPI studies encourage this kind reflection, they will have value in the discussion of 'progress'. Through putting the apples and oranges of costs and benefits to welfare, in the same form, they can be used as an approach to critique public policy outcomes, and development in general. This is beneficial for public and political debate, when compared with the many sins that are usually hidden in an upward GDP curve. The Spanish ISEW shows that, as consumption expenditures increased, so too did environmental costs. It also shows the damage of austerity policy after the recession. Taking transformative integrated sustainable development paths offers the opportunity to render economic growth only a means to an end, replaced by sustainability and well-being as the main focus of progress (O'Mahony & Luukkanen, 2020). In recent years, ISEW and GPI studies have advanced in two key areas to support this: in developing the theoretical basis, particularly in the various writings of Lawn and in Van der Slycken and Bleys (2020), and in standardisation of valuation approaches, as pursued in the Spanish ISEW of O'Mahony et al. (2018). Some criticisms remain, in that the ISEW does not actually measure whether welfare is sustainable or not, merely charging it for costs (Stiglitz et al., 2009). Even if ecological footprints are useful, however, it is not possible to clearly show both progress, and a variety of sustainability limits, in a single indicator. This requires dashboards of indicators, of multiple dimensions. These also must be part of public and policy discussion if sustainable development is to be pursued.

The updated trends in the other indicators of progress, considered in section 3.4 of this paper, are not inconsistent with the conclusion from the original ISEW study. Using new data, the conclusion that the rise in GDP per capita has not translated into commensurate progress, in the social or environmental indicators of sustainability, is further supported. It can be seen that GDP per capita drives disimprovement in environmental sustainability, as measured by the Ecological Footprint. There is little or no improvement in social sustainability indicators, in life satisfaction and income inequality. There is some improvement in the HDI, partially due to increased life expectancy and education. But as HDI is a composite indicator, that includes national income, this can also be related to rising GDP. This updated analysis of development indicators for Spain therefore reinforces the critique provided by the ISEW. However, it also raises questions about the theoretical underpinning of ISEW/ GPI studies, which rely on consumption expenditure as the underlying measure of human welfare.

A deeper and more troubling challenge is in the recognition that income and consumption provide poor indicators of human well-being. Emerging debates across economics, and the variety of fields of human well-being, increasingly suggest the limitations of this approach (O'Mahony & Luukkanen, 2020). Nonetheless, it is important to note, that no indicator can be considered entirely objective, or 'apolitical'. All indicators encompass a philosophical history embedded, which deeply influences how the world is perceived, and the framing and discussion of the priorities of 'progress'. If it is true that 'what's measured gets managed' then it is crucial to recognise this perspective. Reconsidering the philosophy, objectives and the audience of indicators, becomes a crucial exercise, as we move towards addressing the considerable challenges of the 21st century. During the epoch of mass industrialisation in previous centuries, a time of great change, thinkers such as Marshall, Fisher, Smith and Marx, had groundbreaking ideas that had major implications for economics, and for the understanding of the wider world. Similarly, in this current epoch of great change, shifts in economics and in how we understand the world, are inevitable, necessary and have already begun. These shifts are vital to our collective future, and to that of the natural world on which we depend.

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APPENDIX

ITEMS A TO N IN THE INDEX OF SUSTAINABLE ECONOMIC WELFARE FOR SPAIN FROM 1970 TO 2012 IN MILLION 0100 TA THE VIANTA MARCHAN AND THE AT **TABLE A1**

