WORKING PAPER

TOWARDS ISEW AND GPI 2.0, PART II: IS EUROPE FARING WELL WITH GROWTH? EVIDENCE FROM A WELFARE COMPARISON IN THE EU-15 FROM 1995 TO 2018.

Jonas Van der Slycken
Brent Bleys

September 2021
2021/1027

GHENT UNIVERSITY

Department of Economics

Faculty of Economics and Business Administration
Campus Tweekerken, St.-Pietersplein 5, 9000 Ghent - BELGIUM

Towards ISEW and GPI 2.0, part II: Is Europe faring well with growth? Evidence from a welfare comparison in the EU-15 from 1995 to 2018.

Jonas Van der Slycken[1,*] and Brent Bleys[1]

Highlights

Two welfare measures with distinct time and boundary choices are compiled for the EU-15 as a whole and each of its member states individually.

From 1995 to 2018, GDP per capita grew by 32.4% while welfare per capita only increased by 10.5% and 14%.

There was a growing divergence between welfare and gdp, especially after the financial crisis when welfare started stagnating.

At the end of the studied period, the EU-15 had already recovered from the financial crisis from a GDP perspective, but it has not from a welfare view.

A majority of the EU-15 countries has a clear threshold point as the value in 2018 is lower than the maximum obtained during the period.

Abstract

This paper is the first to calculate economic welfare for the EU-15 countries in a standardized and comparable way. This paper does so by building on a case study for Belgium by Van der Slycken and Bleys (2021) that puts forward a "2.0 methodology" and two distinct welfare measures that deal with cross-time and cross-boundary issues. Both welfare and GDP per capita improved in the EU-15 between 1995 and 2018. Yet, there is an important divergence between welfare and GDP: over time experiential welfare per capita and the per capita benefits and costs of present activities improved by respectively 10.5% and 14%, while GDP per capita grew by 32.4%. These trends in per capita welfare are mainly driven by individual consumption growth, the shadow economy and the welfare losses from income inequality, which compensated about half of the welfare gains of the former two categories. The gap between welfare and GDP diverges especially after the financial crisis when welfare starts stagnating. At the end of the studied period, the EU-15 had already recovered from the financial crisis from a GDP perspective, but it has not from a welfare view. Since the welfare levels in 2018 are less than 2% lower than the period-maximum, there is no conclusive evidence in favor of the threshold hypothesis at the level of the EU-15. The fact the welfare level in nine individual countries is more than 5% lower than its the peak value, however, signals a clear threshold for these countries. Yet, welfare levels could be increased beyond previous peak levels with effective social and environmental welfare policies in place that focus on redistributing and respecting environmental boundaries our economies instead of promoting economic growth.

Keywords: Index of Sustainable Economic Welfare (ISEW); Genuine Progress Indicator (GPI); cost-shifting; beyond GDP; threshold hypothesis; postgrowth.

[1] Department of Economics, Faculty of Economics and Business Administration, Ghent University, Tweekerkenstraat 2, B-9000 Ghent, Belgium.
* Corresponding author: Jonas.Vanderslycken@ugent.be; jonasvanderslycken@gmail.com

1. Introduction

After previous warnings that GDP should not be used as an indicator to measure social welfare (Kuznets, 1934; Abramovitz, 1958; Okun, 1971), Nordhaus and Tobin (1972) wondered if pursuing growth had become obsolete. Nordhaus and Tobin developed an alternative measure of economic welfare to examine whether the progress indicated by GDP growth would disappear if a different welfare indicator was used. One the one hand, growth is not obsolete because economies are structurally dependent on growth (EEA, 2020). On the other hand, growth as measured by GDP is obsolete, because GDP is not an indicator for social welfare or social progress, which is acknowledged by most economists (van den Bergh, 2009). Without the structural dependence on growth, it makes little sense to continue growing an indicator that is a poor proxy for social welfare. In order to overcome this deadlock, voices have been raised to: (a) to move beyond growth and to redesign economies so these become less dependent on growth and can manage without growth (Raworth, 2017; Jackson, 2017; Victor, 2019) and (b) to move "beyond GDP" as we urgently need to measure what counts for social and economic performance and to focus on designing policies that stimulate well-being and economic welfare in a sustainable way (Stiglitz et al., 2009; Stiglitz et al., 2018).

While there is a broader debate on the measurement of welfare, well-being or sustainable development – see, for instance, the approaches mentioned in Meadows (1998), Dasgupta and Mäler (2000), Dasgupta (2009), van den Bergh (2009), Fleurbaey (2009), Bleys (2012), O'Neill (2012), Munda (2015), O'Neill et al. (2018) and Hoekstra (2019) – we refer to welfare and economic welfare measures (EWM) as what is being measured by the Index of Sustainable Economic Welfare (ISEW) and Genuine Progress Indicator (GPI). The ISEW and GPI were created more than thirty years ago as *alternative* welfare indicators in an effort to debunk GDP and its growth as a key economy policy goal. Nevertheless, to date EWM's impact on policy-making stays limited (Corlet Walker and Jackson, 2019; Bleys and Whitby, 2015). The lack of standardization does not only act as a barrier to impact policy-making, but also makes it difficult to compare welfare estimates across countries (Bleys and Whitby, 2015).

In the past, scholars have made various suggestions to improve the standardization of the methodology of EWM. Some authors have argued to calculate standardized EWM with a limited component list (e.g. Bleys, 2007; Menegaki, 2018) to deal with data constraints. Others tried to adapt the calculation method to the area studied by including components of local importance (e.g. Clarke and Islam, 2005; Ostergaard-Klem and Oleson, 2014; Held et al., 2018) as this would give policy-makers more detailed region-specific information. In order to foster both comparability and customization, it was also suggested to have a *core* component list in the standard measure that can be supplemented

with a *periphery* of specific items for regional-specific measures (Brown and Lazarus, 2018; Kenny et al., 2019).

In Europe no attempt has been made to date to measure welfare across European countries or at the European level (Schepelmann et al., 2010). In the past, welfare was compiled for 13 of the 15 EU-15 countries: Austria (Stockhammer et al., 1997), Belgium (Bleys, 2008), Finland (Hoffrén, 2018), France (Nourry, 2008), Germany (Held et al., 2018), Greece (Menegaki and Tsagarakis, 2015), Italy (Armiento, 2018), Luxembourg (Rugani et al., 2018), the Netherlands (Bleys, 2007), Portugal (Beça and Santos, 2014), Spain (O'Mahony et al., 2018), Sweden (Jackson and Stymne, 1996) and the UK (Jackson, 2004).[2] Yet, these country-specific studies lack standardization. To date, Denmark and Ireland are the only EU-15 countries without an EWM.

Some scholars have compiled EWM in a comparable way for a group of countries or states. Menegaki et al. (2017) computed a simplified ISEW for 33 European countries, however, this version differs significantly from the commonly used methodology (Bleys and Van der Slycken, 2019). In order to compile a "comparable GPI", Pais et al. (2019) also used a simplified methodology for 28 OECD countries. Furthermore, Fox and Erickson's (2019) GPI study for fifty states in the United States allows for comparability across states, but only covers one year. Notwithstanding these contributions, a standard study with a 'full' component list that is applied to a group of countries over a considerable time period is still missing to date. This study addresses this research gap as it is the first that calculates EWM for the group of EU-15 countries over a considerable time period based on a consistent and standard methodology.[3] This welfare study will allow us to explore whether GDP and welfare are coupled in these European countries before, during and after financial crisis. This research will also examine the main welfare drivers and the relative importance of the different welfare categories in EWM.

This paper is structured as follows: Section 2 discusses the methodology used to calculate welfare in the EU-15 from 1995 to 2018. The third section discusses each countries' welfare evolution and compares it to the respective GDP trends, and finds that the EU-15 recovered from the financial crisis from a per capita GDP view by 2018, but not from an economic welfare perspective. In Section 4 we revisit Max-Neef's (1995) threshold hypothesis and argue that our results give no conclusive evidence regarding threshold hypothesis at the aggregate level of the EU-15. However, a welfare plateau is found for the EU-15 as a whole after the financial crisis and a majority of the EU-15's countries do have

[2] We only listed each country's most recent welfare study.

[3] In this paper, we will refer to these 15 countries as 'EU-15' despite the fact that the UK is no longer part of the European Union. 'EU-15' is to be seen as a mere reference to the fifteen countries that were originally part of the EU-15.

clear threshold points. Finally, as the ecological costs increased during the GDP recovery from the financial crisis in 2010, Section 5 concludes to prioritize a green recovery for a post-COVID transition.

2. A standardized methodology for the EU-15

This paper applies the same methodology as for the Belgian welfare study by Van der Slycken and Bleys (2021), which should allow for meaningful comparisons across the EU-15 from 1995 to 2018. The methodology used can be seen as a core methodology using a full set of EWM-items. Similar to the case study by Van der Slycken and Bleys, we will calculate two EWM – the *benefits and costs experienced* (BCE) and the *benefits and costs of present economic activities* (BCPA):

$$BCE = UW + C_i + S + G_c - DIRE_p - INQ - NEC \quad (1)$$

$$BCPA = UW + C_i + S + G_c - DIRE_p - INQ - BEC + \Delta K \quad (2)$$

In Eqs. 1 and 2: UW = unpaid work, C_i = individual consumption, S = shadow economy, G_c = non-defensive collective government consumption, $DIRE_p$ = defensive, intermediate and rehabilitative private expenditures, INQ = welfare losses from income inequality, NEC = narrow ecological costs that are experienced in the present and within domestic borders, BEC = broad ecological costs, including current costs within domestic and the costs shifted in time and space, ΔK = capital adjustment. UW, C_i, S, G_c are valued positively; INQ, $DIRE_p$, NEC and BEC are deducted, whereas ΔK can be either positive or negative.

Both EWM differ because they are based on two distinct welfare interpretations that are inspired by the income concepts of Fisher and Hicks – without being approximations of these income notions (Van der Slycken and Bleys, 2020). BCE has an experiential interpretation. Following Fisher's psychic income concept, it traces the experiences that are currently experienced within domestic borders. As a consequence, it only includes current ecosystem costs within borders and does not include capital adjustments. Capital adjustments are excluded since Fisher distinguishes between income and capital and a measure based on his psychic income notion should only trace the current services following from capital stocks, but not additions to stocks. BCPA, in contrast, is broader as it accounts for a wider range of benefits and costs coming from present activities. BCPA registers the impacts of present activities, including the impacts shifted in time and space. Therefore, it accounts for the ecological costs shifted abroad and into the future and includes a capital adjustment. Net capital growth is registered because it follows a Hicksian-income view. Table 1 presents an overview of the methodology used. A detailed explanation for all items (including data sources) can be found in Appendix A, while the monetary, population and physical data used in the compilations can be found in Appendix B.

Table 1: Methodological overview and additional information on two welfare interpretations.

	Items *(category)*	**Method of calculation and *additional information***
A	Unpaid work *(UW)*	Total hours of unpaid work x market wages *Unpaid work covers routine housework, shopping, care for household members, care for non-household members, volunteering, travel related to household activities and other unpaid work and is valued using the replacement cost method to find a market substitute.*
B	Actual individual consumption (+) *(C_i)*	B is the sum of the individual consumption expenditures by households and the individual consumption expenditures made by Non-Profit Institutions Serving Households and government.
C	Defensive, intermediate and rehabilitative private expenditures (-) *($DIRE_p$)*	C involves subtracting the following from B: 25% of food and alcohol expenditures, 100% of tobacco and narcotics expenditures, 100% of insurance and financial services expenditures and the cost of road accidents. The latter is calculated by using direct and indirect costs estimates for fatalities and injuries in road accidents. *Defensive expenditures such as insurance expenditures are deducted because they merely serve to defend oneself from the unwanted effects of other economic activities. Intermediate expenditures such as financial services are deducted too, because they are not ultimate consumption. Financial services are at best an intermediate means to final consumption but are by themselves not the ultimate end of economic activity. Rehabilitative expenses after a car accident, for instance, are undertaken to restore to previous, more healthy conditions and are deducted because they are to be seen as costs, not benefits.*
D	Cost of consumer durables (-) *(C_i)*	Current expenditures on durable consumer goods are subtracted.
E	Services of consumer durables (+) *(C_i)*	∑ previous 8 years' consumer durables expenditures x 0,2 *The services are equal to the depreciation and an imputed interest value of the stock of consumer durables.*
F	Shadow economy (+) (S*)*	F approximates the value of the shadow economy. Only 50% is included as welfare-enhancing, to exclude illegal activities and avoid double counting with actual individual consumption and unpaid work.

