

ANALYSIS

The index of sustainable economic welfare (ISEW) as an alternative to GDP in measuring economic welfare.¹ The results of the Austrian (revised) ISEW calculation 1955–1992

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Abstract

Although the inadequacy of GDP to measure economic welfare is widely accepted theoretically, it is still used as the key indicator for economic policy. This article's aim, therefore, is to give some empirical evidence to the theoretical critique. Economic welfare, or at least its change over time, is estimated by the index of sustainable economic welfare (ISEW), which takes account of GDP, unpaid household labor, social costs, environmental damage and income distribution. The concept of the ISEW, which was originally developed by Herman Daly and John Cobb, is entirely reformulated with special regard to questions of inner consistency and clarity in structure. As an illustration the methods of the calculation in the Austria case study and its results are presented. The main result is that GDP and economic welfare as measured by the ISEW differ significantly. Up until the 1970s GDP only slightly overestimated the growth of economic welfare, but since then it has been completely misleading. While GDP continues to rise, sustainable economic welfare has been stagnating since the middle of the 1980s. The main causes have been growing future welfare reductions, increasing income inequality and a stagnation in the value of unpaid household labor. As GDP neglects those aspects, it systematically misinterprets economic welfare. However, the ISEW does not intend to simply replace GDP as a unique welfare measure but should form part of a more holistic social reporting system.

Keywords: Economic welfare; Sustainability; Austria

1. Introduction

There is a strange paradox in the interpretation of GDP. Hardly anyone would argue explicitly that GDP measures economic welfare, but everyone is using it in a way as if it did. Economists and statisticians would probably agree that GDP mea-

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asures the kind of economic activity which is allocated by markets. Nevertheless, as a glance in any newspaper will assure us, in economic policy it still plays the key role and if we want to compare two countries, we will immediately rely on per-capita GDP.

Since the 1970s, when the gap between economic growth and quality of life began to widen, criticism against GDP as the most important economic indicator has been growing. This critique has reached a new climax in the latest report of the Club of Rome (Dieren, 1995) which presents new measures of economic welfare and the quality of environment, and calls for a redirection of economy. The critique against GDP as a measure of welfare is as old as GDP itself, ranging from Boulding in the 1950s up to Daly in the 1970's. Statistical offices are responding slowly, but with the latest revision of the system of national accounts (SNA), the UN is aiming at a system of integrated environmental and economic accounting (SEEA). Important writings on the critique of GDP and proposals for the revision of the SNA include those of Boulding, Daly and El Serafy.²

In this article we present the index of sustainable economic welfare (ISEW), which tries to describe the change of sustainable economic welfare over time. It is our aim to show that GDP is definitely an unsatisfactory indicator for economic welfare and, by applying the ISEW to Austria for the period from 1955 to 1992, to provide an empirical basis for this critique. The ISEW is designed to grasp those aspects of economic welfare neglected by the SNA.

The first part of this article discusses the concept of the ISEW, starting with some general questions about the measurement of economic welfare and the development of the ISEW. After the concept itself, consisting of three steps, the problem of monetization of environmental damage and the concept of potential defensive cost are discussed. The main differences between the revised ISEW and the original one will then be pointed out. Finally, the different approaches of the SEEA and the ISEW are contrasted. The second part of this article presents

the calculation of the ISEW for Austria and a summary of its results. The article concludes by summarizing criticisms against the ISEW with respect to the question of how (and if) they can be incorporated into the ISEW-framework.

2. How to measure economic welfare

At a general level it is not too difficult to lay down several conditions a measure of economic welfare³ should fulfil. Besides including 'classical' material welfare as described by SNA, we can identify the following aspects that should be considered:

- non-market production,
- various parts of production that are not disposable for consumption, but are needed to repair damages caused by the economic system itself (defensive costs),
- environmental damage (that is not 'repaired'),
- the reduction of future welfare caused by production/consumption today,
- the effort required to obtain this welfare, e.g., the duration and intensity of work,
- the question of (income) distribution.

Of course, there is no single way to calculate economic welfare (at least given the actual state of discussion). The ISEW is therefore just one such attempt, albeit, as we think, a promising one. It never seems clear whether economic welfare should be measured by a single indicator or whether a group of indicators would be more accurate. However, the discussion of social indicators of the 1970s showed that a problem with using multiple indicators was in its interpretation when the individual indicators themselves move in opposite directions. So the research turned back to one-dimensional indicators, the ISEW being one such example. Nevertheless, it should be stated clearly that a one-dimensional indicator can only give a rough estimate of the development of economic welfare. For more detailed reports,

² For a comprehensive overview of the discussion see Leipert (1989, p. 61ff); for a summary of critiques see Rubik (1985); for a summary of the SEEA, see Lutz (1993, ch. 4, 5).

³ The term economic welfare originates from Pigou (1952) who distinguished between general welfare, economic welfare and national income. In German there is the term, 'Wohlstand', signifying economic welfare, and the more general, 'Wohlfahrt', equally to general welfare.

especially concerning environmental quality, multi-dimensional reporting systems are necessary.⁴

The history of one-dimensional welfare measures already contains several (empirical) studies, starting with Nordhaus and Tobin (1972), who paid particular attention to the evaluation of leisure time and argued in favor of the GDP as a measure of welfare. Next came Zolotas (1981) 'Economic Aspects of Welfare', which was the first attempt to calculate an alternative measure of welfare which took pollution into consideration. The ISEW, developed by Herman Daly, John Cobb and Clifford Cobb, built upon both of the previous works, encompassed some 23 columns and covered the years from 1950 to 1987. It was first published as an Appendix to Daly and Cobb's 'For the Common Good' in 1989. The idea of the ISEW stimulated great interest in Europe. Since 1989, ISEW calculations have been presented for Germany (Diefenbacher, 1991), Great Britain (Jackson and Marks, 1994) and (in a reduced form) for Scotland. Calculations for Denmark and the Netherlands are in preparation. All of the above follow the initial ISEW quite closely. At the same time, the discussion on the ISEW continues. In 1994 Cobb and Cobb (1994) edited 'The Green National Product' which included critical comments by various economists and a second version of the ISEW. In the meantime Cobb renamed the ISEW to the Genuine Progress Indicator (GPI) involving several major changes (Cobb and Halstead, 1994). For the Austrian case study the ISEW was revised and entirely reformulated, stressing the inner consistency and clarity of what is to be measured by the ISEW as a whole as well as by particular items.⁵ The main differences will be explained in the section below. The following presentation of the ISEW refers only to the Austrian revised ISEW.