| | - | | - | 2010€ | FRUM 0 | MAHUN | Y ET AL. | (2018) | | | | |
|-----------|------------------------------|------------------|------------------------------|--------------------------|--|-------|--|--------------------------------------|---|----------------|-------------------|----------------|
| Ψ | В | С | D | E | F | G | Η | Ι | J | K | Μ | N |
| Year | Personal con- sumption | Gini coeffic. | Weighted con- sumption | Hou- sehold labour | Services of con- sumer durables | Roads | Public health and edu- cation | Cost of con- sumer durables | Private health and edu- cation | Commu- ting | Road accidents | Water poll. |
| | | | + | + | + | + | + | I | I | I | I | I |
| 1970 | 186256 | 0.35 | 137773 | 301689 | 3486 | 771 | 6925 | 15493 | 12316 | 5431 | 11013 | 2010 |
| 1971 | 195522 | 0.36 | 143946 | 304051 | 3427 | 833 | 8043 | 15230 | 12384 | 5610 | 11356 | 2022 |
| 1972 | 210803 | 0.36 | 154468 | 305007 | 4631 | 850 | 9626 | 20583 | 12447 | 7086 | 11711 | 2034 |
| 1973 | 226795 | 0.37 | 165411 | 306121 | 5475 | 901 | 11413 | 24331 | 12282 | 7807 | 12076 | 2046 |
| 1974 | 239798 | 0.36 | 176795 | 307095 | 5869 | 949 | 12435 | 26085 | 11912 | 8624 | 12453 | 2058 |
| 1975 | 245386 | 0.34 | 182903 | 308548 | 5993 | 965 | 14031 | 26634 | 11585 | 8536 | 12467 | 2068 |
| 1976 | 259638 | 0.33 | 195677 | 310122 | 5922 | 1057 | 14928 | 26320 | 11138 | 9507 | 13069 | 2079 |
| 1977 | 264542 | 0.31 | 201613 | 312061 | 5420 | 1040 | 16359 | 24089 | 10310 | 10114 | 13498 | 2090 |
| 1978 | 268889 | 0.3 | 207254 | 313934 | 5080 | 1259 | 17327 | 22576 | 9614 | 10026 | 14659 | 2101 |
| 1979 | 273719 | 0.28 | 213402 | 317016 | 4871 | 1251 | 17447 | 21649 | 9177 | 10393 | 14680 | 2112 |
| 1980 | 280057 | 0.27 | 220882 | 315850 | 4631 | 1405 | 17976 | 20580 | 8378 | 10560 | 13994 | 2122 |
| 1981 | 279773 | 0.26 | 221217 | 317336 | 4169 | 1438 | 17828 | 18529 | 8255 | 10607 | 13860 | 2133 |
| 1982 | 282335 | 0.26 | 223809 | 317208 | 4161 | 1659 | 18514 | 18495 | 8439 | 10450 | 12979 | 2144 |
| 1983 | 284980 | 0.26 | 226480 | 316953 | 4262 | 1738 | 20446 | 18942 | 8452 | 11054 | 13933 | 2155 |
| 1984 | 285562 | 0.26 | 227522 | 316413 | 3937 | 1906 | 19304 | 17498 | 8185 | 11026 | 14559 | 2166 |
| 1985 | 293251 | 0.25 | 234245 | 315737 | 4244 | 2154 | 19095 | 18863 | 8316 | 11085 | 15416 | 2178 |
| 1986 | 303970 | 0.26 | 241246 | 314908 | 5028 | 3359 | 19613 | 22345 | 8499 | 11621 | 16953 | 2190 |
| 1987 | 324061 | 0.26 | 257621 | 313826 | 6116 | 3493 | 21097 | 27184 | 8739 | 13063 | 18856 | 2203 |
| 1988 | 339069 | 0.24 | 272519 | 312647 | 6797 | 3523 | 24707 | 30209 | 9467 | 14120 | 20176 | 2215 |
| 1989 | 359508 | 0.26 | 285528 | 311385 | 7131 | 3667 | 26375 | 31694 | 10117 | 15068 | 21610 | 2228 |
| 1990 | 374233 | 0.27 | 294074 | 310021 | 6663 | 4428 | 29357 | 29611 | 10752 | 13985 | 21190 | 2241 |
| SOURCE: (| O'Mahony et a | al. (2018). | | | | | | | | | | |

| (Cont.) | WELFARE FOR SPAIN FROM 1970 TO 2012 IN MILLION |
|---------|--|
| BLE A1 | DIMONIC |
| TA | ILE ECC |
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| | FSUST |
| | NDEX 0 |
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| | IS A T |
| | ITEN |