G	Net consumption	Actual individual consumption – defensive, intermediate and rehabilitative private expenditures – cost of consumer durables + services of consumer durables + shadow economy (B-C-D+E+F)
H	Welfare losses from income inequality (-) *(INQ)*	Inequality adjustment index x net consumption *H uses an inequality adjustment index that is based on the diminishing marginal utility of income and normalizes the correction at a sufficiency threshold.*
I	Non-defensive government expenditures (+) *(G_c)*	100% of government expenditures on general public services, housing and community amenities and recreation, culture and religion are included.
J	Cost of air pollution (-) *(NEC & BEC)*	J is calculated by multiplying annual emissions with cost estimates. *J compiled from a within border (i.e. production) view captures the costs related to the following pollutants PM 2,5, NOx, NH3, SO2 and NMVOC. It is assumed the direct disamenity cost of air pollution in the narrow ecological costs is equal to 20% of this within border cost. In the broader perspective on air pollution, the costs of air pollution embodied in trade from the pollutants PM 2,5 fossil, PM 2,5 bio, NOx, NH3 and SO2 are added to the within border costs.*
K	Ecosystem costs of nitrogen pollution (-) *(NEC & BEC)*	K is calculated by linking cost estimates to annual emissions of NO2 and NH3 and with the use of inorganic fertilizer. *The cost estimates for NO2 and NH3 only cover ecosystem costs in order to avoid double counting of health costs, which are already registered in the costs of air pollution. The ecosystem cost for reactive nitrogen measures the run-off from agricultural sources to rivers and seas. This item is included in both NEC and BEC, as it reflects current ecosystem costs within domestic borders.*
L	Cost of climate breakdown (-) (*BEC)*	L captures the damages related to climate breakdown and is calculated by multiplying a time-varying marginal social cost by the amount of greenhouse gas emissions. The emissions included are domestic emissions, CO2-emissons embodied in trade, emissions from international navigation and aviation, domestic LULUCF-emissions, the emissions related to global land use changes, and biomass emissions.

		L is forward looking and looking beyond borders. It is only included in the broad ecological costs.
M	Cost of extreme weather events (-) *(NEC)*	M is equal to the total amount of uninsured losses as insurance (subtracted as defensive expenditures) helps to 'reduce' the costs from extreme weather events. *M covers uninsured losses to approximate the damages suffered in the present from extreme weather events for the narrow ecological costs.*
N	Depletion of non-renewable energy resources (-) *(BEC)*	N is calculated by multiplying the primary energy consumption by a transition cost that is needed to replace non-renewable resources and achieve an energy efficiency target of 33% by 2030. *N is only included in the broad ecological costs. Using non-renewable energy resources means that resource stocks are being depleted. This item tries to proxy this depletion by using transition costs to replace non-renewable energy resources with a renewable substitute.*
O	Costs of use of nuclear power (-) *(BEC)*	O is calculated by multiplying the amount of nuclear electricity generated by a cost estimate from the German welfare study. *O is forward looking and only fits in the broad ecological costs.*
P	Net capital growth (+) *(ΔK)*	P is calculated by taking the difference between this year's and previous year's net capital stock. *P only fits in BCPA as net capital growth is seen as a benefit (or cost if negative) of present economic activities.*

Source: Van der Slycken and Bleys (2021).

3. Results

First, we will present and discuss the welfare results for the EU-15 as a whole. In the next subsections, we will analyze and compare the welfare trends for each country.

3.1 Welfare in the EU-15

In order to analyze the overall economic performance of the EU-15 from 1995-2018, we calculated its aggregate GDP, BCE and BCPA by summing the corresponding individual measures across these countries. European aggregate numbers were divided by the EU-15's total population to filter out population trends – the total population increased by 9.7% over the considered period – and obtain per capita figures, which are shown in Fig. 1. In what follows, the analysis focuses on per capita numbers, which are presented in lowercase (i.e. gdp, bce and bcpa), in contrast to aggregate numbers

which are in capital letters. We will first elaborate on the EU-15's overall economic performance and its driving factors and then discuss the welfare categories. Detailed growth rates of welfare indicators and categories for the EU-15 can be found in Tables 2 and 3.

During the period under consideration, gdp is in absolute values higher than both welfare indicators. Bce and bcpa are on average respectively 2.9% and 26.5% lower than gdp. From 1995 to 2018 all measures considered improved, albeit at different rates as shown in Table 2. Gdp outperformed both welfare indicators: gdp grew by 32.4%, bcpa increased by 14%, while bce improved by 10.5%. Over the entire period, gdp increased on average by 1.41% per annum (p.a.) versus 0.61% for bcpa and 0.46% for bce. Throughout the entire period, however, there are notable differences between the evolutions of ewm and gdp. By 2015, the EU-15's gdp had recovered from the financial crisis as it reached the same level as in 2007, i.e. about €30,850. Nonetheless, the EU-15 did not entirely recover from the financial crisis from a welfare perspective as in 2018 both bce and bcpa were below their 2007-level. Bce reached its period welfare maximum of €28,935 in 2011, while bcpa maxed out at €21,935 in 2001.

The studied period can be split into five periods: 1) from 1995 to 2000 with rapid gdp and welfare growth; 2) from 2000 to 2007 when gdp and welfare improved at much lower rates, especially for bce and bcpa; 3) the financial crisis and its aftermath from 2007 to 2011 when gdp fell more sharply than bcpa, while bce still increased; 4) the no-growth period during the subsequent Eurocrisis from 2011 to 2014 when gdp stagnated and both ewm decreased and 5) the post-crises period from 2014 to 2018 when gdp again outperformed bce and bcpa: gdp grew at the same growth rates as the period right before the financial crisis, bcpa grew slightly while bce somewhat decreased.

Figure 1: Welfare and GDP per capita for the EU-15 in prices of 2010 (left panel) and as index values with 2007 = 100 (right panel).

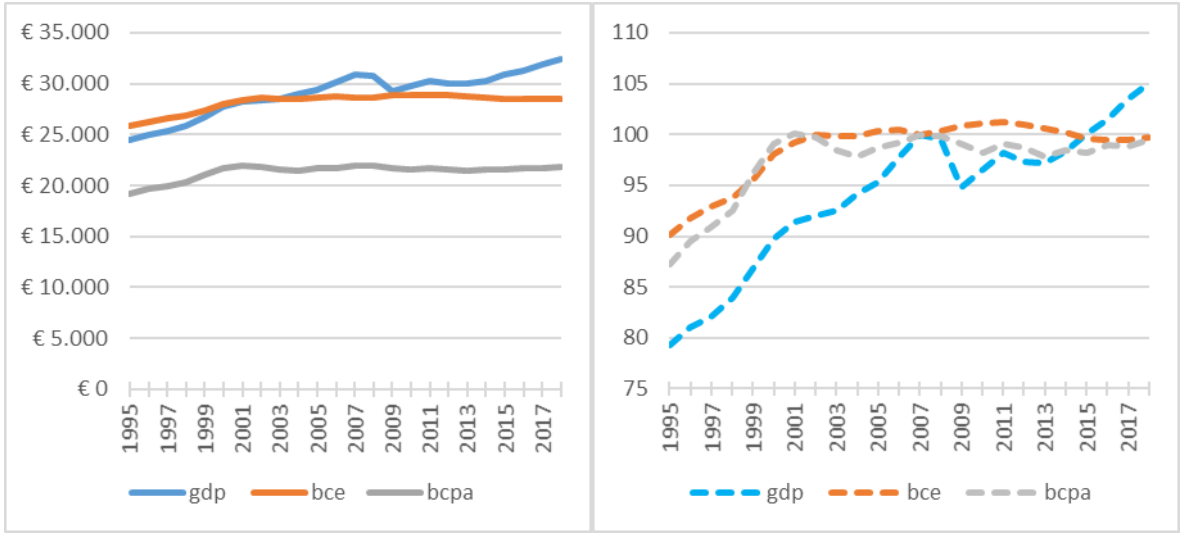


Table 2: Average annual trends of welfare and GDP per capita for the EU-15 (in %).

Time period	gdp	bce	bcpa
1995-2000	2,6	1,7	2,7
2000-2007	1,6	0,3	0,1
2007-2011	-0,5	0,3	-0,2
2011-2014	0,0	-0,3	-0,2
2014-2018	1,7	-0,1	0,3
	1,41	0,46	0,61
1995-2018	*(32,4)*	*(10,5)*	*(14,0)*

Note: The brackets indicate the total trend over the entire period, in contrast to the average annual trends in the subperiods.

3.1.1 Period 1: 1995-2000

In this first phase from 1995-2000 welfare and gdp rose sharply: gdp increased by on average 2.6% per annum (p.a.), bce by 1.7% p.a. and bcpa by 2.7% p.a. This welfare improvement was driven by an increase in individual consumption by €2,111 (i.e. on average +2.5% per year), yet, only a part of this consumption growth was translated into welfare since the welfare losses from income inequality increased by €806 (i.e. an increase by 6.2% p.a.). The value of unpaid work is another important factor that helps to explain this period's unique welfare improvement as it increased by €941 – on average +2.1% per year.

3.1.2 Period 2: 2000-2007

In the build-up to the financial crisis from 2000 to 2007, gdp continued to grow, but its growth was slowing down as gdp only grew by on average 1.6% compared to 2.6% before. Welfare growth also slowed down as bce and bcpa only improved by on average 0.3% and 0.1% per year. Individual consumption was again the most important welfare driver: it increased by €2,022 (on average +1.5% p.a.). Yet, the welfare improvements from consumption growth were partly deducted as welfare losses from income inequality increased by €1,220 or 5.1% per year. Another important driver was the decrease in the value of unpaid work by €591 or -0.8% per year.

3.1.3 Period 3: 2007-2011

During the financial crisis from 2007 to 2009 and its aftermath from 2009 to 2011, gdp and bcpa both dropped: gdp fell by on average 0.5% p.a., while bcpa dropped by on average 0.2% p.a. Bce in contrast increased on average by 0.3% per year. The main driver for both bce and bcpa was a slight increase in individual consumption expenditures by €268 (+0.3% p.a.). In the case of bcpa, plummeting capital adjustments strongly help to explain its fall as net capital declined by €1,087 (-13.9% p.a.). Yet, the drop in bcpa was tempered because broader ecological costs also fell by €606 (i.e. on average -1.7% p.a.). The narrow ecological cost fell at a higher rate of on average 3.5% per annum, however, this only

resulted in a minor absolute reduction of by €58 as the NEC are only a fraction of their broader counterpart.

3.1.4 Period 4: 2011-2014

In the period after the crisis from 2011 to 2014, Europe's gdp stagnated. Welfare, in contrast, declined: bce decreased by 0.3% and bcpa diminished by 0.2%. The welfare evolution was caused by decreases in government consumption by €155 (i.e. on average -1.9% p.a.) and in individual consumption by €105 (i.e. on average -0.2% p.a.). While for bcpa the broader ecological costs and capital adjustment are important drivers. The gdp stagnation resulted in a capital adjustment that was €257 lower (-9.95% p.a.), however, this trend was more than compensated by a decrease in broader ecological costs also decreased by €410 (-1.6% p.a.).

3.1.5 Period 5: 2014-2018

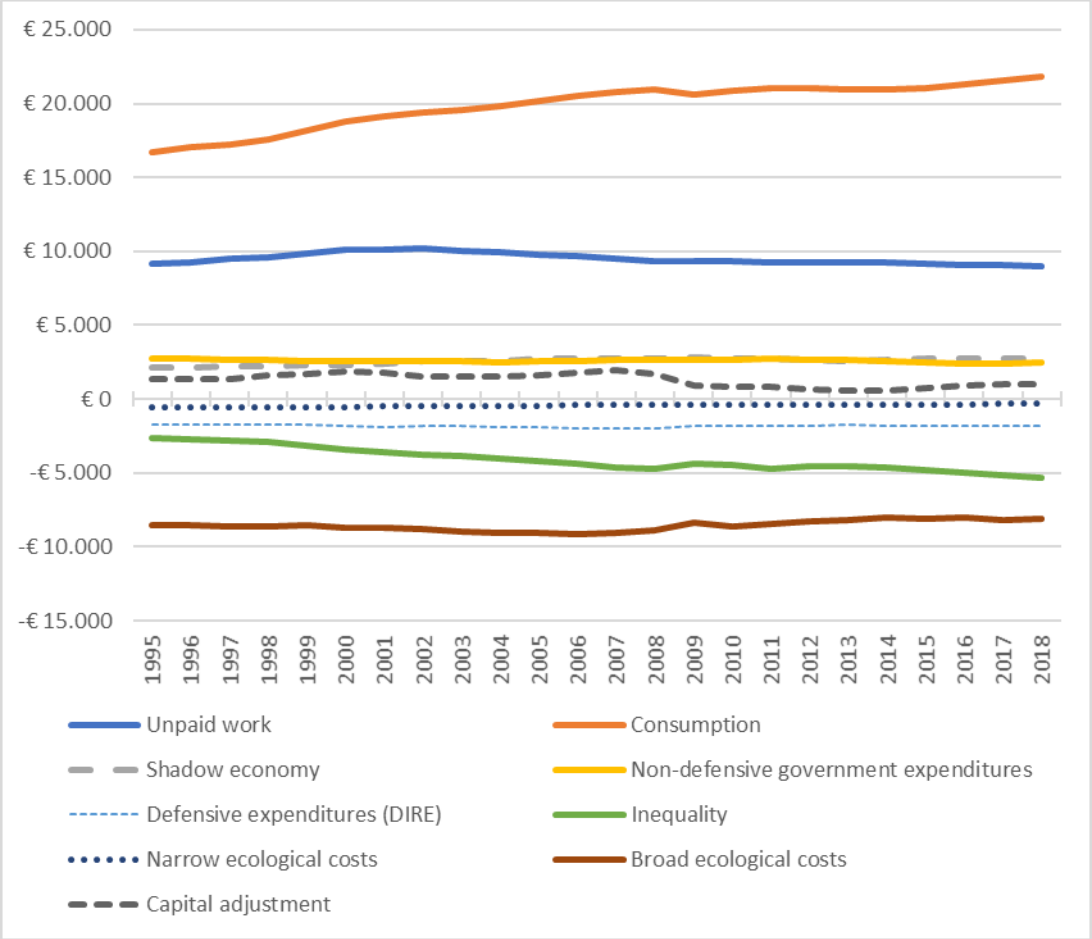
During the last period from 2014-2018, gdp again outperformed welfare: gdp increased by 1.7% p.a., while bcpa increased by 0.3% and bce decreased by 0.1% per year. Bcpa improved, contrary to bce because capital adjustments surged by €433 (i.e. on average +17.8% p.a.). Other drivers in the welfare trends of bcpa and bce are consumption gains of €867 (+1.0% p.a.) and the increases in the welfare losses from inequality by €656 (i.e. +3.5% p.a.), which compensated a large part of this period's consumption growth. In 2018, gdp reached its period maximum with a value of €32,382. Yet, bce and bcpa were by the end of the studied period 1.5% and 0.5% lower than their peak values in respectively 2011 and 2001.