2.1. The concept of the ISEW

The calculation of the ISEW consists of three steps (see Table 1). First the *consumption base* is calculated. It measures what could be consumed, given the actual extent of production. So it consists of market and non-market consumption. The components of this are similar to those in the SNA. Public consumption is taken directly, private consumption with slight modifications (for consumer durables) and investment with somewhat larger modifications. The modifications to the latter two items are necessary to make meaningful assertions about actual economic welfare. Only the value of unpaid household labor is not found in the SNA and has to be estimated autonomously.

In the second step the *subtraction items* are estimated. They consist of either economic activities that do not genuinely contribute to economic welfare ('defensive costs'), but are required to maintain the standard of welfare, or future reductions that will be caused by today's production or consumption. The first group includes defensive costs of environmental as well as of social nature. Because of accounting difficulties, defensive health costs are indicated separately. In the second group only future costs related to the greenhouse effect and resource depletion are reckoned.

Two remarks on this step seem to be necessary. First the two groups, defensive cost and future welfare reductions, differ widely in meaning and nature. The former are expenditures that have actually occurred and are classified as not 'welfare-bearing' due to a systematic bias in the economic social system. The typical example for defensive costs is filters, which would not be necessary if production did not cause pollution in the first place. The latter are costs that will probably arise normally without any exact knowledge available as to when they will occur and in what magnitude. Conservative estimates are used throughout the whole calculation. Secondly, the monetary value given to the subtraction items has to be seen as distinct from the phenomenon it stands for. That is, while the environmental damage itself is a multidimensional, complex ecological and social phenomenon, the defensive costs are merely the monetary equivalent of the reaction to the environmental damage.

⁴ For a more detailed discussion on the question of requirements on environmental reporting systems, see the chapter of Ulrike Tappeiner in Holub et al. (1994).

⁵ In October, 1994, a workshop on the ISEW took place in Heidelberg (Germany). A report containing summaries of the different case studies and discussion of methodological and conceptual questions is planned. This would also include a lengthy presentation of the revised ISEW for Austria.

The consumption base minus the subtraction items yields the provisional result, which might also be referred to as raw-ISEW. In the third step this provisional result is weighted by an index for the inequality in the distribution of income and labor. To calculate income inequality, the income differences between workers and employers, men and women, and employed and unemployed are each divided by the average income and weighted by the share of the group concerned. The calculation of the Gini-coefficient of personal income distribution, clearly a more elegant way, was not possible due to lack of data. In measuring the inequality in work distribution, only the unequal distribution of paid and unpaid work, e.g., wage work and household work, between men and women is taken into consideration. The result of the raw-ISEW multiplied by this distributional index renders the ISEW.

Some criticisms arise immediately. What should be measured by the ISEW is the social and sustainable economic welfare, given the actual structure of society and technology. In fact the ISEW measures market and non-market production minus those parts of production that

- are not disposable for consumption due to the need to repair damages caused by the economic system itself,
- will not be obtained in the future,

- cannot be socially realized due to unequal distribution of income (and work).

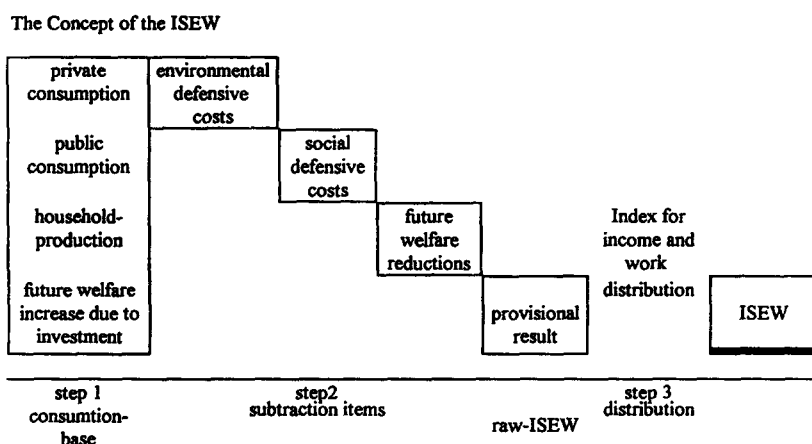
This clearly is not sustainable economic welfare, but only a first proxy, or to be more precise, a conservative estimate of it, which means that it is unlikely to overestimate sustainable economic welfare.

The ISEW follows Hicks (1948, p. 172) in defining 'a man's income as the maximum value which he can consume during a week, and still expect to be as well off in the future', but also goes further. Not only are estimates of future income losses subtracted, but subtractions are also made for expenditures that do not genuinely generate welfare (defensive costs), and the distribution of income and work is regarded as a part of sustainable economic welfare. This, of course, implies a value judgement which we think is unavoidable in measuring social welfare. The ISEW is committed to the idea of an environmentally sustainable economic development as well as to social justice. Despite its different interpretations, these are values put forward by the concept of sustainable development (WCED, 1987; Harborth, 1991).

2.2. Environmental damage and its monetization

There are different kinds of costs resulting environmental damage (e.g., income loss, loss of assets,

Table 1
The concept of the ISEW



damage that does not lead to any monetary flows, etc.) and many different ways to measure them (e.g., avoidance costs, restoration costs, willingness-to-pay method, etc.). The technique of monetization can cut in both ways; it may lead us to realize the necessity of environmental conservation as well as to a misunderstanding of eco-systems and a systematic underestimation of environmental damage (see Behrens-Egge, 1991). Since it implies expressing non-monetary phenomena in monetary terms, it usually implies a loss of information. A complex phenomenon is reduced to just one dimension. Besides, it can give one the illusion that everything is exchangeable for money, which is obviously not correct. Although it might be true that there is an amount of money to satisfy any type of damage, it is hardly ever possible to restore the original situation because eco-systems are often unique and damages irreversible.