| | | | | 2010€ | FROM O | MAHON | Y ET AL. | (2018) | | | | |
|-----------|-----------------------------------|------------------|-------------------------------------|--------------------------|--|-------|--|--------------------------------------|---|----------------|---------------------|----------------|
| A | B | c | D | E | F | IJ | Н | I | ſ | K | Μ | Z |
| Year | Personal con- sump- tion | Gini coeffic. | Weigh- ted con- sump- tion | Hou- sehold labour | Services of con- sumer durables | Roads | Public health and edu- cation | Cost of con- sumer durables | Private health and edu- cation | Commu- ting | Road ac- cidents | Water poll. |
| | | | + | + | + | + | + | I | I | I | I | I |
| 1991 | 387586 | 0.29 | 301373 | 308483 | 6367 | 4656 | 30932 | 28296 | 11687 | 14405 | 20651 | 2253 |
| 1992 | 397144 | 0.30 | 305602 | 307096 | 6459 | 4209 | 32991 | 28705 | 12559 | 15296 | 17662 | 2265 |
| 1993 | 393641 | 0.31 | 299796 | 305690 | 5571 | 4152 | 33650 | 24760 | 13267 | 15316 | 16973 | 2276 |
| 1994 | 397409 | 0.33 | 299589 | 304166 | 6059 | 4248 | 33068 | 26928 | 13733 | 16266 | 15331 | 2288 |
| 1995 | 430282 | 0.34 | 321106 | 302487 | 4700 | 3989 | 34150 | 20889 | 10424 | 13458 | 15896 | 2304 |
| 1996 | 445502 | 0.34 | 332464 | 300734 | 5058 | 3468 | 35000 | 22482 | 10984 | 14359 | 15199 | 2316 |
| 1997 | 450691 | 0.35 | 333845 | 288598 | 5605 | 2903 | 35913 | 24912 | 11019 | 14978 | 15373 | 2628 |
| 1998 | 470298 | 0.34 | 350969 | 276548 | 6370 | 3072 | 37314 | 28313 | 11506 | 15811 | 16108 | 2939 |
| 1999 | 498004 | 0.33 | 374439 | 264765 | 7234 | 3140 | 39096 | 32149 | 12174 | 17226 | 15247 | 3149 |
| 2000 | 523953 | 0.32 | 396934 | 253416 | 6862 | 3257 | 40176 | 30499 | 12607 | 17851 | 14494 | 1432 |
| 2001 | 539884 | 0.33 | 405928 | 263327 | 6889 | 3322 | 41668 | 30618 | 13029 | 17967 | 13895 | 1438 |
| 2002 | 550541 | 0.31 | 420260 | 274101 | 6262 | 3406 | 43997 | 27832 | 13409 | 17496 | 13563 | 1511 |
| 2003 | 566513 | 0.31 | 432452 | 286500 | 6431 | 3494 | 47007 | 28581 | 13957 | 17810 | 13687 | 1394 |
| 2004 | 590886 | 0.31 | 451058 | 292147 | 7055 | 3506 | 49264 | 31354 | 14429 | 18989 | 11791 | 2856 |
| 2005 | 613501 | 0.32 | 464070 | 298041 | 7230 | 3725 | 50962 | 32132 | 14943 | 20376 | 11361 | 2702 |
| 2006 | 637825 | 0.32 | 483567 | 303694 | 7352 | 3918 | 53819 | 32674 | 15211 | 21423 | 10871 | 2259 |
| 2007 | 660756 | 0.32 | 500952 | 309816 | 7373 | 4108 | 56824 | 32768 | 15546 | 22207 | 10055 | 2248 |
| 2008 | 652653 | 0.32 | 494809 | 316698 | 6421 | 4102 | 60180 | 28539 | 15565 | 21851 | 8423 | 2237 |
| 2009 | 621898 | 0.33 | 467592 | 321452 | 5333 | 4286 | 63357 | 23702 | 15442 | 19736 | 7334 | 2226 |
| 2010 | 623812 | 0.34 | 464146 | 323948 | 5099 | 4227 | 61373 | 22661 | 15571 | 20405 | 6587 | 2215 |
| 2011 | 615691 | 0.35 | 457763 | 325984 | 4491 | 2684 | 57615 | 19962 | 15179 | 20220 | 5857 | 2204 |
| 2012 | 599652 | 0.35 | 444187 | 327844 | 4035 | 2561 | 52382 | 17932 | 15276 | 19701 | 5460 | 2193 |
| SOURCE: (|)'Mahony et ; | al. (2018). | | | | | | | | | | |

TABLE A2

ITEMS O TO AB IN THE INDEX OF SUSTAINABLE ECONOMIC WELFARE FOR SPAIN FROM 1970 TO 2012 IN MILLION 2010€ FROM O'MAHONY ET AL. (2018)