3.1.6 A detailed breakdown of the welfare categories

Detailed breakdowns of the EU-15's welfare in absolute values in Fig. 2 and in relative weights of bcpa's per capita welfare contributions and deductions in Fig. 3 illustrate that consumption and unpaid work are the welfare contributions of the highest quantitative importance, while the broader ecological costs and welfare losses from inequality are the largest welfare deductions. Over the studied period, consumption, the welfare losses from income inequality and the shadow economy impacted the welfare trend most. Consumption increased by €5,164 or 31%, which only increased its relative weight in the bcpa's positive contributions from 52.1% in 1995 to 59% in 2018. The welfare losses from income inequality increased by €2,713 or 103.9%, which indicates that because of the diminishing marginal utility of income only 53.3% of the growth in consumption and the shadow economy is translated into welfare. The shadow economy had an increasing positive welfare contribution as it respectively increased by €644 (+30.5%). Over time, the shadow economy's relative weight in bcpa's positive welfare contributions increased from 6.6% in 1995 to 2018 7.4% in 2018.

Unpaid work and government expenditures are two welfare positive welfare contributions that decreased over time by respectively €192 (-2.1%) and €296 (-10.8%). As a consequence unpaid work's share fell from 28.6% in 1995 to 24.2% in 2018, while the share of government consumption expenditures decreased from 8.6% to 6.6% over time.

Figure 2: Welfare categories for the EU-15 in per capita values (2010 prices).



Note: In this figure welfare deductions have been reclassified as negative numbers, even though these categories are deducted as positive numbers in Eq. 1 and 2 to calculate the aggregate welfare level.

In contrast to bcpa's broader ecological costs, bce's narrow ecological costs are of negligible quantitative importance. Over time both costs fell: the narrow ecological costs decreased by €245 (-42.6%) versus €504 (-5.9%) for their broader counterpart. Since the welfare losses from inequality rose and the broader ecological costs decreased, the latter's relative share in bcpa's welfare deductions decreased from 66.6% to 53% while the former's weight increased from 20.3% in the initial year to 35% in the final year. The financial crisis made bcpa's capital adjustment decrease, yet, although net capital growth increased by the end of the studied period, it was €283 or 21.3% lower in 2018 than it

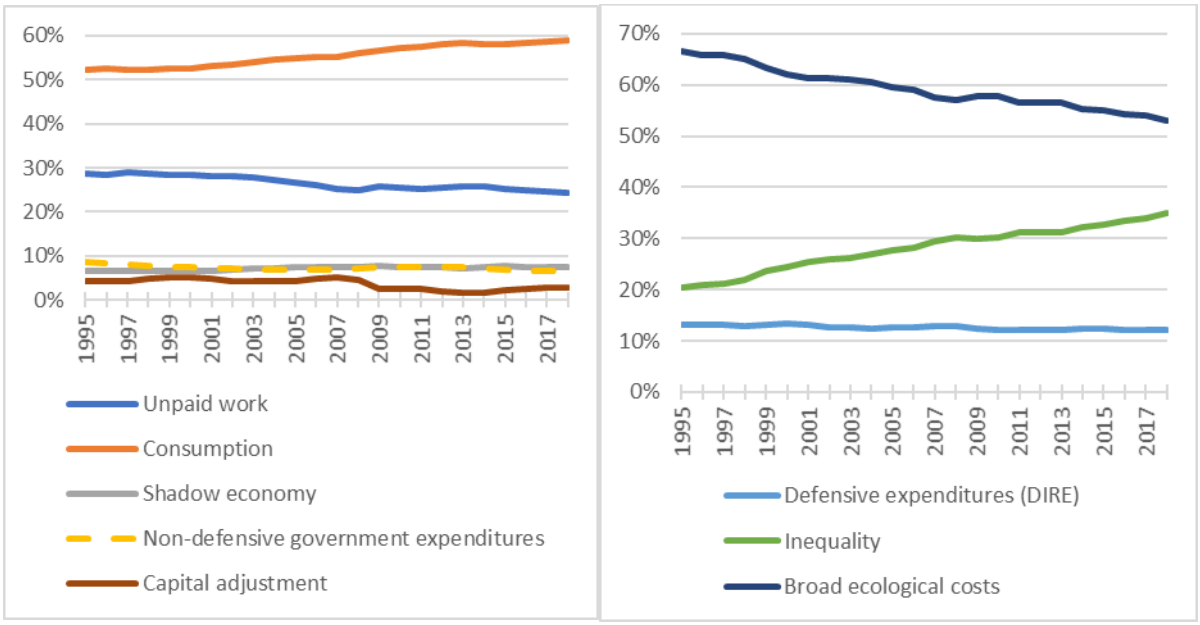
was in 1995 so that its share in bcpa's positive contributions fell from 4.1% to 2.8%. Finally, defensive, rehabilitative and intermediate expenditures grew by €142 or 8.4% - making its share in the total welfare deductions drop by 1 percentage point from 13.1 % to 12%.

Table 3: Average annual trends of welfare categories per capita for the EU-15 (in %).

Time period	uw	c_i	s	g_c	$dire_p$	inq	nec	bec	Δk
1995-2000	2,1	2,5	2,3	-0,9	2,0	6,2	-1,8	0,3	7,8
2000-2007	-0,8	1,5	2,4	0,1	1,3	5,1	-3,0	0,6	0,8
2007-2011	-0,6	0,3	-0,3	0,9	-2,4	0,2	-3,5	-1,7	-13,9
2011-2014	-0,1	-0,2	-0,8	-1,9	-0,6	-0,1	-1,2	-1,6	-9,9
2014-2018	-0,8	1,0	1,0	-1,2	0,5	3,5	-0,8	0,1	17,8
1995-2018	-0,09 *(-2,1)*	1,35 *(31,0)*	1,33 *(30,5)*	-0,47 *(-10,8)*	0,36 *(8,4)*	4,52 *(103,9)*	-1,85 *(-42,6)*	-0,26 *(-5,9)*	-0,93 *(-21,3)*

Note: The brackets indicate the total trend over the entire period, in contrast to the average annual trends in the subperiods.

Figure 3: Relative weight of per capita BCPA's welfare contributions (left panel) and welfare deductions (right panel) from 1995 to 2018.



3.2 Welfare in the EU-15 countries

In this section, we will discuss the EU-15-countries' welfare and gdp trends for the period 1995-2018. Detailed calculations of bce, bcpa, welfare categories and individual items can be found in Appendix B. Table 4 gives an overview of the relative changes over time of each country's gdp, bce, bcpa and its welfare categories.

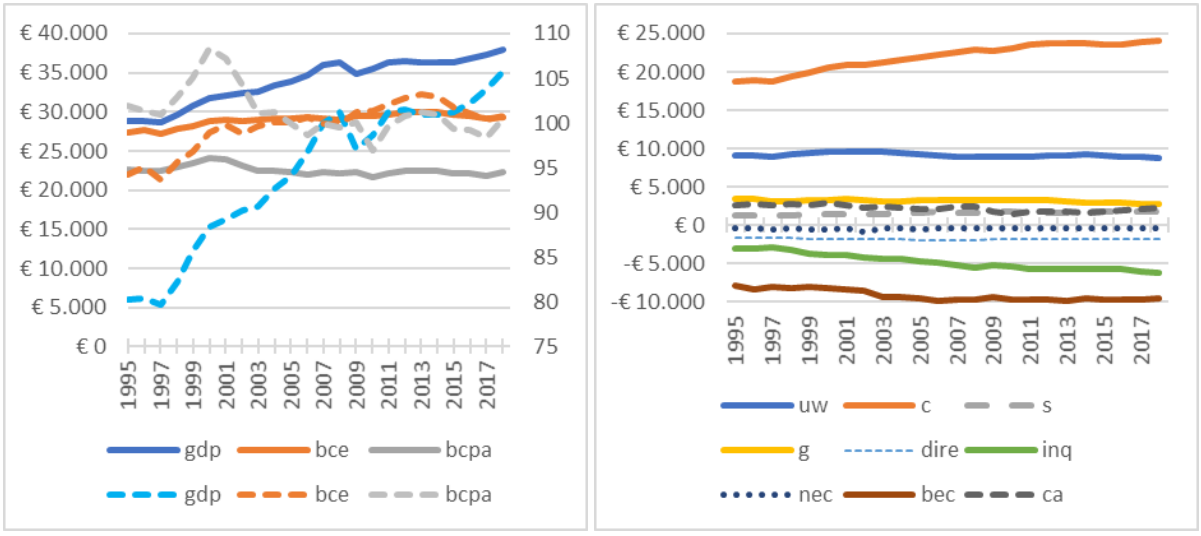
Table 4: Relative changes in percentage from 1995 to 2018 of gdp, bce, bcpa, and the welfare categories (per capita values, 2010 prices) for all countries and the EU-15.

	gdp	bce	bcpa	uw	c	s	g	dire	inq	new	bec	ca
EU-15	32,4	10,5	14,0	-2,1	31,0	30,5	-10,8	8,4	103,9	-42,6	-5,9	-21,3
Austria	31,9	6,8	-1,5	-3,0	28,7	32,1	-19,4	4,1	97,3	-24,5	22,5	-13,6
Belgium	30,1	9,0	9,2	-5,2	32,3	37,1	-23,4	11,7	89,9	-52,4	6,8	20,0
Denmark	27,4	9,4	19,1	12,0	23,1	30,7	-18,1	2,8	86,0	-33,7	-4,3	186,5
Finland	46,2	31,6	46,9	20,1	52,7	44,9	36,8	22,0	232,6	-38,0	23,0	538,2
France	27,7	11,9	19,8	-3,4	28,2	24,8	9,3	18,0	83,4	-40,1	-7,4	23,5
Germany	29,5	6,9	7,1	-4,8	24,9	38,2	0,6	2,5	96,8	-33,4	-4,1	-40,6
Greece	4,8	0,6	-8,6	11,2	4,0	5,5	-44,4	0,9	3,9	-46,8	-7,6	-206,9
Ireland	180,7	27,6	25,5	9,7	73,4	178,0	29,2	3,1	522,4	-33,8	0,6	-111,2
Italy	18,7	1,0	-3,1	-9,6	21,8	19,6	-34,7	2,0	58,3	-42,6	-4,1	-93,9
Luxembourg	40,1	-2,8	-54,8	-13,8	8,2	36,5	38,4	0,8	49,3	-57,7	48,4	-3,6
Netherlands	35,7	-6,8	-4,1	-27,2	32,3	34,7	-50,6	0,2	107,0	-57,3	-12,1	19,5
Portugal	29,8	31,9	27,3	52,6	27,8	29,1	0,7	32,2	63,9	-39,4	13,5	-97,1
Spain	35,9	6,0	-0,2	-13,8	31,4	27,4	-5,7	3,3	112,5	-39,0	10,6	-37,0
Sweden	51,9	24,1	41,6	34,4	49,5	48,4	-10,7	24,1	224,5	-34,8	-5,9	97,7
UK	42,1	32,2	67,1	26,7	47,7	35,6	21,9	15,3	159,7	-59,5	-25,4	17,4

Note: The color scale indicates per column the highest values in shades of green and the lowest values in shades of red.