Therefore one has to be quite careful with the use of monetization. Within the ISEW, monetization fulfils a distinct task. Its aim is to estimate the long-run development of economic welfare. For example, we do not intend to measure or describe the damage due to air pollution itself, but the economic aspect of it. To express these costs we used actual or potential defensive costs. Defensive expenditures are expenditures that occur because the economic (or social) system has led to certain damages that have to be repaired or it requires some activities to be sustained.⁶ The classical example is filters (so called end-of-pipe technologies) to reduce the emission of pollutants. They would not be necessary if there were no plants causing pollution. There are three important things to mention about these defensive costs. First, they are costs that actually occur (or have occurred) in monetary terms (quite contrary to other concepts, i.e., avoidance costs). Second, they do not measure the damage itself but a reaction to

this damage. Third, they do not directly relate to welfare. Low defensive expenditures can be caused by either a low social awareness of environmental problems or a low level of pollution. (Leipert, 1989, pp. 117–123; Bayer, 1992).

In order to be used for measuring economic welfare the concept of defensive costs had to be further developed. For a couple of ISEW-items we used *potential defensive costs*, which we defined as those costs that would have occurred if society had reacted to environmental devaluation in the same way (concerning one 'unit of pollution') as it reacts today.⁷ As noted above the problem with the (actual) defensive costs is that they do not have a straightforward interpretation if a society's responsiveness to environmental damage changes. The aim of potential defensive costs is precisely to keep this responsiveness constant. Hence potential defensive costs give a consistent estimation of loss in economic welfare as they depart from actual expenditures, and use physical indicators to reconstruct past welfare losses. Further, the estimate is conservative as its 'pricing' of environmental damage is based on expenditures that actually occurred. Consider air pollution as an example. We had an estimation of defensive costs in one year (1987) and emission data for the whole period (1955–1992). So we calculated defensive expenditures per unit of pollution for 1987 to produce our time series of potential defensive costs by multiplying this amount by the pollution units of each year.⁸ A 'unit of pollution' is here defined as a bundle of SO₂, CO, NO_x, particles and VOCs, the weights of which are derived from the inverse of the threshold levels of the Austrian smog alarm plan.

2.3. The major changes of the revised ISEW

As already mentioned, this reformulation of the ISEW contains some major changes (and several

⁶ The key work concerning defensive costs is Leipert (1986). Leipert does not only deal with environmental defensive costs, but also social defensive cost. His central empirical finding is that defensive expenditures are growing at a much greater speed than GDP. Bayer (1992) has presented a detailed analysis of environmental defensive costs for Austria. While Bayer substantiates defensive costs within neoclassical analysis of external effects, Leipert's theoretical basis is to be found in a more institutionalist analysis, going back to Kapp (1950). For definition and conceptual questions, see Leipert (1989, p. 110), or Bayer (1992).

⁷ Only in one item do we depart from this definition. In 'costs of noise pollution' avoidance costs are calculated as potential defensive costs because otherwise the order of magnitude would be thoroughly misleading.

⁸ An assumption implicitly made here is that the pollutants cause damage in a linear way, i.e., to double the emissions means doubling the damage. This assumption is clearly not correct, but as we do not have information available on the precise functional form, we consider it valid as a first approximation.

minor ones) compared to the ISEW originally developed by Daly and Cobb. Further, each ISEW country study has involved some changes in methodology, sometimes for theoretical reasons, other times due to differences in data availability. Therefore the major differences between the revised Austrian ISEW and the original one presented by Cobb (1989) will be briefly described.

The first major change is the rearrangement and ordering of the numerous items ('columns') of the ISEW. They are grouped under the headings consumption base, subtraction items and distribution index, as presented above. Daly and Cobb, in contrast, gave no explicit groupings of their items and argued each of them individually. The new structure is first of all a clearer method of presentation, but it also facilitates the interpretation of particular items and the detection of inconsistencies or omissions within the ISEW framework.

2.3.1. Consistency

One of our major aims was to make the ISEW more consistent. This at first sight trivial demand is difficult to fulfill within a framework as complex as the ISEW. The following requirements have to be met:

Requirement I (R I): A clear distinction between stocks and flows should be made (see also Jespersen, 1994) and only flows can enter the ISEW calculation.

(R II): Only something counted positively in the first place can be subtracted afterwards. This puts restrictions on the calculations of environmental damages.

(R III): All subtraction items within one field should be methodically calculated in an analogous way.

2.3.2. Estimates for the welfare losses within environmental items

According to the requirement of consistency, the willingness to pay method is not suitable for subtraction items since it includes consumer rent and therefore cannot be subtracted from a magnitude given in market prices (R II). Furthermore, losses in production and income are already reflected in the consumption base, hence should not be subtracted. Losses in assets (e.g., value of land) is not compati-

ble (R I) with the consumption base. According to (R III) we developed the concept of potential defensive cost, explained above. Daly and Cobb (1989) did not pay attention to these problems and included, for example, reduction in property values and income losses in the estimate for air pollution and consumer surplus in the one of losses of wetland.

2.3.3. Increase in future consumption due to an expansion of capital stock

Daly and Cobb (1989, p. 402), in discussion of Nordhaus and Tobin (1972), add a population adjusted measure of net capital growth. In the revised ISEW, according to (R I), net capital growth is multiplied by capital productivity since the item's aim is to indicate future consumption, not growth in assets.

2.3.4. Public consumption

Daly and Cobb did not add public consumption as such in their indicator. As there are no a priori reasons why public consumption (i.e., mostly services offered by the state) should be more or less welfare-bearing than private consumption, it is treated, according to (R III), as private consumption: It is tallied positively first, after which identified defensive costs are subtracted.

2.3.5. Distribution of economic welfare

Daly and Cobb (1989, p. 417) only take income distribution into consideration and then use it only to weight private consumption. In the revised ISEW we depart in two ways from this treatment of distributional inequality. First, the revised ISEW takes not only the distribution of income, but also that of work effort, into account. For simplicity only the main division of work into paid (wage labor) and unpaid (household labor), the first mainly performed by men, the second almost exclusively by women, (Bennholdt-Thomsen, 1988) is taken into consideration. Second, not only the private consumption, but the whole raw-ISEW is weighted by the distribution index since it does not seem reasonable to subtract full defensive costs from a weighted private consumption (R II). Theoretically each item should be weighted with an index indicating its specific distributional effects — an unrealistic task for the moment. Interpreting the distribution of income and

work effort as an indicator of the overall distribution of economic welfare, it can be seen as a first proxy to weight the whole raw-ISEW.