| | (| 4 | ; | | E | ; | , | | | ; | | | 5 |
|-------------------------|-------------------------------------|---------------------------|--|---------------------|-------------------|--------------------|--------------------------|-----------------------------|---------------|-----------------|--------|------------------|-----------------|
| Α | 0 | ה | K | N | | n | > | M | X | Χ | 7 | AA | AB |
| Year | Air pollution | Wet- lands | Gain/loss agri- cultural land | Energy depletion | Climate change | Ozone depletion | Net capital growth | Invest- ment position | Total ISEW | Popula- tion | GDP | ISEW/ capita* | GDP/ capita* |
| | 1 | + | -/+ | 1 | I | I | + | + | | | | | |
| 1970 | 25333 | 0 | -961 | 27194 | 9410 | 2386 | 47951 | -17630 | 341483 | 33587610 | 334535 | 10 167 | 0966 |
| 1971 | 27470 | 0 | -1077 | 28178 | 10565 | 4772 | 47951 | -17630 | 346407 | 34041452 | 348827 | 10 176 | 10247 |
| 1972 | 29773 | 0 | -1167 | 28990 | 12148 | 7158 | 47951 | -17630 | 348644 | 34341903 | 378053 | 10 152 | 11008 |
| 1973 | 32222 | 0 | -1263 | 29853 | 13278 | 9544 | 47951 | -17630 | 354161 | 34663507 | 409178 | 10 217 | 11804 |
| 1974 | 34101 | 0 | -1337 | 31103 | 15097 | 11930 | 47951 | -17630 | 360374 | 34970634 | 433019 | 10 305 | 12382 |
| 1975 | 34243 | 0 | -1343 | 31950 | 16158 | 14316 | 62442 | -12566 | 367455 | 35338041 | 434831 | 10 398 | 12305 |
| 1976 | 35032 | 0 | -1374 | 34558 | 18010 | <i>16702</i> | 62442 | -12566 | 376619 | 35723408 | 444846 | 10 543 | 12453 |
| 1977 | 35695 | 0 | -1400 | 33883 | 18117 | 19088 | 62442 | -12566 | 387296 | 36155465 | 453272 | 10 712 | 12537 |
| 1978 | 36474 | 0 | -1430 | 35067 | 18940 | 21474 | 62442 | -12566 | 393967 | 36584635 | 463155 | 10 769 | 12660 |
| 1979 | 36887 | 0 | -1446 | 36204 | 19637 | 23860 | 62442 | -12566 | 401801 | 37160377 | 468405 | 10 813 | 12605 |
| 1980 | 36679 | 0 | -1438 | 38203 | 21141 | 26246 | 34953 | -8812 | 407648 | 37241868 | 469656 | 10946 | 12611 |
| 1981 | 35980 | 0 | -1411 | 37944 | 20795 | 28632 | 34953 | -8812 | 412474 | 37636201 | 460002 | 10 959 | 12222 |
| 1982 | 36390 | 639 | -1427 | 37939 | 21484 | 31018 | 34953 | -8812 | 416244 | 37844910 | 462375 | 10 999 | 12218 |
| 1983 | 37060 | 647 | -1453 | 37532 | 21393 | 33404 | 34953 | -8812 | 418551 | 38040699 | 469330 | 11 003 | 12338 |
| 1984 | 37722 | 647 | -1426 | 38509 | 21195 | 35790 | 34953 | -8812 | 417444 | 38204159 | 475948 | 10 927 | 12458 |
| 1985 | 38307 | 647 | -1458 | 39261 | 21872 | 38176 | -115 | -8368 | 419364 | 38352991 | 486003 | 10 934 | 12672 |
| 1986 | 40358 | 647 | -1502 | 41165 | 21121 | 40562 | -115 | -8368 | 419046 | 38484642 | 511418 | $10\ 889$ | 13289 |
| 1987 | 42878 | 647 | -1618 | 42581 | 21595 | 42880 | -115 | -8368 | 424084 | 38586591 | 543367 | 10,990 | 14082 |
| 1988 | 45441 | 647 | -1730 | 43845 | 22973 | 45129 | -115 | -8368 | 430664 | 38675049 | 577016 | 11 135 | 14920 |
| 1989 | 47727 | 918 | -1723 | 48572 | 26693 | 47310 | -115 | -8368 | 429572 | 38756648 | 605462 | 11 084 | 15622 |
| 1990 | 49788 | 918 | -1569 | 47081 | 24511 | 48979 | 33315 | -12776 | 444733 | 38826297 | 631938 | 11 454 | 16276 |
| * NOTA. IS SOURCE: 0 | SEW/ capita <i>i</i> D'Mahony et | and GDP/ C al. (2018). | apita in €201 | 10, all other 1 | monetary ite | ms in millio | n €2010. | | | | | | |