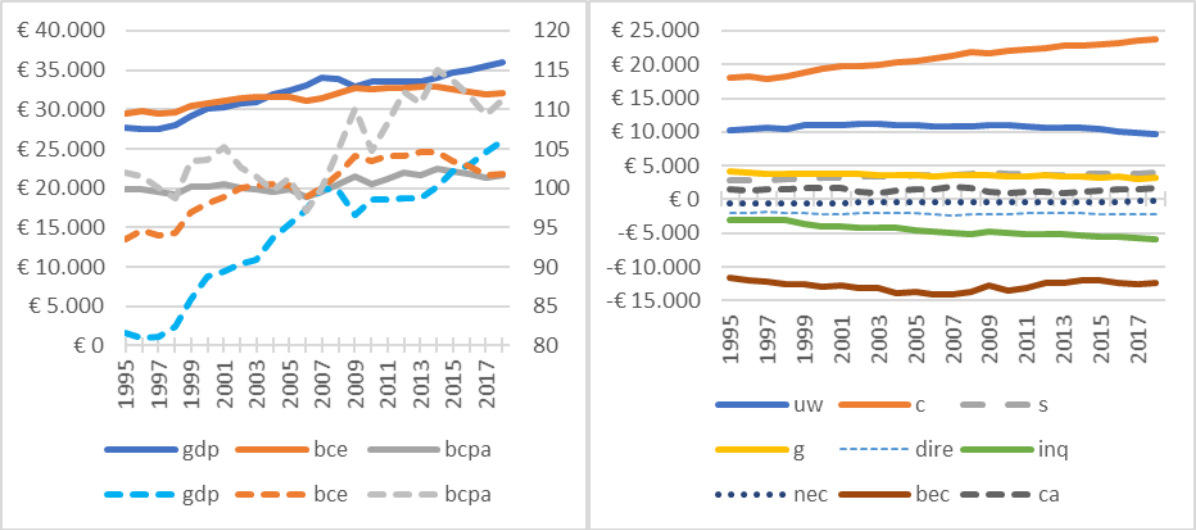
Austria's bce increased by 6.8% and its bcpa decreased by 1.5% over the study period, which is much lower than Austria's growth in gdp by +31.9%. Gdp reached its maximum level in 2018, whereas bce and bcpa reached their period peak in respectively 2013 and 2000, as indicated in Fig. 4. Austria's bcpa dropped between 2001 and 2003 with 5.7% because the broader ecological costs increased rapidly by 12.8%. The financial crisis had a strong impact on gdp that fell by 4.1% in 2009, but had no negative effect on bce (+1.4%) and bcpa (+0.06%). However, the crisis had a delayed impact on bcpa that decreased by 3.1% in 2010 mainly because the broader ecological costs increased by 4.9% during a polluting gdp-recovery and due a decrease in the capital adjustment by 16%. After recovering in 2010 and 2011, gdp stagnated from 2012 to 2015. Bce and bcpa declined from 2013 to 2017. In 2018, all three measures improved. Bcpa jumped up by 2.2% in 2018 since individual consumption grew by 1.1%, while the broader ecological costs decreased by 2.2% and net capital grew by 8.2%. However, bcpa was in 2018 still 7.2% lower than its period maximum in 2000.

Figure 4: Austria's GDP, BCE and BCPA per capita in absolute values (left axis) and index values with 2007 = 100 (right axis) on the left panel and the evolution of the welfare categories in per capita values on the right panel. All values are in 2010 prices.



Belgium's gdp increased by 30.1%, while its bce and bcpa improved by less than a third of that rate: bce increased by 9% and bcpa by 9.2%.[4] The financial crisis made Belgium's gdp decrease in 2009 by 3%. The crisis did not negatively impact bce and bcpa as both measures grew by 2.2% and 5% in 2009, as illustrated in Fig. 5. The sharp rise in bcpa was mainly caused by decreasing broader ecological costs (-7.5%), which more than compensated a drop in capital growth by 39.5%. However, there was a delayed crisis effect for Belgium too as bce and bcpa decreased by respectively 0.6% and 4.8% while gdp grew by 2% in 2010. The largest contributor to the deterioration in bcpa is an increase in the broader ecological costs by 5.8%. After the polluting recovery in 2010, gdp stagnated from 2010 and 2013, while bcpa and bce declined between 2014 and 2017. In 2018, all three indicators increased so that gdp reached its period maximum in 2018. Bce and bcpa, in contrast, already peaked in 2013 and 2014.

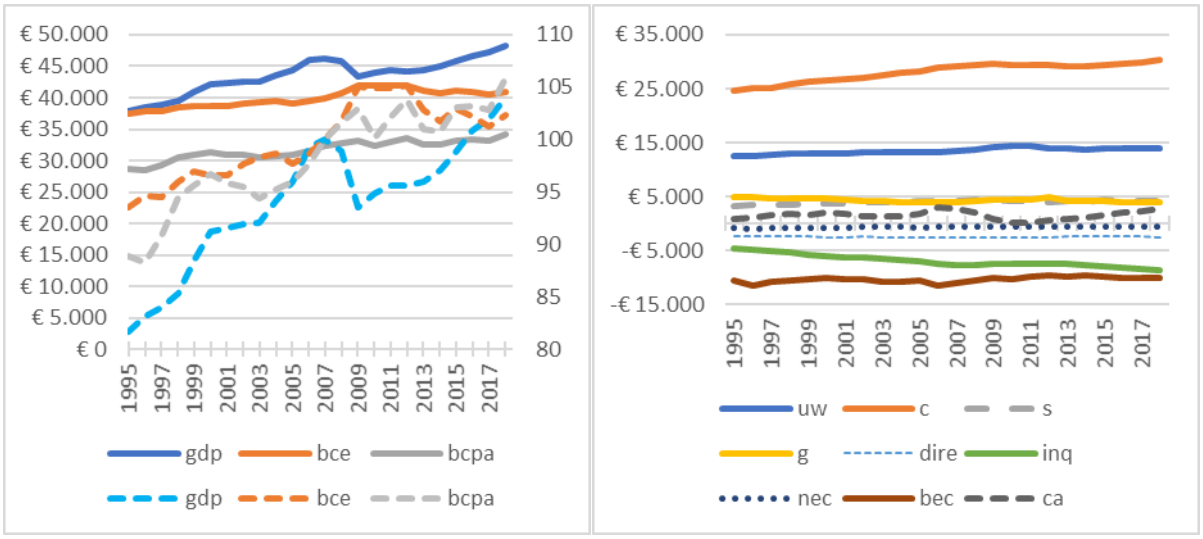
Figure 5: Belgium's GDP, BCE and BCPA per capita in absolute values (left axis) and index values with 2007 = 100 (right axis) on the left panel and the evolution of the welfare categories in per capita values on the right panel. All values are in 2010 prices.



[4] The results presented here differ compared to the Belgian case study by Van der Slycken and Bleys (2021) because we make use of updated data for the valuation of unpaid work.

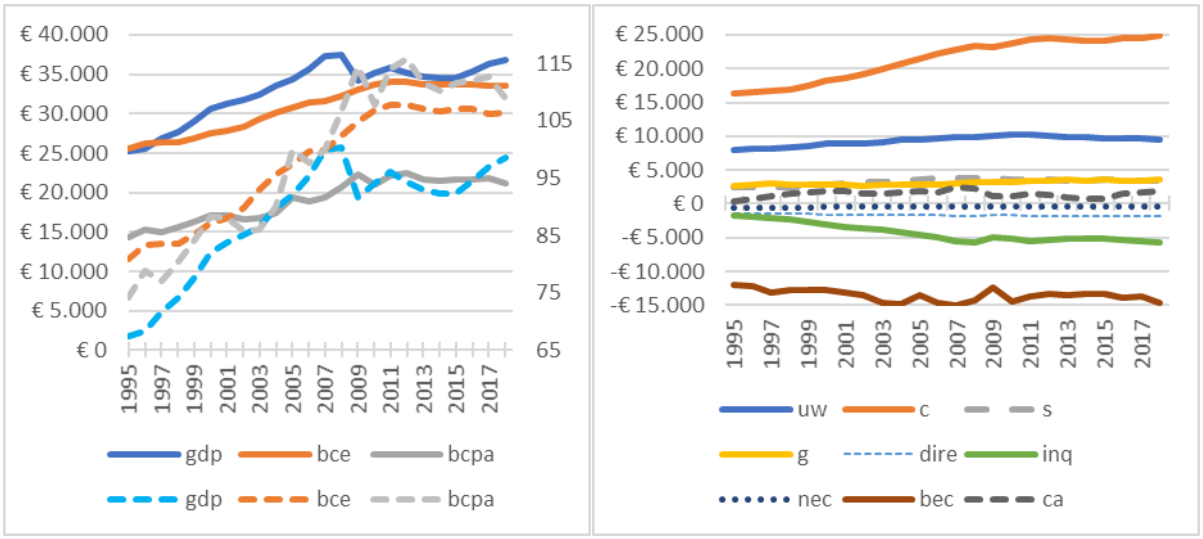
Denmark's bcpa and gdp grew over the entire period by respectively 19.1% and 27.4%, while bce only enhanced by 9.4%. Denmark was strongly impacted by the financial crisis in 2009 seen from a gdp-view but not from a welfare perspective: gdp fell by 5.4%, while bce and bcpa increased by 3.2% and 1.3% because the value of unpaid work increased (+4.3%) and the welfare losses from income inequality dropped by 3.7%. The evolution of bcpa was also driven by decreases in the broader ecological costs (-3.8%) and capital adjustment (-59.4%). The response in welfare was, once again, lagged. In 2010, bce slightly decreased (-0.2%), whereas bcpa diminished by 2.8% mainly due to rising broader ecological costs (+1.9%) and a further dwindling capital adjustment (-78.5%) that more than compensated an increase in unpaid work (+1.4%). By the end of the study period, gdp grew, while bcpa fluctuated and increased too so that bcpa and gdp reached their maximum level in 2018, while bce slightly oscillated but had decreased compared to its 2012 maximum.

Figure 7: Denmark's GDP, BCE and BCPA per capita in absolute values (left axis) and index values with 2007 = 100 (right axis) on the left panel and the evolution of the welfare categories in per capita values on the right panel. All values are in 2010 prices.



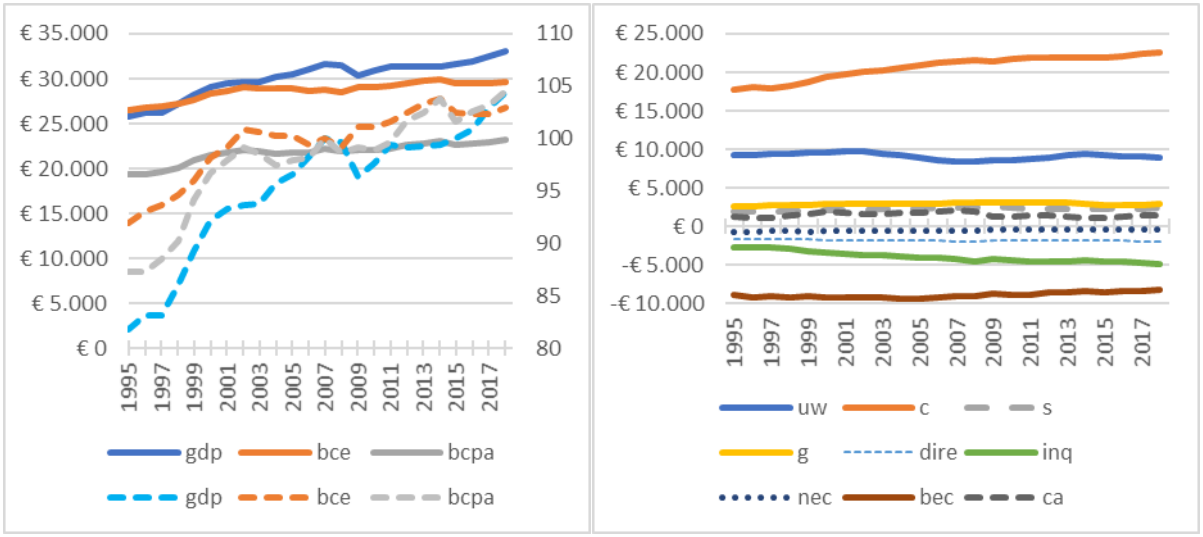
Finland performed better than the EU-15 on average over the entire period: its gdp grew by 46.2%, its bcpa improved by 46.9% and its bce bettered by 31.6%. Notwithstanding these remarkable evolutions, its gdp level was 1.7% lower in 2018 compared to its maximum in 2008, while its bce and bcpa were in 2018 respectively 1.4% and 5.9% lower than their maximum in 2012. As shown in Fig. 8, the financial crisis impacted Finland strongly from a gdp-perspective, but not from a welfare view. In 2009, Finland's gdp dropped by 8.6%, however, its bcpa improved by 7.4% due do sharply falling broader ecological costs (-13.4%). The subsequent gdp recovery by 2.7% in 2010 was polluting and detrimental to bcpa, which fell by 5.8% as the broader ecological costs rose by 16.4%. Bce steadily increased and grew by 2.6% in 2009 and 1.9% in 2010.

Figure 8: Finland's GDP, BCE and BCPA per capita in absolute values (left axis) and index values with 2007 = 100 (right axis) on the left panel and the evolution of the welfare categories in per capita values on the right panel. All values are in 2010 prices.