2.3.6. *Theoretical basis*

Daly and Cobb (1989) are rather ambiguous on their underlying theoretical assumptions, using 'a mixture of rather mainstream market analysis combined with a holistic macro theory' (Jespersen, 1994, p. 2). Hochreiter et al. (1995) insist that the ISEW is not bound to a special economic paradigm: It can be founded in neoclassical economics as well as in Marxian or Neoricardian economics. For illustration, consider private consumption which is valued by market prices. For neoclassical economists market prices are derived from marginal utility, thus market prices can give a minimum value of the utility, and welfare is understood simply as the aggregate of the individual utility levels. For Marxian/Neoricardian economists market prices rather stand for abstract labor necessary to produce these commodities. Market prices in this interpretation do not measure economic welfare directly, but the effort to produce it. As the commodities sold have use value (otherwise they would not have been bought), more products can be interpreted as more economic welfare.

2.4. *The ISEW and the SEEA*

With the latest revision of the SNA (system of national accounts) the UN also proposed the SEEA (system of integrated environmental and economic accounting) which provides a framework to compile environmental data, be it physical and monetary, in a form consistent with the SNA structure. This 'satellite approach' towards environmental accounting was developed by the UN statistical division and the Worldbank jointly (Lutz, 1993), and pioneered by two country studies, on Mexico (van Tongeren et al., 1993) and Papua New Guinea (Bartelmus et al., 1993). Within the SEEA two measures are given that allow the calculation of what is called the 'environmentally adjusted net domestic product' (EDP). The first is depletion of natural resources, the second (imputed) environmental costs. The imputation follows the restoration/avoidance cost approach.

The ISEW and SEEA are partly complementary and partly in conflict. As far as the SEEA provides a

framework to organize data, its implementation would allow a better data base for the calculation of indicators such as the ISEW. However, in another respect they have quite different aims. First, as a satellite system, the SEEA tries to add environmental aspects to the SNA. Second, with the EDP it provides an environmentally adjusted version of GDP. The ISEW's aim is much more radical: It questions GDP and the social philosophy equating GDP growth with increasing welfare. The ISEW goes much further than EDP in that it does not only take depletion and environmental costs, but also social costs, future costs and distributional issues into account. Therefore the ISEW is not restricted to environmental questions.

The SEEA has with its narrower scope undoubtedly reached higher degrees of sophistication concerning its inner structure. But it shares with the ISEW the problem of monetization of environmental costs. The restoration/avoidance cost approach is similar, though not identical, to our potential defensive costs, and no less ambiguous. It lies in the very nature of the subject that monetization of environmental damage requires ad hoc assumptions that are at best plausible, but in fact always arbitrary.

3. *The calculation of the ISEW for Austria 1955–1992*

This section presents a survey of each item of the ISEW calculation. As we do not expect the reader to be primarily interested in the Austrian data situation, rather in how the ISEW tries to measure economic welfare, the presentation focuses on methodological questions. Complaints about insufficient data availability are generally omitted. For a fully detailed presentation where sources are given extensively, see Hochreiter et al. (1995).

The presentation follows the three steps explained above. Each item is briefly explained and the empirical results of each step are summarized. Afterwards the development of the ISEW and GDP are compared.

3.1. *Step 1: The consumption base*

The consumption base measures possible consumption. It mainly consists of private consumption,

public consumption and the value of unpaid household labor. In addition some corrections are made in order to get magnitudes measuring actual consumption. Within this section the problem of monetization is of minor importance because all items except household labor are already in monetary terms.

3.1.1. Private consumption and consumer durables

Private consumption, taken directly from the SNA, includes all consumption goods consumed by private households. Just one major change was made. To reflect the actual use of consumer durables and not the act of buying them, the expenditures for consumer durables were subtracted and a flow from the stock of consumer durables, analogous to the treatment of depreciation (20%) of investment goods, was added.

3.1.2. Public consumption

The item for public consumption is taken from the SNA. Here we also face the problem of how it is calculated. There are no market prices for public goods, and they are calculated by their production costs. (So we implicitly assume that all public production is at least worth its costs.)

3.1.3. The value of unpaid household labor

Although the contribution of household labor to welfare is undisputed, its measurement raises some problems. There are, roughly speaking, three methods of calculation: (i) pricing the outputs (goods and services) of household labor by market prices, or pricing the inputs (especially labor) by either (ii) opportunity costs or (iii) market prices. The feminist critique on this point should be mentioned. Each of these methods treats household labor as if it were paid and therefore neglects its specificity as a social relation. Contrary to the wage relation, household labor is not paid and is almost exclusively done by women. Both arguments are correct and are partly considered in our treatment of distribution. For reasons of data availability we chose the third method, i.e., the average wage of a janitor was used to weight the hours worked, which also provides a rather low (conservative) estimate. The major problem was that data concerning the time worked in the household only exists for 1969, 1977 and 1981, which made intrapolations for a quite long range of years necessary.

3.1.4. Increase in future consumption due to net capital growth

As the ISEW is not intended to measure economic wealth (which would include assets), but economic welfare — operationalized as disposable sustainable consumption — the increase in net capital stock has to be converted to consumption.⁹ This is done by a multiplication of the change in net capital stock times the productivity of capital. The result gives a rough estimate of future consumption.

This conversion of capital stock to a flow magnitude compatible with consumption implies that for reasons of consistency all items including investments have to be converted in an analogous way.

3.1.5. Current account ('welfare from abroad')¹⁰

Following textbook economics, a surplus of either imports or exports cannot be sustained in the long run, although in the short run disequilibria in foreign trade do not pose great problems. This means that in order to get sustainable consumption, the long-run current account surplus (i.e., a five-year average) is added (or, if it is a deficit, subtracted).

3.1.6. Services from public infrastructure: Roads

The State offers an infrastructure without a price being paid for it. Therefore an item indicating a flow of services (10% of the capital stock), similar to depreciation of capital stock, is added.