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ITEMS O TO AB IN THE INDEX OF SUSTAINABLE ECONOMIC WELFARE FOR SPAIN FROM 1970 TO 2012 IN MILLION 2010€ FROM O'MAHONY ET AL. (2018)

| A | 0 | 0 | R | s | T | n | v | M | X | Y | z | AA | AB |
|-------------------------|------------------------------|------------------------------|-------------------------------------|---------------------|-------------------|--------------------|--------------------------|-----------------------------|----------------|-----------------|---------|------------------|-----------------|
| Year | Air pollution | Wet- lands | Gain/loss agricultu- ral land | Energy depletion | Climate change | Ozone depletion | Net capital growth | Invest- ment position | Total ISE W | Popula- tion | GDP | ISEW/ capita* | GDP/ capita* |
| | I | + | -/+ | I | I | I | + | + | | | | | |
| 1991 | 50896 | 918 | -442 | 49248 | 26141 | 50769 | 33315 | -12776 | 448709 | 38874573 | 654144 | 11542 | 16827 |
| 1992 | 51059 | 918 | -366 | 50837 | 27958 | 52944 | 33315 | -12776 | 450565 | 39003524 | 665115 | 11552 | 17053 |
| 1993 | 48741 | 1042 | -349 | 48491 | 27500 | 54866 | 33315 | -12776 | 452228 | 39131966 | 658057 | 11556 | 16816 |
| 1994 | 49064 | 1233 | -147 | 51291 | 29436 | 56191 | 33315 | -12776 | 443878 | 39246833 | 668344 | 11310 | 17029 |
| 1995 | 46941 | 1233 | -149 | 55601 | 31914 | 56576 | -5773 | -26440 | 470089 | 39343100 | 688469 | 11948 | 17499 |
| 1996 | 44968 | 1235 | -417 | 54222 | 30884 | 56959 | -5773 | -26440 | 482129 | 39430933 | 706285 | 12227 | 17912 |
| 1997 | 45919 | 1235 | -467 | 58275 | 33090 | 57413 | -5773 | -26440 | 461439 | 39525438 | 735296 | 11674 | 18603 |
| 1998 | 44654 | 1235 | 3930 | 61021 | 34607 | 57807 | -5773 | -26440 | 464481 | 39639388 | 772224 | 11718 | 19481 |
| 1999 | 44723 | 1235 | 4279 | 64511 | 38638 | 58220 | -5773 | -26440 | 466370 | 39802827 | 809650 | 11717 | 20342 |
| 2000 | 43634 | 1235 | 4422 | 67486 | 41181 | 58604 | 66697 | -60754 | 477119 | 40049708 | 851183 | 11913 | 21253 |
| 2001 | 42407 | 1235 | -6056 | 68642 | 41721 | 59088 | 66697 | -60754 | 486596 | 40476723 | 889416 | 12022 | 21974 |
| 2002 | 43028 | 1318 | -6243 | 71408 | 45364 | 59547 | 66697 | -60754 | 509492 | 41035278 | 924336 | 12416 | 22525 |
| 2003 | 41097 | 1304 | -6457 | 72927 | 47282 | 59894 | 66697 | -60754 | 533995 | 41827838 | 961937 | 12766 | 22998 |
| 2004 | 41318 | 1304 | -1086 | 76970 | 50569 | 60205 | 66697 | -60754 | 554972 | 42547451 | 1000911 | 13044 | 23525 |
| 2005 | 40215 | 1304 | -1131 | 78673 | 54034 | 60459 | 82749 | -115832 | 569765 | 43296338 | 1046007 | 13160 | 24159 |
| 2006 | 38574 | 1304 | 311 | 78186 | 53732 | 60669 | 82749 | -115832 | 601034 | 44009971 | 1094536 | 13657 | 24870 |
| 2007 | 37668 | 1588 | 322 | 79260 | 55706 | 60765 | 82749 | -115832 | 625527 | 44784666 | 1141805 | 13967 | 25495 |
| 2008 | 29564 | 1605 | -9461 | 76194 | 51881 | 60857 | 82749 | -115832 | 640103 | 45668939 | 1133024 | 14016 | 24810 |
| 2009 | 26881 | 1707 | -9048 | 68028 | 46321 | 60958 | 82749 | -115832 | 645010 | 46239273 | 1098454 | 13949 | 23756 |
| 2010 | 25623 | 1605 | -8632 | 66634 | 44964 | 61053 | -22889 | 9444 | 647106 | 46486619 | 1080913 | 13920 | 23252 |
| 2011 | 25575 | 1707 | -4451 | 66268 | 45862 | 61144 | -22889 | 9444 | 644667 | 46667174 | 1041847 | 13814 | 25575 |
| 2012 | 24513 | 1707 | -4215 | 65485 | 45968 | 61230 | -22889 | 9444 | 631972 | 46818219 | 998065 | 13498 | 24513 |
| * ISEW/cal SOURCE: (| oita and GDP. D'Mahony et | //Capita in € al. (2018). | €2010, all oth | er monetary | items in mil | lion €2010. | | | | | | | |