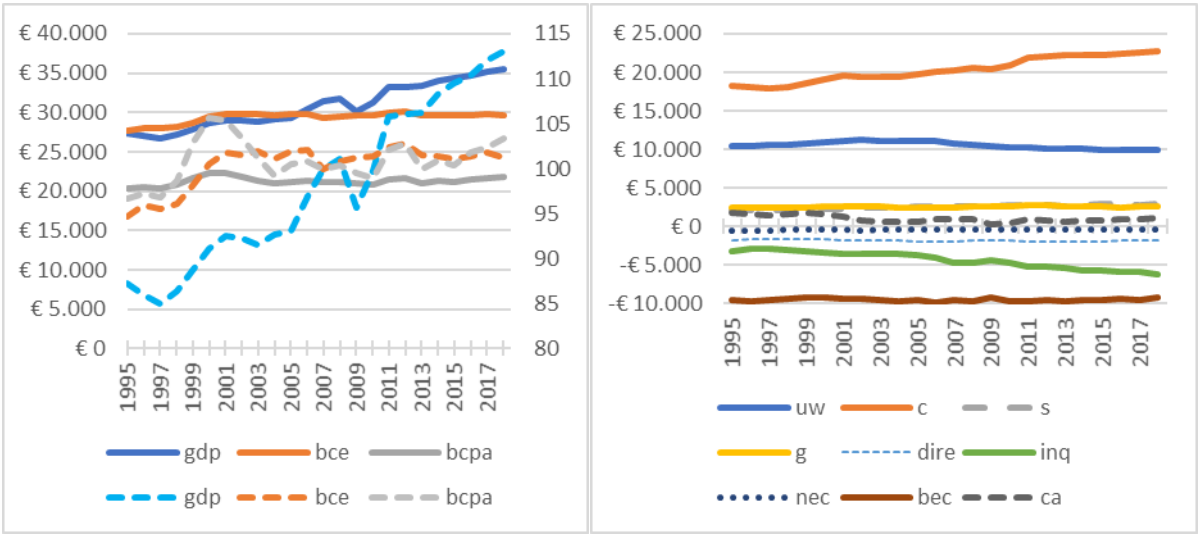
From 1995 to 2018, *France*'s gdp both improved by about 28%, while the increase in bce and bcpa were respectively 16 and 8 percentage points lower. The financial crisis resulted in a gdp decrease of 3.4% in 2009, whereas bce and bcpa grew by 2% and 0.5% in 2009. There was no delayed response in ewm as both welfare indicators remained slightly grew in 2011. All three indicators gradually improved after the financial crisis, so that gdp and bcpa reached their maximum level in 2018, as illustrated in Fig. 9. Bce, however, was in 2018 0.8% lower than its period maximum in 2014.

Figure 9: France's GDP, BCE and BCPA per capita in absolute values (left axis) and index values with 2007 = 100 (right axis) on the left panel and the evolution of the welfare categories in per capita values on the right panel. All values are in 2010 prices.



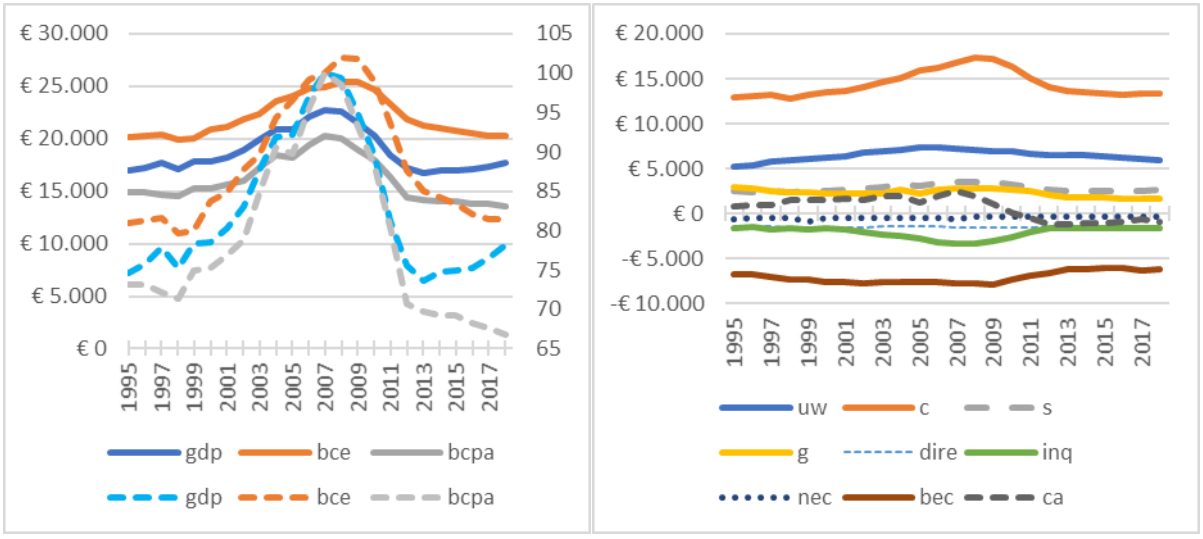
Germany's improvement in bce and bcpa was less than a quarter of its gdp growth: gdp increased by 29.5% versus an increase by 6.9% in bce and by 7.1% in bcpa. Bcpa peaked in 2000 and decreased the next four consecutive years by 6.2% because there was strong decrease in net capital growth by 65.3% (see Fig. 10). Germany's bce fluctuated around its 2001-level and peaked in 2012. The financial crisis had almost no effect on Germany's ewm, yet, bce and bcpa were more heavily impacted in 2013 when the former decreased by 1.3% and the latter by 2.8%. In 2018, bce was 1.5% lower than its peak in 2012 while bcpa was 2.1% lower than its maximum in 2000.

Figure 10: Germany's GDP, BCE and BCPA per capita in absolute values (left axis) and index values with 2007 = 100 (right axis) on the left panel and the evolution of the welfare categories in per capita values on the right panel. All values are in 2010 prices.



Greece's economic experience from 1995 to 2018 is bell-shaped: its gdp and bcpa increased from the beginning of the studied period and reached a peak in 2007 (see Fig. 11). The evolution of bce is similar, yet, bce reached its maximum in 2008. Gdp increased in 2007 by 34% compared to 1995, whereas its bce was 23.5% higher and its bcpa was even 36.7% higher in 2007 than it was in 1995 – yet, afterwards all measures decreased substantially. The financial crisis and the subsequent eurocrisis had dramatic effects on Greece's economy. Greece lost 25.9% of its gdp in the five years from 2008 to 2013 – its gdp level in 2013 was even 1.2% lower than it was in 1995 – whereas Greece's bce and bcpa decreased by 16.6% and 29.4% between 2008 and 2013. Contrarily to gdp, which started increasing from 2013, bce and bcpa continuously declined until 2018. During this welfare crash, net consumption plummeted, the value of unpaid work dropped as wages started falling and dropped by 15.8% between 2010 and 2018, the shadow economy shrunk and government expenditures were reduced.[5] More strikingly, Greece's capital adjustments dropped dramatically too, which explains why bcpa fell more than bce. From 2011 onwards, Greece even had negative net capital growth, which indicates a declining capital stock. During the last two years of the study period Greece's bce and bcpa had not stabilized yet. In 2018, bce, bcpa and gdp were respectively 20.1%, 33.2% and 21.8% below their peak value – bcpa was even still below its starting value in 1995. A final remarkable observation is that Greece bce higher than its gdp throughout the entire period.

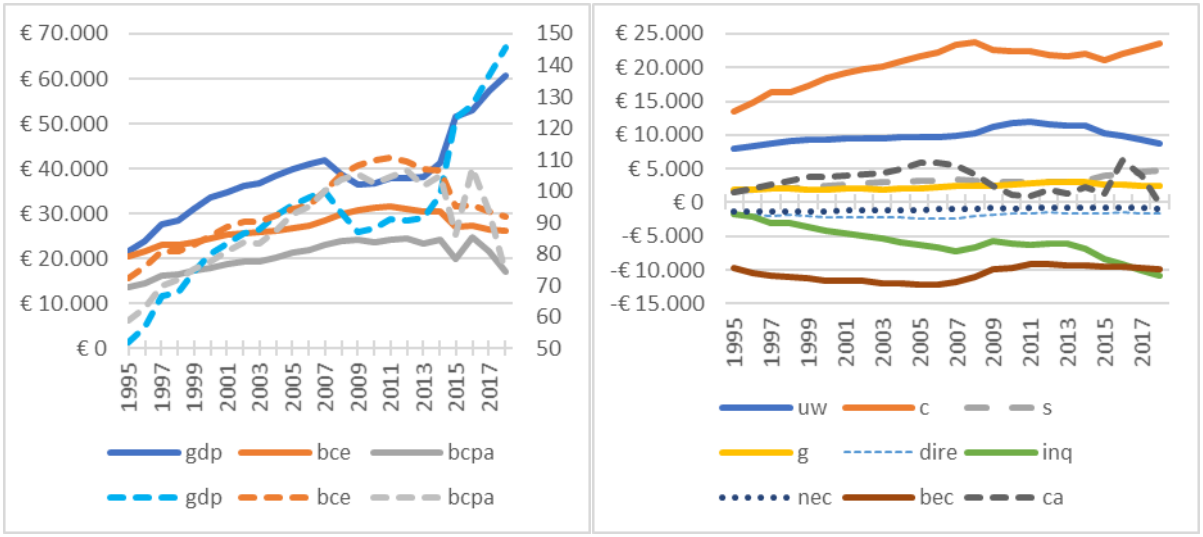
Figure 11: Greece's GDP, BCE and BCPA per capita in absolute values (left axis) and index values with 2007 = 100 (right axis) on the left panel and the evolution of the welfare categories in per capita values on the right panel. All values are in 2010 prices.



[5] The variability in the value of unpaid work depends entirely on changes in the wage rate. As we only have one datapoint, the number of unpaid hours worked is kept constant. Other countries have two datapoints, which allows me to interpolate the time use between both datapoints, which introduces time use variability too.

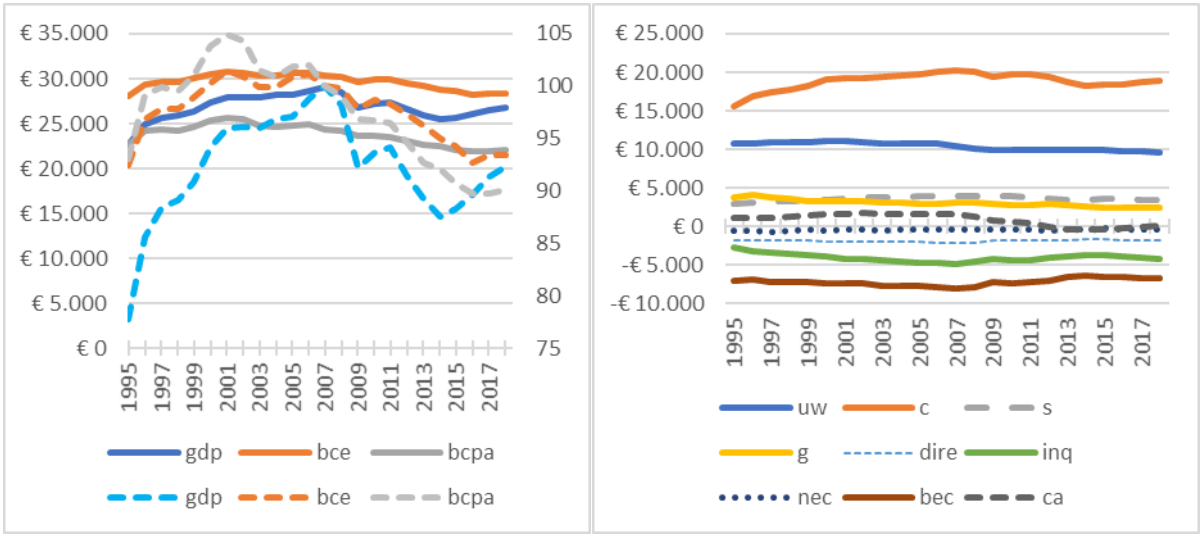
Ireland's economy grew remarkably during the mid-1990s to the late-2000s, the period when Ireland's economy was known as the 'Celtic Tiger'. Ireland's gdp almost doubled (+92.8%) between 1995 and 2007, as can be seen in Fig. 12. After a recession and stagnation in 2008-2013, gdp had grown by 180.7% by the end of the studied period. In 2018, Ireland's gdp reached its maximum with a value of more than €60,000. Ireland's improvement in bce and bcpa was less than one sixth of its gdp growth: bce increased by 27.6% and bcpa by 25.5%. Its bce peaked in 2011. While in 2016 Ireland's bcpa surged by 24.6% and peaked in 2016 after a strong increase in net capital growth by 376%. Bcpa dropped by 12.7% and 20.8% in 2017 and 2018 because its capital adjustment plunged after its earlier spike and even became negative in 2018. In contrast to the other countries, net capital growth is a quantitatively important welfare component that also introduces more variability in the Irish bcpa. Given the evolution of Irelands investments (in capital), the results of both bcpa and gdp – the Irish gdp grew by more than €10,000 (+24.5%) in 2015 – are to be used and interpreted with caution.

Figure 12: Ireland's GDP, BCE and BCPA per capita in absolute values (left axis) and index values with 2007 = 100 (right axis) on the left panel and the evolution of the welfare categories in per capita values on the right panel. All values are in 2010 prices.