3.1.7. The consumption base – empirical results

As can be seen from Fig. 1, private consumption is the biggest contributor to the consumption base and also develops most dynamically. Unpaid house-

⁹ Wealth, as used here, refers to a stock magnitude, whereas income or consumption is a flow magnitude.

¹⁰ Daly and Cobb (1989, p. 405, 472) add net international (investment) position to measure that part of welfare that is not sustainable due to its finance import. But foreign investment is not per se unsustainable. Once a plant is built, it does not matter anymore where the capital came from. In terms of sustainability, it is not the source of capital, but the kind of investment that is important. On the other hand, long-run deficits in the current account are probably unsustainable. Therefore they are subtracted in the revised ISEW.

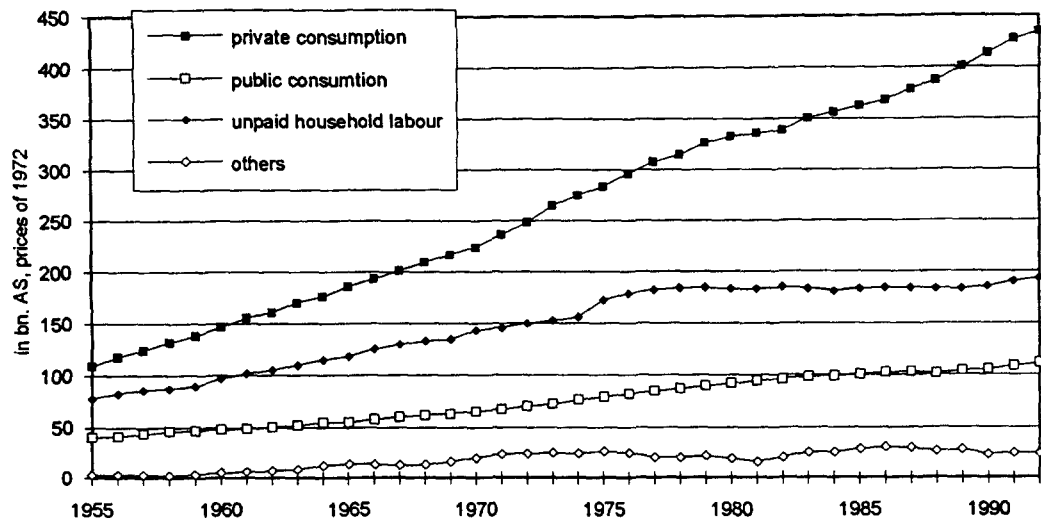


Fig. 1. Composition of the consumption base.

hold labor has grown from the 1950s up to 1979 and has stagnated since then. The jump in 1974/1975 is due to a general shortening in work time, which enters our calculation via a rise of the hourly wages. Public consumption grows in a stable manner, doubling from 1955 to 1992. Public consumption is very sensitive to the price base, as its implicit price index grows faster than consumer price index (CPI) or the GDP-deflator. The value of the other items (increase in capital stock, current account, services of roads) do not amount to a significant sum in the ISEW. Negative values are due to a deficit in the current account, since services from roads and net investment always have been positive.

3.2. Step 2: Subtraction items

3.2.1. Social defensive costs

The items assembled under this title have in common that they all signify expenditures that do not contribute to social welfare, but are necessary to sustain the economic system or repair damages caused by the economic system itself. No costs for human health damages are counted in here. Defensive health expenditures are accounted for separately.

3.2.1.1. Costs of commuting. Expenditures for commuting form part of private consumption. The separation of the place to live from that to work is one

integral feature of modern society. Commuting is a logical consequence of a society that concentrates its production locations. The individual no longer has a choice about whether to commute or not, for he or she cannot change the surrounding conditions. That part of the expenditures for commuting that exceeded the level given by our base year (1955) are thus subtracted.¹¹

3.2.1.2. Costs of auto accidents. The message of this item is not that the repair of cars damaged by accidents does not bring welfare, but that the cause for the accidents is not to be found in individual failure, but in the traffic system as a whole. Rising costs of car accidents primarily reflect the inefficiency of the system of individual traffic. Again the costs of auto accidents that exceed the level given by the base year are subtracted.

3.2.1.3. Costs of urbanization. The process of centralization and urbanization leads to a rise in prices of sites and, consequently, rental payments which do

¹¹ If not indicated differently, the base year, or initial year, refers to 1955, the first year of the study. The comparison to the initial year does not necessarily imply that the value of that year was sustainable, but that a further increase in the amount of that item is not contributing to economic welfare.

not reflect increased welfare but increased scarcity. Due to lack of data, this item, while theoretically valid, was not considered in the Austrian case study.

3.2.1.4. Costs of advertising. Advertising seems to be largely defensive in a competitive economy. Each firm has to keep its advertisements up to the level of its competitors. Not knowing the extent to which advertising actually transports information, 50% of advertisement spending was subtracted as defensive.

3.2.2. Environmental defensive costs

As the general questions concerning monetization and defensive costs have already been discussed, we will only concentrate on more concrete problems here. In the many studies of monetization, one major problem is lack of appropriate data. It was often necessary to choose second best methods of monetization or other estimations because the best one was impossible. The applied methods therefore strongly depend on available data. All calculations rely heavily on data made available by UBA (Umweltbundesamt, Federal Environment Agency Austria), ÖSTAT (Österreichisches Statistisches Zentralamt) and BMU (Bundesministerium für Umwelt, Austrian Ministry for Environmental Affairs). Their publications are numerous, but relatively easy to access. To save space they are not mentioned. Hence only sources other than these which were of crucial importance to our calculations are referred to explicitly.

3.2.2.1. Costs of unsustainable cultivation of soil.

The output possible in a sustainable agriculture which is characterized by low inputs in energy, artificial fertilizers, pesticides, etc, is unknown due to theoretical problems and data gaps. As Austrian agriculture is widely regarded as sustainable in the years after World War II, the expenditures for fertilizers and herbicides exceeding the level of the initial year (1955) were subtracted. Detailed data on the intermediate demand of the agricultural sector was extracted from the SNA.

3.2.2.2. Loss of natural areas. The destruction of natural areas, especially wetlands, and, closely connected to it, the extinction of species, is in general an irreversible process. These areas are used for building plants, houses, or streets, or for agricultural use.

