Improving the quality of public spending in Europe

Social policy

STUDY

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This study analyses the potential European Union (EU) added value (or untapped cost of non-Europe) in certain areas of social and labour policy: short-time work schemes, anti-poverty and inequality-reduction measures, and minimum wage regulations. The three areas are closely interlinked, and the study shows the potential relevance of EU action in addressing the main existing challenges. The quantitative analysis uses the 'budgetary waste rate' approach to measure the potential efficiency gains in the selected areas. Finally, the study discusses the channels that could allow the EU to support these gains and improve social outcomes.

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Executive summary

Social policy has been at the centre of European Union (EU) discussions for many years, seen as a way to move towards an 'upward convergence' among EU countries. In 2010, the Europe 2020 strategy – as an overarching, long-term 'growth and jobs' strategy of the EU – was built around five ambitious objectives, covering employment; fighting poverty and social exclusion; innovation; climate change and energy sustainability; and education. In 2017, the European Parliament, the Council and the European Commission proclaimed the European Pillar of Social Rights (social pillar), setting out 20 key principles towards achieving a strong social Europe. This commitment was reaffirmed at the 2021 Porto social summit.

However, a number of crucial issues on social and labour conditions in the EU persist, and major challenges remain in the capacity to protect employment in downturns and in granting wages that allow for adequate living conditions, since major inequalities persist both within (based for instance on gender, migration status, occupation and contractual arrangements) and across Member States (signalling the limitations in the convergence process within the EU). Other challenges are related to the capacity of protecting people (both in and outside employment) from poverty and sustaining both workers' conditions and the purchasing power of wages. The fragmentation of the EU labour market across a wide range of temporary contracts and involuntary part-time and self-employment is part of this challenging context. The framework at the EU level is very heterogeneous across these areas.

This study analyses the potential EU added value (or untapped cost of non-Europe) in selected areas of social policy. To quantify this potential, it adopts the 'budgetary waste rate' methodology. The policy areas explored are:

- **short-time work schemes** with the potential to stabilise employment levels;
- **anti-poverty and inequality-reduction measures**, such as minimum income policies, and fighting poverty, inequality and social exclusion;
- **minimum wage regulations** as a preventive approach to avoiding in-work poverty.

These policy areas are strongly interlinked. By way of example, employment protection in the short run during downturns can also have long-run implications on the employment level and can avoid losing human capital. As another example, the level and distribution of wages affect poverty and inequality and, in turn, anti-poverty measures can support workers' conditions. There are also some cross-cutting issues across these policy areas, such as the **gender** dimension: women are more affected by poverty and lower protection due to flexible working arrangements; labour market participation and hours worked are affected by the distribution of care work and the presence of social support; the presence of women in low-wage employment is increasing substantially and, therefore, employment protection and wage increases in these occupations have the potential to decrease gender inequality.

The scale, scope, governance and design of public policies in these areas are crucial for their effectiveness and efficiency. The EU can play a role in supporting both, as analysed by this study. The quantitative analysis calculates and illustrates the 'budgetary waste rate' specifically on the efficiency side, and shows how greater integration at the EU level could improve social outcomes and allow for better use of resources. In addition, this study analyses the potential channels that explain **EU added value**, i.e. the ways in which greater action at the EU level could improve social outcomes and reduce the calculated missed gains. EU-level action can be particularly beneficial in situations in which:

- there is the possibility of generating supra-national public goods, which are especially relevant in cases of strongly integrated economies, as is the case within the single market: higher social standards can be regarded as EU-level public goods;

- there are risk-pooling opportunities and room for increased solidarity;
- there are cross-border spillovers and the need to avoid 'races to the bottom' in terms of social standards;
- there is the possibility of exploiting economies of scale;
- there is room for reduced costs of financing.

The calculation of the '**budgetary waste rate**', a possible way of identifying the 'cost of non-Europe', is done through a benchmarking technique, the data envelopment analysis (DEA), and is detailed in the annexed paper drafted by the Centro di ricerca sul Lavoro 'Carlo Dell'Aringa' (CRILDA). DEA compares EU Member States starting from the definition of input (in general terms, public spending for a specific social policy) and outcome (a goal Member States pursue with the public policy), assuming the existence of a common 'frontier' at the EU level. This frontier is constructed on the basis of the 'efficiency' criterion: a country is on that frontier if no other countries produce a greater level of outcome with the same level of input. While DEA allows for the distance from the common frontier to be described and the 'waste' in public budgets to be computed, it is not suitable for investigating the (causal) effect of a social policy on the expected outcomes. Of course, the way the 'outcome' is defined strongly influences the results and should be carefully taken into consideration.