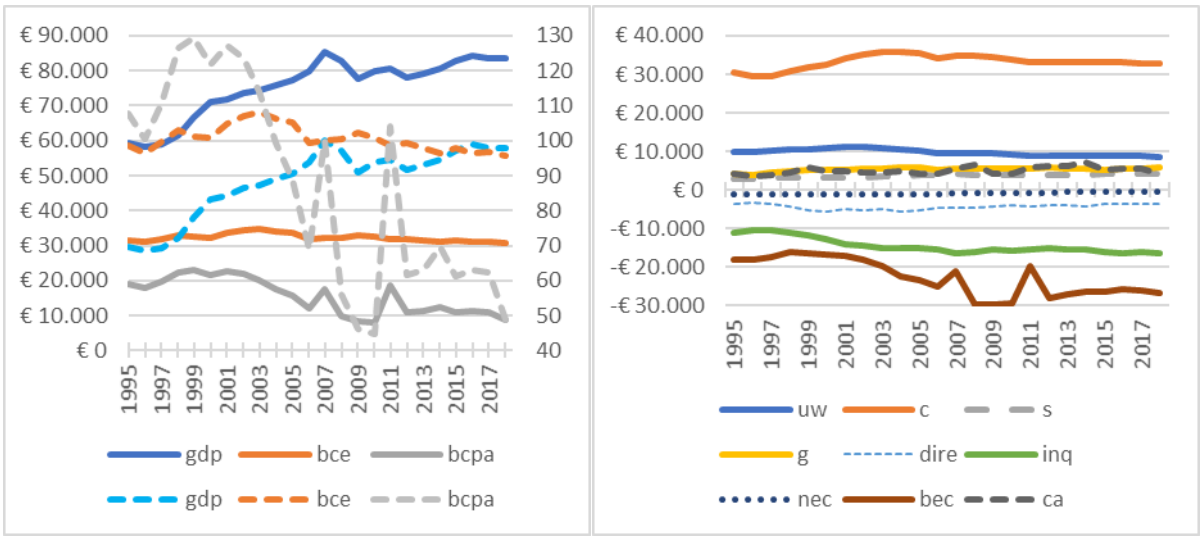
Italy is – together with Greece, Portugal and Spain – an outlier compared to all the other countries as its bce is higher than its gdp during the entire period (see Fig. 13). Italy had a double recession as it first suffered from the financial crisis and later from the eurocrisis. In 2009, its gdp fell by 6.1% while the negative effect of the crisis was less severe for its bce and bcpa as the former decreased by 1.9% and the latter by 2.3%. During the eurocrisis, gdp, bce and bcpa dwindled between 2011 and 2014. Yet, bce and bcpa continued decreasing until 2016. Similar to Greece, Italy's capital adjustment decreased substantially after the financial crisis and Italy had negative net capital growth between 2013 and 2017. Italy's gdp peaked right before the financial crisis in 2007 – it had grown by 28.6% compared to 1995 – and after the double recession, the Italian gdp was in 2018 18.7% higher than in 1995. Italy's bce and bcpa peaked in 2001 and were in 2018, respectively 1% higher and 3.1% lower than their starting value. The welfare levels were in 2018 8% lower for bce and 14.1% lower for bcpa compared to the 2001-maxima.

Figure 13: Italy's GDP, BCE and BCPA per capita in absolute values (left axis) and index values with 2007 = 100 (right axis) on the left panel and the evolution of the welfare categories in per capita values on the right panel. All values are in 2010 prices.



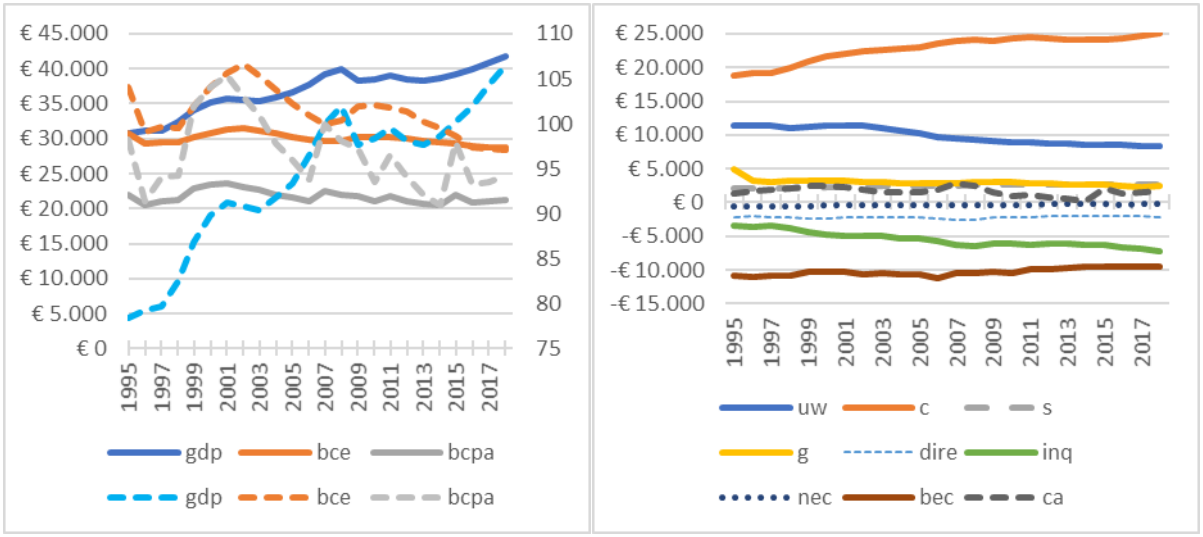
Similar to Ireland, *Luxembourg*'s gdp is extremely high too: its 2018-level of €83,000 was 40.1% higher compared to the initial year when it was almost at €60,000, as illustrated by Fig. 14. Luxembourg's bcpa was very volatile, with remarkable upturns and downturns between 2006 and 2008 and in 2011 and 2012 because its broader ecological costs – and in particular the cost of climate disruption – fluctuated heavily during these years. This volatility illustrates that Luxembourg as a small, open economy is heavily dependent on hydrocarbons. Bce was more constant throughout the entire period. Over the entire period, gdp improved by 40.1%. However, welfare decreased: bce diminished by 2.8% whereas bcpa decreased by 54.8%. Luxembourg did not recover from the financial crisis from a gdp and welfare view. In 2018, gdp was 2.1% lower than the gdp maximum value in 2007 while the values of bce and bcpa were 11.4% and 62.% lower than their maxima in respectively 2003 and 1999.

Figure 14: Luxembourg's GDP, BCE and BCPA per capita in absolute values (left axis) and index values with 2007 = 100 (right axis) on the left panel and the evolution of the welfare categories in per capita values on the right panel. All values are in 2010 prices.



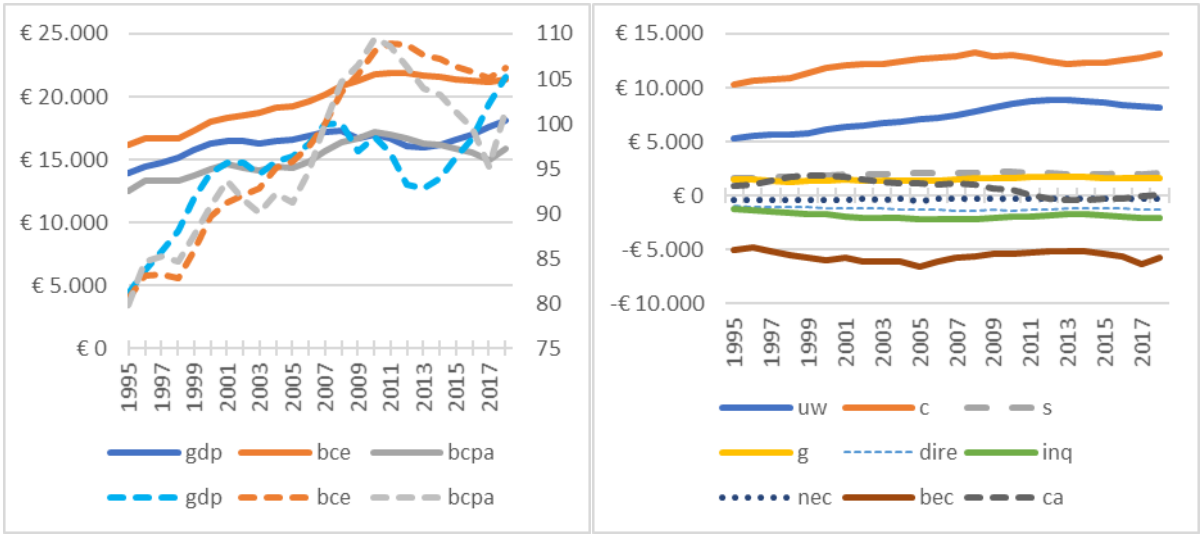
The Netherlands' gdp reached its maximum in 2018 when it had increased by 35.7% since 1995 (see Fig. 15). In 2018, bce and bcpa were still 8.9% and 10.6% lower than their period maximum in respectively 2002 and 2001. And more strikingly, the bcpa and bce of the Netherlands, decreased over time by respectively 4.1% and 6.8%. After their peak, both ewm decreased gradually in the early 2000s. During the financial crisis in 2009, both gdp and bcpa decreased by respectively 4.1% and 0.9%, yet bce improved by 1.4%. Also the Netherlands' bcpa has a negative lagged effect of this crisis in 2010 mainly because the capital adjustment decreased and (to a lesser extent) due to rising broader ecological costs. The crisis had a minor impact on the Dutch bce.

Figure 15: Netherland's GDP, BCE and BCPA per capita in absolute values (left axis) and index values with 2007 = 100 (right axis) on the left panel and the evolution of the welfare categories in per capita values on the right panel. All values are in 2010 prices.



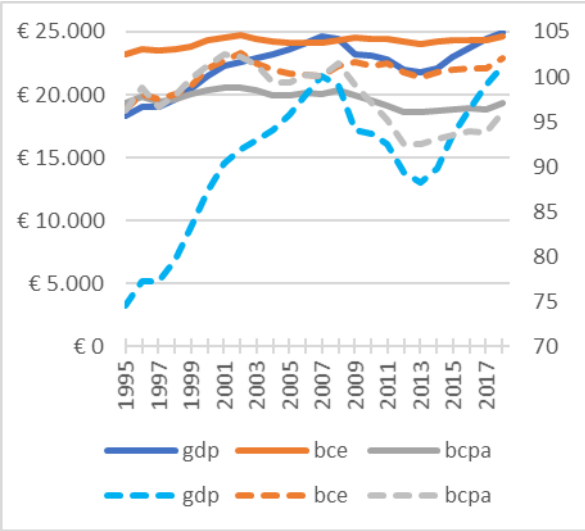
Similar to Greece, Italy and Spain, *Portugal*'s bce was higher than its gdp throughout the entire period, as depicted in Fig. 16. Gdp grew by 29.8%, which is comparable to its welfare performance as bce and bcpa improved by respectively 31.9% and 27.3% over the study period. Portugal's ewm were not negatively affected by the financial crisis between 2009 and 2010 as welfare increased. The eurocrisis, however, caused a decrease in bce and bcpa between 2011 and 2017. Bcpa diminished more sharply than bce because the capital adjustment became negative. Parallel to Italy and Greece, Portugal also had negative net capital growth between 2012 and 2017.

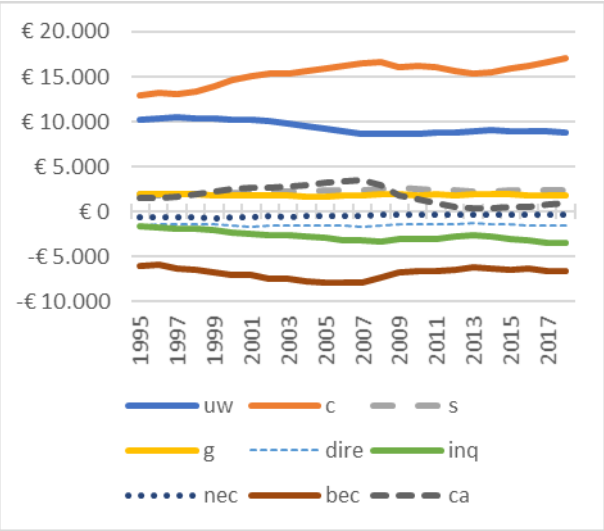
Figure 16: Portugal's GDP, BCE and BCPA per capita in absolute values (left axis) and index values with 2007 = 100 (right axis) on the left panel and the evolution of the welfare categories in per capita values on the right panel. All values are in 2010 prices.



Spain is one of the few countries whose bce is higher than gdp during the largest part of the study period, as shown in Fig. 17. Spain's gdp peaked in 2018 at a level that was respectively 35.9% than in 1995. The Spanish bce reached a maximum in 2002 at a level which was slightly higher than in 2018. Over time, bce improved by 6%. Bcpa, in contrast, slightly diminished over time: its 2018-value was 0.2% lower than its 1995-value and 6.3% lower than its maximum value in 2001. The financial crisis had a stronger impact on gdp and bcpa than on bce. Its gdp fell from 2007 to 2013, but recovered afterwards and surpassed its pre-crisis maximum value in 2018. Bcpa fell by 8.7% between 2008 and 2012, primarily because net capital growth fell sharply.