A price stemming from the political process, namely an amount (about \$7) used in negotiations between the land (local government) and the electricity company, was used to estimate a value for these losses. According to the data available (ÖBIG, 1989), natural areas were classified as 'of regional importance', 'of national importance' and 'of international importance'. The first was weighted by only half the amount mentioned, the latter two with the entire one.

3.2.2.3. Costs of air pollution. The emission of pollutants causes damage to buildings and agricultural production. As described above, the defensive costs of one year (1987, see Fischer-Kowalski, 1991) were used to calculate potential defensive costs according to the emission of pollutants. Sulfur oxides, carbon monoxide, nitrous oxides, particles and VOC were considered and weighted according to the threshold levels of Austrian smog alarm plans. Emission data from 1955 to 1980 (in five-year steps) was found in Hackl, 1987 and Mylona, 1993. More recent data was made available by UBA.

3.2.2.4. Costs of water pollution. Once again the defensive costs for one year (1988, see Lichtenegger, 1991) were estimated and taken as a base for the back-calculation of potential defensive costs. As no emission data were available, the gross production values (GPV) of the main polluting sectors (paper and chemical industries) and physical indicators for agriculture and households, were used for the construction of the time series. According to the sectors' investment in wastewater treatment, these time series were weighted with coefficients of 1 to 1.5. The share of the polluting industries was known for 1987 from the UBA.

3.2.2.5. Costs of noise pollution. This section was the only one where avoidance costs were used as potential defensive costs because the loss due to noise is obvious and immense, especially in cities. Therefore the number of people burdened strongly or very strongly by noise multiplied by the costs for noise protection windows (e.g., double-glazing) yields our subtraction item. The number of people disturbed was extracted from a standardized census of the Austrian statistical office (ÖSTAT). Data was available in 3-year intervals starting from 1970.

3.2.3. Defensive health expenditures

The following item is a hybrid of environmental and social defensive expenditures because it is impossible to relate it to particular items.

3.2.3.1. Defensive health expenditures. As a rough (and undoubtedly unsatisfactory) estimation, a constant share (50%) of health expenditures was interpreted as defensive.

3.2.4. Future reduction of economic welfare

Today's welfare, or more precisely its production, will reduce that of the future. Due to technical problems within the ISEW, only two kinds of future losses are taken into account, those caused by the depletion of non-renewable resources and those caused by the global warming. Therefore the real costs of today's mode of production are largely underestimated.

3.2.4.1. Depletion of non-renewable resources.

Non-renewable resources, as their name indicates, can only be exploited once. Therefore, the value added of the mining sector was subtracted. El Serafy's objection against this depreciation approach is that capital stocks to substitute for these resources can be built up from the revenues of non-renewable resources. While this holds true theoretically, there

have been no empirically relevant attempts to develop such technologies that would justify a different treatment of this position.

3.2.4.2. Long-term environmental damage: The greenhouse effect. Despite the fact that human CO₂ emissions will have a significant influence on future global climate, there is no consensus about either the exact physical impact or the economic consequences of this climate change. For our calculations we referred to estimations of the report of Hohmeyer (1992) to the European Commission, using his lowest estimate (which implies a complete fulfillment of the Toronto Treaty). In order to obtain an undoubtedly conservative value, only half of his value of future costs per ton of CO₂ emitted was taken. This value was connected with Austrian CO₂ emissions since 1900. Since Hohmeyer measured the damages up to the year 2030, the cumulative damage had to be converted to a damage per year to fit in the ISEW framework.

3.2.4.3. Empirical results. As can be seen from Fig. 2, defensive and future costs add up to about the same amount, the future reductions increasing more rapidly in the 1980s. Among the defensive costs, social and health show a similar development, growing from some 3 or 4 bn. Austrian Schilling (AS) to

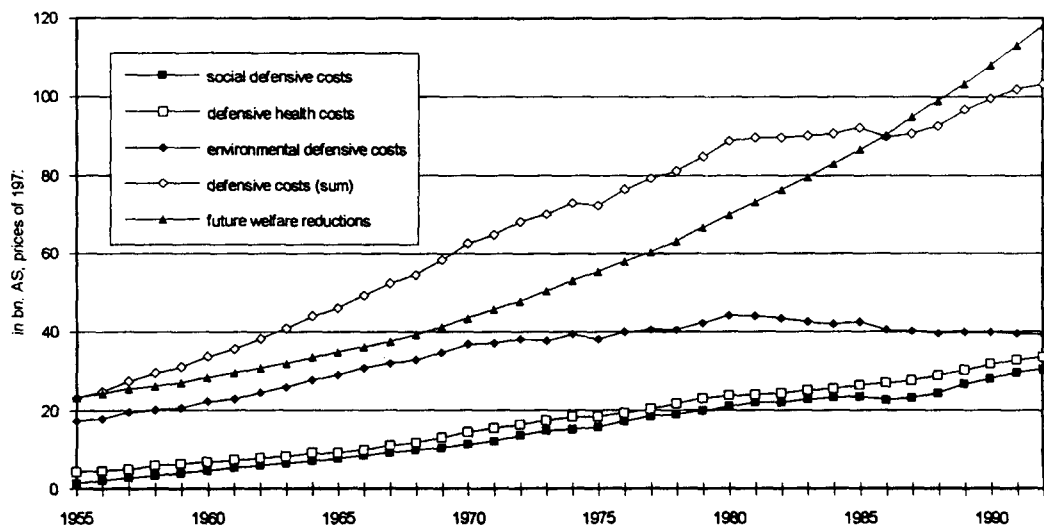


Fig. 2. Composition of the subtraction items.