For each policy area, several possible outcomes are selected. Depending on the variables used to capture the desirable social outcome more adequately, the overall 'budgetary waste' from all 27 EU Member States (EU-27), which could be reduced by means of EU action, ranges **between €9.8 billion and €30.1 billion**. The computation of the 'budgetary waste rate' thus indicates that there is ample room for increasing these policies' efficiency and effectiveness.

Expenditure for **short-time work (STW) schemes** over the 2008-2017 period amounted, in absolute terms, to about €7.6 billion per year. The estimated waste rate is of particular relevance in the short run: between €4.1 billion (54 % of SWT expenditure) and €4.8 billion (62.7 % of SWT expenditure). However, the long-run effects provide a different picture, showing a significantly lower waste rate (in the range of 5-16 %). While in the short run, the success of STW schemes is measured by their capacity to reduce employment volatility, in the long run, it is measured by the average employment rate. The spending for STW schemes may be relatively high – in the short run – during a recession. Its capacity to stop when the recovery kicks in may enable companies and workers not to use these schemes longer than necessary, but restart business as usual or reallocate the resources, with the result being a higher employment rate. This positive outcome needs to be supported by other policies, such as unemployment benefits and active labour market policies.

Anti-poverty measures are expected to decrease both poverty and inequality. Higher expenditure targeted to fight social exclusion is indeed associated with lower poverty and lower inequality. Once the 'EU efficiency frontier' is identified, the size of the inefficiency depends on the indicator used, and ranges between €3.3 billion and €18.7 billion. These policies (such as basic income measures) are particularly important under recessions, since poverty increases in economic crises. Moreover, they could have positive spillovers on employment conditions.

At the same time, increasing wages, in particular at the bottom of the wage distribution, is expected to reduce poverty and inequality. **Minimum wage legislation** differs from the previous two cases as it does not have direct budgetary implications. Still, the expected impact is again to reduce poverty and inequality, and particularly to reduce the share of low-wage earners. In this case, the study looks at the correlation between the 'bite' of the minimum wage (its level with respect to the median wage in the country) and the share of low-wage earners: the bigger the former, the smaller the latter. It is then possible to compute the number of low-wage earners who would be able to leave the low-wage status if an effective minimum wage policy was in place: in the EU, there are more than 23 million low-wage earners, of which about 10 % could increase their earnings if these inefficiencies were addressed.

These are potential unrealised gains that could be attainable through EU action. The sources of **EU added value** analysed here and in the annexed research paper are further discussed. Some of the advantages of EU action are evident thanks to recent experiences, such as the implementation of the SURE mechanism to promote and support STW schemes in Member States. Other potential benefits are currently part of the debate, such as the Commission proposal for a directive on adequate minimum wages in the EU. Some other tools could be part of instruments available at the EU level, such as labour market regulations to combat precarious employment; actions to support the purchasing power of wages; closing gender inequalities on the labour market (addressing challenges in the care sector, for example); and, overall, favouring upward convergence of social standards within the EU.

STW schemes offer companies and employees advantages over the alternative of laying off workers in a crisis. With its volume of €100 billion, SURE – as an EU financial instrument – has had a sizable macroeconomic stabilisation effect. The increase in unemployment rates during the 2020 crisis was significantly lower than during the 2009 financial crisis, despite the higher decrease in gross domestic product (GDP). With its clear conditionality, the link between STW schemes and the protection against dismissals, SURE has delivered what has been missing in the past:

- an EU counter-cyclical fiscal capacity;
- an improvement of the EU's 'fast track' ability and management to respond effectively and efficiently to unprecedented social and economic developments;
- social innovation, with the majority of Member States indicating that the instrument played a role when they introduced new STW schemes or modified existing ones.
- With a volume of €100 billion, SURE made more short-time work schemes possible.
- Member States that benefitted from SURE have saved a total of €8.2 billion on interest payments alone by receiving financial assistance through SURE, which offered lower interest rates than those they would have paid if they had issued sovereign debt themselves.
- More importantly, SURE has been a lifeline that enabled millions of EU workers to avoid being confronted with the permanent scars of revenue losses and precarity.
- Lastly, the participation of women and young people in short-time work increased; this reflects the change in the sectoral composition of the support away from manufacturing and construction towards services and retail, i.e. sectors with a significantly higher share of women and young people in employment.

In the area of **anti-poverty and inequality-reduction measures**, inefficiencies can be reduced and social outcomes improved (thus reducing the incidence of poverty and inequality) by EU action aimed at:

- support for broad approaches to tackling poverty and intersectional inequalities in the EU;
- savings in the costs of financing, since the EU can borrow at much more favourable conditions than some Member States on their own account;
- the possibility of risk pooling, since business cycles within the EU are correlated imperfectly, and there is evidence that the variability of social expenses is lower within bigger economic areas (and, indeed, lower in the EU-27 than in each Member State);
- implementing anti-poverty measures at a greater scale, which can lower the cost of provision;
- a more cohesive society, in which less favoured regions, sectors and individuals are not left behind.