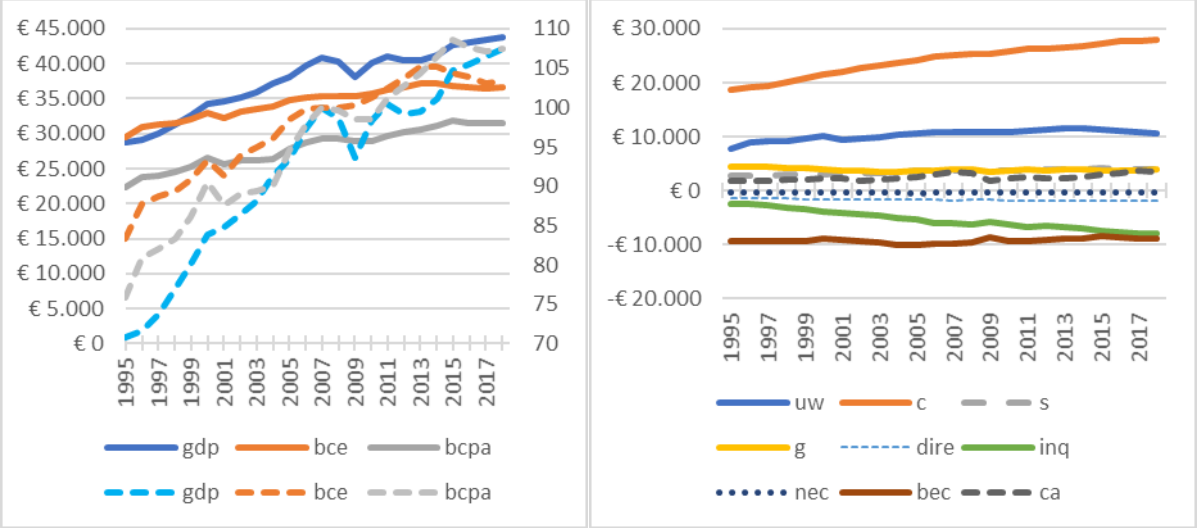
Figure 17: Spain's GDP, BCE and BCPA per capita in absolute values (left axis) and index values with 2007 = 100 (right axis) on the left panel and the evolution of the welfare categories in per capita values on the right panel. All values are in 2010 prices.


€ 25.000
€ 20.000
€ 15.000
€ 10.000
€ 5.000
€ 0
105
100
95
90
85
80
75
70
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013
2015
2017
gdp
bce
bcpa
gdp
bce
bcpa


€ 20.000
€ 15.000
€ 10.000
€ 5.000
€ 0
-€ 5.000
-€ 10.000
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013
2015
2017
uw
c
s
g
dire
inq
nec
bec
ca

Sweden's gdp, bce and bcpa all follow an upward trend as indicated by Fig. 18 . Over time, gdp grew by 51.9%, while bce and bcpa increased by 24.1% and 41.6%. All indicators dropped markedly after the financial crisis, but recovered quickly. Over time the welfare losses from income inequality increased by 224% so that 52% of the growth in consumption and the shadow economy was compensated. The Swedish gdp reached its maximum in 2018. In 2018, Sweden's bce and bcpa were respectively 1.6% and 1.1% lower than their maximum in 2014 and 2015.[6]

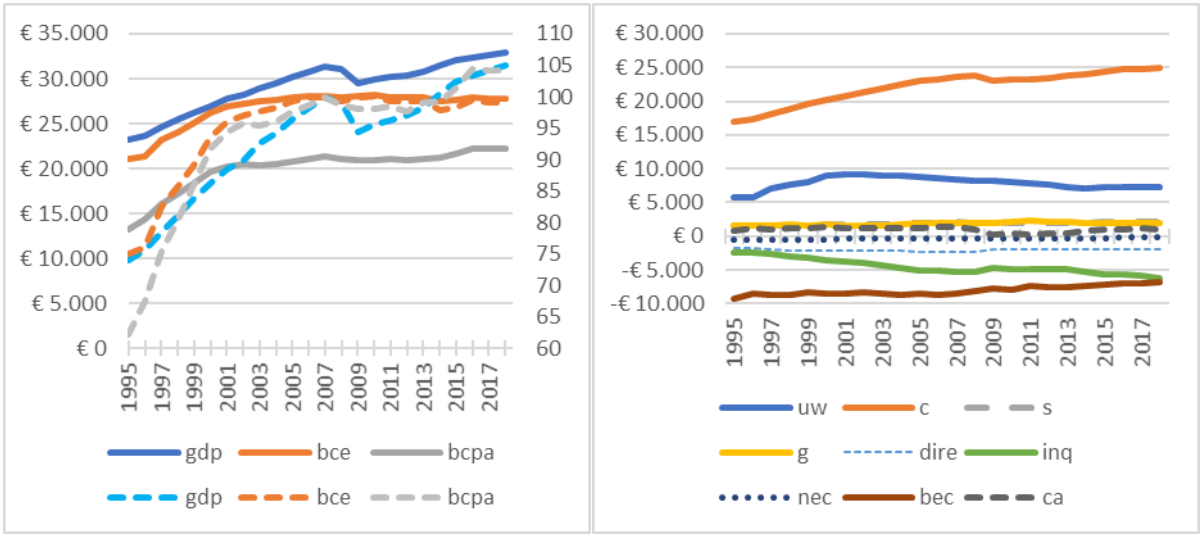
Figure 18: Sweden's GDP, BCE and BCPA per capita in absolute values (left axis) and index values with 2007 = 100 (right axis) on the left panel and the evolution of the welfare categories in per capita values on the right panel. All values are in 2010 prices.



[6] Contrary to Denmark, Sweden does not have a fixed exchange rate with the Eurozone. As indicated on Eurostat (2021) data in Euro series are not suited for comparing variables over time, which is the purpose of this paper. Therefore, it is needed to remove exchange rate effects (Eurostat, 2021). In order to study the development of these variables over time, we used data in national currency units and converted these to euros with a fixed exchange rate. Since the data are in 2010 euros, we used the exchange rate of 2010.

The *UK*'s gdp increased during the entire period, except during the financial crisis (see Fig. 19). The UK's gdp reached a maximum in 2018 when it had increased by 42.1% compared to 1995. Welfare als increased substantially in the UK over time, by 2018 bce and bcpa had grown by 32.2 and 67.1%. In 2018, bce was 1.1% lower than its 2010-maximum whereas bcpa's value was 0.2% lower than its maximum in 2016. Over time, bcpa's broader ecological costs decreased by 25.4%, which is the best performance across the EU-15. Yet, this development was more than compensated by increasing welfare losses from income inequality, an item that increased over time by 160%.[7]

Figure 19: The United Kingdom's GDP, BCE and BCPA per capita in absolute values (left axis) and index values with 2007 = 100 (right axis) on the left panel and the evolution of the welfare categories in per capita values on the right panel. All values are in 2010 prices.



3.3 Comparing maximum values in the EU-15

In the previous section, some country's bce, bcpa and gdp reached a maximum value during and not at the end of the study period. We called this a period *maximum* or a *peak*. However, some maxima were only slightly higher than the value of these indicators in 2018, while other maxima were absolutely peaks in the sense that the peak value was much higher than the indicators' level at the end of the study period. Here we will compare which countries end values are only slightly below their peak values and which countries are well below their peak values. Table 5 gives an overview of the

[7] Contrary to Denmark, the United Kingdom does not have a fixed exchange rate with the Eurozone. As indicated on Eurostat (2021) data in Euro series are not suited for comparing variables over time, which is the purpose of this paper. Therefore, it is needed to remove exchange rate effects (Eurostat, 2021). In order to study the development of these variables over time, we used data in national currency units and converted these to euros with a fixed exchange rate. Since the data are in 2010 euros, we used the exchange rate of 2010.

years in which gdp, bce and bcpa peaked and the relative difference of these indicator's value compared to the peak value.

The EU-15's bce and bcpa peaked in 2011 and 2001 and their level in 2018 was only 1.5% and 0.5% lower than these maxima. Yet, the bce value in 2018 was at least 5 percent lower than its maximum value for Italy (-8%), Luxembourg (-11.4%) and Netherlands (-8.9%). The 2018-bce was much lower than the bce-peak in Ireland (-16.8%) and Greece (-20.1%). When we compare bcpa-values, then we observe that more countries are well below their peak-value although this is not the case for the EU-15 as a whole. Austria, Finland, Portugal, Spain and Sweden are more than 5 percent below their maximum bcpa-value in 2018, while the 2018 bcpa-value of Italy and the Netherlands is respectively 14.1% and 10.6% lower than at the maximum value. The reduction in bcpa was highest in Ireland, Greece and Luxembourg, where the 2018 bcpa-values were respectively 30.8%, 33.2% and 62.3% lower than their maximum bcpa-value. Finally, gdp reached a maximum for the EU-15 and most of its countries in 2018. Yet, gdp had decreased in Finland by 1.7%, in Luxembourg by 2.1%, in Italy by 7.7% in Greece by 21.8% in 2018 compared to their pre-financial crisis period maximum.

Table 5: Year in which the EU-15-countries reached their peak or maximum GDP, BCE and BCPA (in per capita values, 2010 prices) and the relative difference between the value in the peak year and in 2018.

	gdp		bce		bcpa	
	max year	%Δ(2018-max year)	max year	%Δ(2018-max year)	max year	%Δ(2018-max year)
EU-15	2018	0	2011	-1,5	2001	-0,5
Austria	2018	0	2013	-2,4	2000	-7,2
Belgium	2018	0	2013	-2,6	2014	-3,2
Denmark	2018	0	2012	-2,6	2018	0
Finland	2008	-1,7	2012	-1,4	2012	-5,9
France	2018	0	2014	-0,8	2018	0
Germany	2018	0	2012	-1,5	2000	-2,1
Greece	2007	-21,8	2008	-20,1	2007	-33,2
Ireland	2018	0	2011	-16,8	2016	-30,8
Italy	2007	-7,7	2001	-8	2001	-14,1
Luxembourg	2007	-2,1	2003	-11,4	1999	-62,3
Netherlands	2018	0	2002	-8,9	2001	-10,6
Portugal	2018	0	2011	-2,4	2010	-7,3
Spain	2018	0	2002	-0,6	2001	-6,3
Sweden	2018	0	2014	-1,6	2015	-1,1
UK	2018	0	2010	-1,1	2016	-0,2

Note: The color scale for the peak values indicates the most recent peak years in shades of green and the oldest peak years in shades of red.

4. Revisiting the threshold hypothesis

Our welfare results for the EU-15 as a whole do not indicate a strong decline compared to its peak value. Yet, our results clearly indicate that: (a) welfare in the EU-15 has been stagnating after the financial crisis of 2008 and 2009, (b) since gdp in the EU-15 recovered from the financial crisis, there was a growing divergence between welfare and gdp after the financial crisis, and (c) the economic welfare measures in majority of the EU-15 countries (i.e. Austria, Finland, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal and Spain) were more than 5% lower by the end of the study period in 2018 compared to their earlier welfare peak.

Our results for the countries just mentioned gives evidence regarding Max-Neef's (1995) threshold hypothesis, stating that "for every society there seems to be a period in which economic growth (as conventionally measured) brings about an improvement in the quality of life, but only up to a point – the threshold point – beyond which, if there is more economic growth, quality of life may being to deteriorate". Our findings for the EU-15 as a whole give no conclusive evidence regarding the threshold hypothesis, since the economic welfare per capita in the EU-15 as a whole is less than two percent below its period maximum. The reason that the threshold hypothesis fails to materialize with a clear negative trend for the EU-15 as a whole could, however, be methodological as the EWM only include a limited amount of ecological items. The methodology that is currently used, for instance, does not include the losses in agricultural land, forests, grasslands and wetlands, because of a lack of available data.

Max-Neef (1995) thought of the threshold as indicating the point "in a country's economic evolution where quantitative growth must be metamorphosed into qualitative development", yet, he acknowledged that welfare could still increase. If we acknowledge that (a) ever increasing incomes will lead to increasingly smaller additions to welfare due to the correction for the diminishing marginal utility of income, (b) economic growth is ecologically extremely costly because of the unfolding consequences of the climate and ecological crisis and (c) many economists argue that we are in a situation of *Secular Stagnation*, in which economic growth rates have declined and are not likely to return to their earlier higher growth rates (Summers, 2016; Jackson, 2018), then policies that empower economies and societies to fare well without growth will become increasingly important in the future.

With effective social and environmental welfare policies in place that focus on redistributing and sharing resources and limiting our economies, EWM could increase beyond their earlier welfare peak or threshold point. Examples of these policies, could be a Green New Deal without growth (Mastini et al., 2021), measures that make social security and welfare systems less dependent on growth (Bohnenberger and Fritz, 2020), or a post-COVID economic agenda that takes into account inequality

(Ashford et al., 2020) and biodiversity (McElwee et al., 2020) to build back better. More concretely, Büscher et al. (2021) outline five priorities for a post-COVID development pathway: (1) a move away from development focused on aggregate economic growth, (2) an economic framework focused on redistribution and care, (3) a transformation towards regenerative agriculture and convivial conservation, (4) reduction of consumption and travel, and (5) debt cancellation.

5. Conclusion

This paper is the first to calculate welfare for the EU-15 as a whole and for its 15 original members using a comparable methodology. Two economic welfare measures were calculated, the benefits and costs experienced (BCE) and the benefits and costs of present economic activities (BCPA). The former only looks at what is experienced here and now: it only includes present ecological costs within borders and excludes capital adjustments. The broader measure looks at the impacts of present activities and, as a consequence, it includes capital adjustments and also contains the ecological costs that are shifted in time and space. Since there are substantial costs shifted in time and space, we argued that the broad welfare measure is to be preferred to inform policy-makers about the (need to tackle the) climate and ecological crisis.