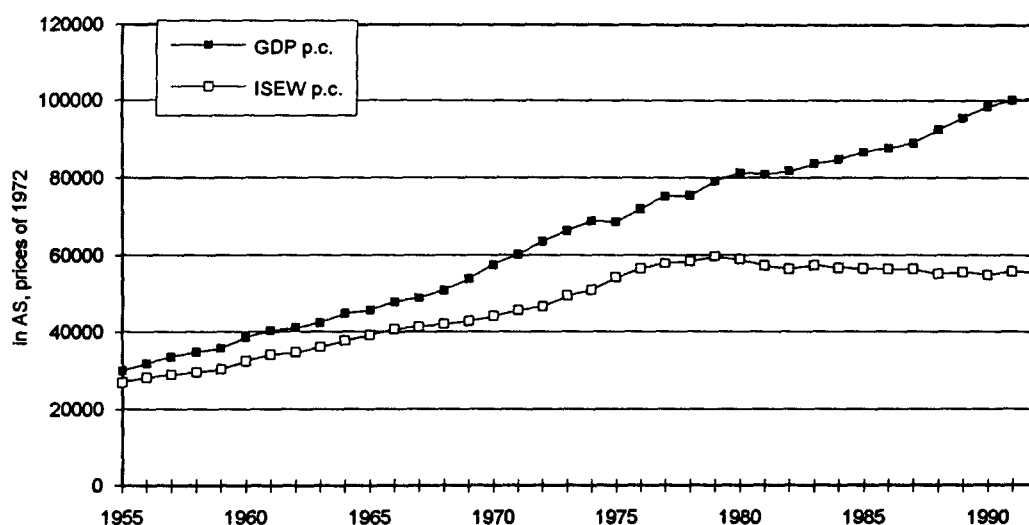


Fig. 3. GDP and ISEW per capita.

about 30, whereas the environmental defensive costs rise from 20 bn. AS in 1955 to reach their peak in 1980 with some 42 bn., and have stagnated at that level since then.

3.3. Step 3: The distribution of welfare

Distribution is an integral part of welfare itself. As we generally reject methodological individualism,¹² we regard welfare as a social phenomenon. It is only possible to speak of social welfare if society as a whole can take part in this welfare. The distribution of economic welfare depends on two factors: The distribution of goods representing the material substance of economic welfare and the distribution of the effort necessary to produce these goods. The first will be referred to as the income distribution and the second as the distribution of work effort. To avoid judgements on the optimal distribution of income and work, only

changes in the distribution relative to the initial year are considered for the ISEW calculation. So the only assumption implied is that a more equal distribution contributes positively to economic welfare.

3.3.1. The distribution of income

The distribution of goods is measured by the distribution of income. In Austria there is no useable data on personal income distribution, so we had to identify three areas of structural income inequality, all of them stemming from social conflicts and interpreted as kinds of discrimination. These kinds of income inequality are: that between workers and employers, that between women and men and that between the unemployed and the employed. Three sub-indices were developed, each measuring the deviation of the income of the discriminated group from the average income, and then weighted by the group's population share.

3.3.2. The distribution of paid and unpaid work effort

The distribution of work effort is too difficult to measure.¹³ We distinguished between two funda-

¹² The critique of methodological individualism can roughly be summarized in the statement that the whole (society) is more than the sum of its parts (individuals), a subject beyond the scope of this paper. For critiques on methodological individualism see Dow (1985), Hodgson (1988) and Pirker (1992). This does not necessarily mean that methodological individualism is inappropriate for all kinds of questions, but as a paradigm underlying general analysis we reject it.

¹³ For an attempt to measure work effort, see Weisskopf et al. (1983).

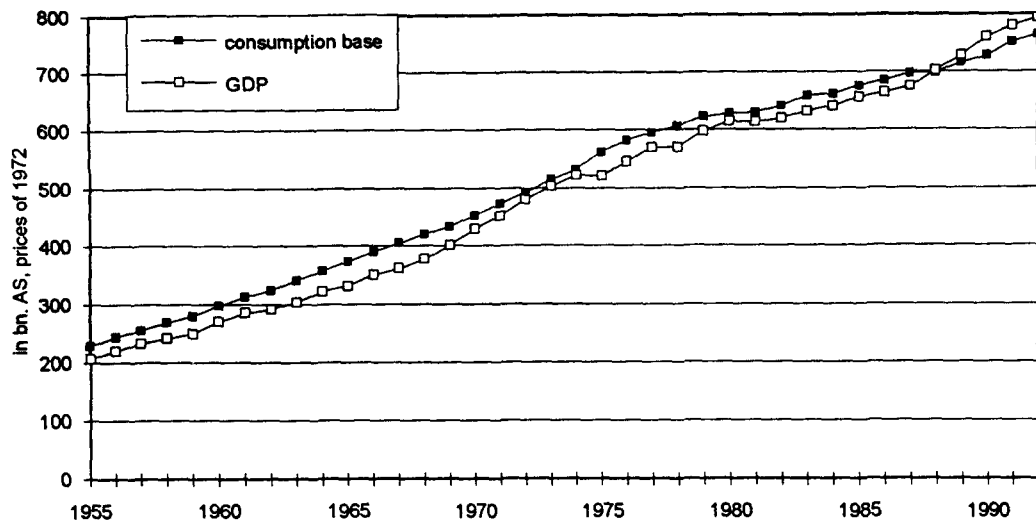


Fig. 4. GDP and the consumption base.

mental kinds of labor: paid labor, i.e., wage-labor, and unpaid labor, mainly household labor, and constructed an indicator measuring the distribution of worked time paid and unpaid between men and women. This reveals a quite dramatic inequality. Wage labor is undertaken roughly 70% by men and 30% by women, whereas household labor is almost entirely (90%) done by women. Nevertheless this hardly influences the ISEW as only changes in distribution enter the calculation, and the distribution of paid and unpaid labor has remained fairly stable (in Austria) over the period 1955–1992.

3.3.3. Empirical results

The distributional inequality index remains stable until the 1980s, when it begins to rise. By 1992 it is at 124 (1955 = 100). This rise is caused by increasing income inequality, mainly between wages and profits. The distribution of work has improved slightly due to increased female participation in wage labor.

3.4. Changes in ISEW and GDP in Austria

The ISEW is a measure of the consumption level that really is at our disposal and can probably be sustained in the future. Furthermore, because conservative estimates are used throughout the subtraction

items, the ISEW is likely to overestimate sustainable economic welfare.