EU action could help reduce inefficiencies in implementation of statutory minimum wage rules, which exist both in Member States relying on statutory minimum wages and in those relying on

sectorial minimum wages defined by collective agreements. The EU added value stems from a number of channels, including the possibility of:

- increasing the level of minimum wages (and their purchasing power) to guarantee adequate standards of living; this would have a specific impact on gender inequalities, given the feminisation of low-paid jobs; and supporting the positive impacts of these levels on the level of median and average wages;
- improving coverage of minimum wages: in the EU, six Member States do not have minimum wage regulations, and the other 21 appear to have both adequacy and coverage issues that still leave a large share of workers in low-wage status and poverty;
- supporting additional actions to address the other root causes of in-work poverty, including precarious employment and poor protection of workers in some categories;
- supporting actions to address gender inequalities in the labour market, taking into account the relevance of care work and the positive impact of public sector employment on the increase of mid- and high-wage employment for women;
- favouring upward convergence in minimum wages across the EU. Relatedly, of reinforcing the level playing field in the single market and avoiding a race to the bottom on wages and working conditions, and addressing inequality, in particular between genders, the proliferation of unwanted part-time arrangements at the expense of workers, and labour market fragmentation.

Overall, this study confirms, in line with the social pillar, that there is considerable added value in EU action in the area of social policies, both in areas with and without budgetary implications. Greater added value can be achieved by combined action in several policy areas to address and exploit the **interlinkages** among them.

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1. Background

The European Added Value Unit (EAVA) of the European Parliamentary Research Service (EPRS) provides unique expertise for the European Parliament. The objective of the unit is to provide an evidence-based approach by analysing potential costs and benefits through common EU action that could result in greater efficiency and provision of public good.

This study is a contribution to and further development of the 'Establishing national budgetary waste rates' project, related to the implementation of the European Parliament's strategic execution framework. The waste rate concept could serve as a tool to provide an evidence-based approach and further enhance the Parliament's role in setting the legislative agenda. The approach aims to provide evidence on the potential added value of common action at EU level, and therefore to help define long-term policy objectives for both Member States and the EU. In addition, enabling higher efficiencies and ensuring additional public goods would help to develop a positive narrative also from a citizens' perspective.

The analysis uses the waste rate methodology as defined and developed in the 2020 study on 'Improving the quality of public spending in Europe – Budgetary "waste rates" in EU Member States'.[1] The 2020 study looked into budgetary expenditures of Member States in four policy areas: healthcare, energy and environment, social protection and defence. The authors estimate that €180 billion per year could be saved by improving the allocation of budgetary resources.

The waste rate methodology is applied to three key areas of social policy: short-time work schemes, anti-poverty schemes and minimum wage regulations. The aim is to establish whether and under which circumstances budgetary benefits and cost savings could be achieved through common action at EU level. The analysis puts into context the main challenges in fighting poverty (including in-work poverty), inequality and employment protection. It also discusses the channels through which EU added value can be achieved.

The study draws on a research paper[2] drafted by the Research Centre on Labour – Centro di ricerca sul Lavoro 'Carlo Dell'Aringa' (CRILDA) – at Università Cattolica del Sacro Cuore in Milan, at the request of the European Parliamentary Research Service (EPRS).

1.1. EU policy context

Social policy has long been at the centre of EU discussions, seen as a way to move towards an 'upward convergence' among EU countries. The Europe 2020 strategy[3] as an overarching, long-term 'growth and jobs' strategy of the EU, was built around five ambitious measurable targets, including employment, fighting poverty and social exclusion, as well as innovation, climate change, energy sustainability, and education.[4] In 2017, the European Parliament, the Council and the Commission proclaimed the **European Pillar of Social Rights** (social pillar), setting out 20 key principles towards achieving a strong social Europe.[5]

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1 J. Saulnier, Improving the quality of public spending in Europe – Budgetary 'waste rates' in EU Member States, EPRS, European Parliament, October 2020.

2 By C. Lucifora, G. Turati and L. Gerotto.

3 Europe 2020: A strategy for smart, sustainable and inclusive growth' (COM(2010) 2020), March 2010, and resolution of 28 October 2015 on cohesion policy and the review of the Europe 2020 strategy, European Parliament.