For the EU-15, GDP per capita increased by 32.4% between 1995 and 2018, while its per capita BCE and BCPA improved by respectively 10.5% and 14%. These results a growing divergence between welfare and gdp over time. These trends in per capita BCE and BCPA were driven by individual consumption growth (+31%), by the shadow economy (+30.5%) and the welfare losses from income inequality (+103.9%), yet, since the welfare losses from income inequality increased, part of the growth in consumption and in the shadow economy is not translated into welfare because of the diminishing marginal utility of income. Despite these overall improvements over the entire period, GDP per capita barely improved after 2007: it only fully recovered from the financial crisis in 2015 and started growing again so that it reached a period maximum in 2018. The EU-15's economic welfare per capita already peaked right before the financial crisis in 2011 for BCE and in 2001 for BCPA. At the end of the studied period, the EU-15 had already recovered from the financial crisis from a GDP perspective, but it has not from a welfare view. In 2018, BCE per capita and BCPA per capita were respectively only 1.5% and 0.5% lower than their maximum values. As a consequence, we found no conclusive evidence regarding the threshold hypothesis for the EU-15 as a whole. Nevertheless, welfare was stagnating after the financial crisis and as a consequence there was a growing divergence between welfare and gdp. Furthermore, we found evidence of threshold points in Austria, Finland, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal and Spain, where the welfare levels were at least 5% lower by the end of the study period in 2018 compared to their maximum welfare value.

Finally, the financial crisis and its recovery had a different impact on GDP and economic welfare measures. In contrast to GDP, the response in economic welfare measures to the financial crisis of 2009 was delayed in some countries: their per capita BCPA only fell during the economic GDP-recovery in 2010 as the broader ecological costs increased. At the level of the EU-15, the broader ecological costs decreased in 2009 but increased again in 2010 during an environmentally more polluting recovery in GDP per capita. Our results thus indicate that a post-COVID agenda should prioritize a green and just economic recovery that is centered around welfare and a move beyond GDP that prioritizes human and planetary well-being by limiting and by moving beyond economic growth.

Acknowledgements

We gratefully acknowledge that this research is supported by a doctoral fellowship from the Special Research Fund (BOF) of Ghent University and we would like to thank Bart Defloor, Claire Dupont, Johan Eyckmans, Freddy Heylen and Géraldine Thiry for sharing their thoughts and comments that helped to improve an earlier draft of this article.

References

Abramovitz, M. (1958). The welfare interpretation of secular trends in national income and product. In Abramovitz, M. et al. (eds.), *The Allocation of Economic Resources.* Stanford: Stanford University Press.

Armiento, M. (2018). The Sustainable Welfare Index: Towards a Threshold Effect for Italy. *Ecological Economics, 152*, 296-309.

Ashford, N.A., Hall, R.P., Arango-Quiroga, J., Metaxas, K.A., & Showalter, A. (2020). Addressing Inequality: The first step beyond COVID-19 and towards sustainability. *Sustainability, 12,* 5404.

Beça, P. and R. Santos (2014). A comparison between GDP and ISEW in decoupling analysis. *Ecological Indicators, 46*, 167–176.

Bleys, B. (2007). Simplifying the ISEW: Methodology, Data Sources and a Case Study for the Netherlands. *International Journal of Environment, Workplace and Employment, 3*(2), 103–118.

Bleys, B. (2008). Proposed changes to the Index of Sustainable Economic Welfare : An application to Belgium. *Ecological Economics, 64*, 741-751.

Bleys, B. (2012). Beyond GDP: Classifying alternative measures for progress. *Social Indicators Research, 109,* 355-376.

Bleys, B., & Van der Slycken, J. (2019). De Index voor Duurzame Economische Welvaart (ISEW) voor Vlaanderen, 1990-2017. Studie uitgevoerd in opdracht van de Vlaamse Milieumaatschappij, MIRA, MIRA/2019/04, Universiteit Gent.

Bleys, B., & Whitby, A. (2015). Barriers and Opportunities for Alternative Measures of Economic Welfare. *Ecological Economics, 117*, 162-172.

Bohnenberger, K., & Fritz, M. (2020). Making welfare resilient. Creating stable and sustainable welfare systems in times of declining economic growth. *Transformation Policy Briefs #2*, ZOE-Institute for future-fit economies.

Brown, C., & Lazarus, E. (2018). Genuine Progress Indicator for California: 2010-2014. *Ecological Indicators, 93*, 1143-1151.

Büscher, B., Feola, G., Fischer, A., Fletcher, R., Gerber, J.-F., Harcourt, W., Koster, M., Schneider, M., Scholtens, J., Spierenburg, M., Walstra, V., & Wiskerke, H. (2021). Planning for a world beyond COVID-19: Five pillars for post-neoliberal development. *World Development, 140,* https://doi.org/10.1016/j.worlddev.2020.105357.

Clarke, M., & Islam, S.M.N. (2005). Diminishing and negative welfare returns of economic growth: an index of sustainable economic welfare (ISEW) for Thailand. *Ecological Economics, 54*(1), 81-93.

Corlet Walker, C., & Jackson, T. (2019). Measuring Prosperity—Navigating the options. *CUSP Working Paper No 20*. Guildford: University of Surrey.

Dasgupta, P. (2009). The Welfare Economic Theory of Green National Accounts. *Environ Resource Econ, 42*, 3-38.

Dasgupta, P., & Mäler, K.-G. (2000). Net national product, wealth and social well-being. *Environment and Development Economics, 5*, 69-93.

EEA (2020). Growth withouth economic growth. *Briefing no. 28/2020*. Copenhagen: European Environmental Agency, doi: 10.2800/492717.

Eurostat (2021). Annual national accounts (nama10). Eurostat metadata. Accessed on 14 September, 2021, via: Annual national accounts (nama10) (europa.eu).

Fox, M.V., & Erickson, J.D. (2018). Genuine Economic Progress in the United States: A Fifty State Study and Comparative Assessment. *Ecological Economics, 147*, 29-35.

Jackson, T. (2004). *Chasing Progress: Beyond Measuring Economic Growth.* London, UK: New Economics Foundation.

Jackson, T. (2017). *Prosperity without Growth – Foundations for the Economy of Tomorrow* (2nd Edition). London: Routlegde.

Jackson, T. (2018). The Post-Growth Challenge: Secular Stagnation, Inequality and the Limits to Growth. *CUSP Working Paper No 12*. Guildford: University of Surrey.

Jackson, T., & Stymne, S. (1996). *Sustainable Economic Welfare in Sweden: A Pilot Index 1950-1992.* Stockholm: Stockholm Environmental Institute.

Fleurbaey, M. (2009). Beyond GDP: The Quest for a Measure of Social Welfare. *Journal of Economic Literature, 47*(4), 1029-1075.

Held, B., Rodenhäuser, D., Diefenbacher, H., & Zieschank, R. (2018). The National and Regional Welfare Index (NWI/RWI): Redefining progress in Germany. *Ecological Economics, 145*, 391-400.

Hoekstra, R. (2019). *Replacing GDP by 2030 : Towards a Common Language for the Well-Being and Sustainability Community.* Cambridge : Cambridge University Press.

Hoffrén, J. (2018). Hyvinvointitalouden mittareiden käyttökelpoisuus päätöksenteossa. Eduskunnan tulevaisuusvaliokunnan julkaisu 8/2018. Helsinki: Eduskunta. Available at: https://www.eduskunta.fi/FI/lakiensaataminen/valiokunnat/tulevaisuusvaliokunta/julkaisut/Sivut/hyvinvointitalouden-mittareiden-kayttokelpoisuus-paatoksenteossa.aspx

Kenny, D.C., Costanza, R., Dowsley, T., Jackson, N., Josol, J., Kubiszewski, I., Narulla, H., Sese, S., Sutanto, A., & Thompson, J. (2019). Australia's Genuine Progress Indicator Revisited (1962-2013). *Ecological Economics, 158,* 1-10.

Kuznets, S. (1934). National Income, 1929-1932. Report presented to the 73rd U.S. Congress, 2nd Session, Senate Document No. 124, p. 7. Reprinted as National Income, 1929-1932, *NBER Bulletin 49,* 7 June 1934, p. 1.

Mastini, R., Kallis, G., & Hickel, J. (2021). A Green New Deal without growth? *Ecological Economics, 179,* https://doi.org/10.1016/j.ecolecon.2020.106832

Max-Neef, M. (1995). Economic growth and quality of life : a threshold hypothesis. *Ecological Economics, 15*, 115-118.

McElwee, P., Turnout, E., Chiroleu-Assouline, M., Clapp, J., Isenhour, C., Jackson, T., Kelemen, E., Miller, D.C., Rusch, G., Spangenberg, J.H., Waldron, A., Baumgartner, R.J., Bleys, B., Howard, M., Mungatana, E., Ngo, H., Ring, I., & Ferreira dos Santos, R. (2020). Ensuring a Post-COVID Economic Agenda Tackles Global Biodiversity Loss. *One Earth,* doi: https://doi.org/10.1016/j.oneear.2020.09.011.

Meadows, D. (1998). Indicators and Information Sytems for Sustainable Development: A Report to the Balatan Group. Hartland: The Sustainability Institute.

Menegaki, A. (2018). The basic, the solid, the site-specific and the full or total Index of Sustainable Economic Welfare (ISEW). *Economies, 6*(2), 24.

Menegaki, A., Marques, A.C., & Fuinhas, J.A. (2017). Redefining the energy-growth nexus with an index for sustainable economic welfare in Europe. *Energy, 141*, 1254-1268.

Menegaki, A., & Tsagarakis, K. (2015). More indebted than we know? Informing fiscal policy with an index of sustainable welfare for Greece. *Ecological Indicators, 57*, 159–163.

Munda, G. (2016). Beyond welfare economics: some methodological issues. *Journal of Economic Methodology, 23*(2), 185-202.

Nordhaus, W.D., & Tobin, J. (1972). Is Growth Obsolete? In NBER (Ed.), *Economic Growth* (pp. 1-80). New York: Columbia University Press.

Nourry, M. (2008). Measuring Sustainable Development: Some Empirical Evidence for France from Eight Alternative Indicators. *Ecological Economics, 67*(3), 441–456.

Okun, A.M. (1971). Should GNP Measure Social Welfare? *The Brookings Bulletin, 8*(3), 4-7.

O'Neill, D.W., (2012). Measuring progress in the degrowth transition to a steady state economy. *Ecol. Econ., 84*, 221-231.

O'Neill, D.W., Fanning, A.L., Lamb, W.F., & Steinberger, J.K. (2018). A good life for all withing planetary boundaries. *Nature Sustainability, 1,* 88-95.

O'Mahony, T., Escardó-Serra, P., & Dufour, J. (2018). Revisiting ISEW Valuation Approaches: The Case of Spain Including the Costs of Energy Depletion and of Climate Change. *Ecological Economics, 144*, 292-303.

Ostergaard-Klem, R., & Oleson, K. (2014). GPI island-style : localising the Genuine Progress Indicator to Hawaii. *Environmental Practice, 16*(3), 182-193.

Pais, D.F., Afonso, T.L., Marques, A.C., & Fuinhas, J.A. (2019). Are Economic Growth and Sustainable Development Converging ? Evidence from the Comparable Genuine Progress Indicator for Ogansiation for Economic Co-operation and Development Countries. *International Journal of Energy Economics and Policy, 9*(4), 202-213.

Raworth, K. (2017). *Doughnut Economics – Seven Ways to Think like a 21st-Century Economist.* London: Random House Business Books.

Rugani, B., Marvuglia, A., & Pulselli, F.M. (2018). Predicting sustainable economic welfare – analysis and perspectives for Luxembourg based on energy policy scenarios. *Technological Forecasting and Social Change, 137*, 288-303.

Schepelmann, P., Goossens, Y., & Makipaa, A., eds. (2010). Towards sustainable development: Alternatives to GDP for measuring progress. *Wuppertal Spezial, No. 42*, ISBN 978-3-929944-81-5. Wuppertal: Wuppertal Institut für Klima, Umwelt, Energie. Available at: http://nbn-resolving.de/urn:nbn:de:101:1-2010050792

Stiglitz, J., Fitoussi, J.-P., & Durand, M. (2018). Beyond GDP: Measuring What Counts for Economic and Social Performance. Paris: OECD Publishing. Available at: https://doi.org/10.1787/9789264307292-en

Stiglitz, J., Sen, A., & Fitoussi, J.-P. (2009). Report by the Commission on the measurement of economic performance and social progress. Available at: http://www.stiglitz-sen-fitoussi.fr/

Stockhammer, E., Hochreiter, H., Obermayr, B., & Steiner, K. (1997). The index of sustainable economic welfare (ISEW) as an alternative to GDP in measuring economic welfare. The results of the Austrian (revised) ISEW calculation 1955-1992. *Ecological Economics, 21*, 19-34.

Summers, L.H. (2016). The Age of Secular Stagnation: What It Is and What to Do About It. *Foreign Affairs, 95*(2), 2-9.

van den Bergh, J.C.J.M. (2009). The GDP paradox. *Journal of Economic Psychology, 30*(2), 117-135.

Van der Slycken, J., & Bleys, B. (2020). A conceptual exploration and critical inquiry into the theoretical foundation(s) of economic welfare measures. *Ecological Economics, 176,* https://doi.org/10.1016/j.ecolecon.2020.106753

Van der Slycken, J., & Bleys, B. (2021). Toward ISEW and GPI 2.0, part I : developing two alternative measures of econoic welfare with distinct time and boundary perspectives for Belgium.

Victor, P.A. (2019). *Managing without Growth: Slower by Design, not Disaster* (2nd Edition). Cheltenham: Edward Elgar Publishing.