If we compare changes in the ISEW to those of GDP (see Fig. 3), a growing gap can be seen. Up to the 1970s GDP only slightly overestimates the growth of economic welfare, but since then it has been completely misleading. While GDP has continued to rise, sustainable economic welfare has been stagnating. The causes are to be found in a mode of production (and consumption) that endangers future wealth. Today's economic system requires an ever-growing part of production to be sustained or to repair the damages that it produces.¹⁴ Even though a lengthy discussion of the causes of the stagnation of the ISEW in the 1980s is not possible here, three important reasons for the ISEW's recent 'flattening-out' should be mentioned. First, long-term environmental damage has been growing much faster than the ISEW-consumption base in the 1980s. Second, income distribution has worsened during the last decade. Third, there seemingly has been a substitution between household production and private con-

¹⁴ Our findings are in line with those of other studies of similar area, see Leipert (1989); Cobb (1989); Diefenbacher, 1991; Jackson and Marks (1994).

sumption throughout the reported period, a phenomenon often referred to as commodification. While this is a ‘neutral’ change with respect to the ISEW (increase in one item balanced by a decrease in another) it is an unambiguous gain according to GDP because this latter measure implicitly assigns a zero value to household production.

GDP does not measure that part of production which can be consumed and which enhances welfare, rather only production itself. Therefore it is a measure of potential welfare rather than of actual welfare, similar to the ISEW-consumption base. In fact, their trend over time is quite similar (see Fig. 4). This does not mean that GDP, or more generally speaking the SNA, is not useful. But one has to be careful with its interpretation. GDP as a measure of economic activity will remain a useful tool, but it can no longer serve as a main target for economic policy. It does in fact need to be replaced by genuine welfare indicators. The ISEW is only a first step to develop these measures, and it also illustrates the limitations of relying on a one-dimensional indicator. In order to provide meaningful tools for a policy intended to direct society towards solidarity and sustainability, measures of welfare, production, and environmental quality have to be improved. The UN’s SEEA, not challenging the GDP’s central position, goes only a little way down this path.

4. Discussing the ISEW

4.1. Critiques of the ISEW

Although the Austrian revision of the ISEW seems to improve its validity significantly, numerous objections may be raised against it, either theoretical or more technical in nature. As there is, at least to our knowledge, no comprehensive overview on these critiques, the most important of them are summarized below. They are arranged in groups according to the mode of possible incorporation in the ISEW.

The first group contains critiques that can be solved by convention, however sophisticated, since they do not require major changes in the concept of the ISEW itself. It has to be recalled that other accounting systems also rely on convention to ‘solve’ problems, e.g., the treatment of public consumption or deflation in the SNA.

- The most obvious problem is that of data availability. Consequently problems in the calculation of particular items arise.
- Many calculations rely on assumptions that, though plausible, are arbitrary.
- The problem of monetization and valuation of environmental damage remains.
- Not all relevant kinds of future welfare reductions are covered by the ISEW.
- The treatment of distribution is still unsatisfactory. Particularly, the relation to the base year prohibits any meaningful international comparisons.

The problems summarized next have in common that for their incorporation an extensive discussion is necessary, since their inclusion would involve major changes in the ISEW-framework or in what it measures.

- Leisure is not included in the ISEW, although it is undoubtedly part of welfare. A measure of economic welfare that cannot incorporate changes in leisure time might be considered misleading. But its monetization poses fundamental problems. What is leisure and how can it be valued? Since this question will probably not lead toward any useful solution, we propose a different approach. As leisure cannot be directly operationalized, the focus has to turn from leisure itself to the duration and intensity of work.
- Up to now the ISEW is a national indicator. For example, relocations of polluting industries to other countries count as a positive development.
- The ISEW defines sustainable economic welfare as potential economic welfare minus its unsustainable parts. Sustainable income therefore will always be lower than actual income. Besides giving the impression that sustainability has something to do with asceticism, this is misleading. Income in a sustainable economy may, of course, lie above the potential income, given the actual structure of production since modern society destroys production possibilities. For example, pollution may lead to income and production losses in agriculture. A ‘potential sustainable economic welfare’ should therefore be calculated in parallel to the ISEW, their difference indicating social inefficiency.
- Up to now the ISEW does not cover the costs of

the capitalist mode of production, where labor is extracted from labor power (Bowles, 1985). Workers are rather forced or bribed to work rather than motivated. Bowles et al. (1990) suggest that huge losses are due to this hierarchical organization of the production process.

The last point differs completely from the ones above. It questions the ISEW as whole. Therefore no incorporation is possible.

In our view, the most important critique of the ISEW is that a multidimensional phenomenon like welfare cannot be reduced to one dimension and that the expression of different areas of welfare through money neglects their qualitative aspects.

This short list suggests that a lot of work is still needed in order to achieve a satisfactory measure of economic welfare. In this way the ISEW is a big leap forward, but still needs further improvement. Its strength lies in its combination of economic, ecological and social aspects, which are often separated. Furthermore it provides a framework for systematic accounting of these aspects. Nevertheless, one has to be clear about the limitations of the ISEW. It only measures economic welfare and it is a rough survey, which gives best results on longer periods (even though a one-year comparison with GDP might be interesting). For an exhaustive report on welfare accompanying indicator systems would be necessary.

5. Conclusion

The aim of the ISEW is threefold: First to provide an empirical critique of GDP as a welfare measure, second, to describe the development of economic welfare in the long run, and, third, to play a central role for policy making, to be more precise, to replace GDP in this function. Only the first aim can be regarded as fully accomplished. As demonstrated above, GDP as a measure of economic welfare is systematically misleading as it measures potential, not the realized welfare. The ISEW clearly shows the obsolescence of 'quantitative growth' as measured by GDP. The second aim can be seen as partly fulfilled. The ISEW gives useful and new information on the development of economic welfare as it integrates several aspects of modern society usually separated in scientific discussion, such as discussion

on environmental and distributional questions or on gender discrimination.¹⁵ But at the same time it also shows the limitations of any project of a one-dimensional measure of (economic) welfare: Qualitatively different areas of society are all reduced to the 'general equivalent', thereby neglecting their specificity. This limitation of the ISEW becomes even more important in regard to the third aim. For all these reasons, while the ISEW seems qualified to kick GDP from the throne as leading indicator for economic policy, it is not ready to usurp that throne.

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¹⁵ The ISEW therefore could also serve as a point of contact between even more tracks of discussion, e.g. the stagnation of economic welfare since the end of the 1970's could be interpreted in the light of the crises of 'fordism' or that of the post-war 'social structure of accumulation'.

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