4 Europe 2020: A European strategy for smart. sustainable and inclusive growth, European Commission.

5 European Pillar of Social Rights, November 2017.

To finally start translating these principles and commitments in to concrete actions, the Commission adopted the European Pillar of Social Rights action plan[6] in March 2021. The action plan outlines how Commission and EU action could complement national action in implementing the social pillar principles. During an exchange of views with Nicolas Schmit, European Commissioner for Jobs and Social Rights, members of the Parliament's Committee on Employment and Social Affairs (EMPL) asked for more ambitious action in the fight against poverty, and introduction of measurable indicators for the minimum wage.[7]

Despite a decline over the past decade, around 91 million people were at **risk of poverty or social exclusion** in 2019 in the EU. To address this problem, the EU set a target of reducing this number by at least 15 million by 2030.[8] The **coronavirus pandemic** has put additional pressure on social systems and worsened citizens' social wellbeing, as confirmed by early estimates from Eurostat showing a 7.2 % decrease in work income across the EU in 2020 compared with 2019. The loss varies across the EU Member States, impacting heavily the most vulnerable groups. Young workers (16-34 years) face the highest risk of poverty. Among Member States, a significant increase in the at-risk-of-poverty rate is noted in (in order of magnitude) Portugal, Greece, Spain, Italy, Ireland, Slovenia, Bulgaria, Austria and Sweden. The Eurostat data also show that the median disposable income and the risk-of-poverty rate remain stable overall in the EU, as social benefits and short-time work schemes could alleviate the pandemic's effects (employment income decreases were partly compensated by social policy interventions).[9] Short-time work schemes have played a key role in preserving employment and alleviating the pandemic's negative impact. Despite the decrease in real gross domestic product (GDP) by 6.8 % in 2020, unemployment increased by only 0.2 percentage points during the same period.[10]

Beyond aggregate figures, the situation is heterogeneous. While in around half of EU countries, the at-risk-of-poverty rate remained stable, eight countries experienced an increase in 2020. The largest decrease in median income between 2019 and 2020 was recorded in Cyprus, Italy, Belgium and Greece, as also shown in Figure 1, indicating significant difference between Member States.[11]

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6 The European Pillar of Social Rights Action Plan, European Commission, March 2021.

7 MEPs want more ambition in Action Plan for implementation of European Pillar on Social Rights, press release, Agence Europe, 6 March 2021.

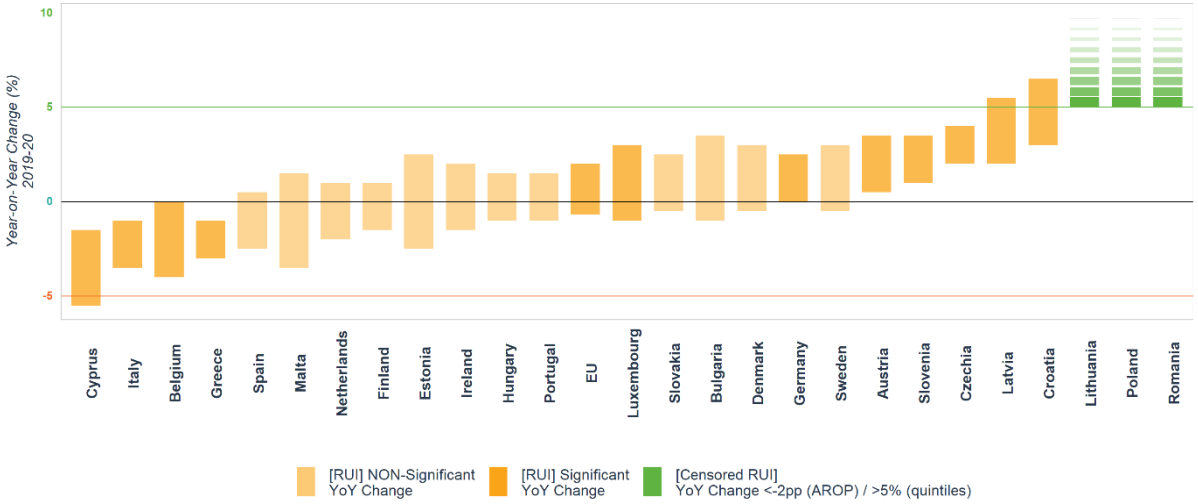
8 The European Pillar of Social Rights Action Plan, European Commission website.

9 Early estimates of income inequalities during the 2020 pandemic, Eurostat, June 2021.

10 Report on the European instrument for Temporary Support to mitigate Unemployment Risks in an Emergency (SURE) following the COVID-19 outbreak: SURE: One Year On, COM(2021) 596, European Commission, September 2021.

11 Early estimates of income inequalities during the 2020 pandemic, Eurostat (consulted in February 2022).

Figure 1: Median income change 2019-2020, flash estimates



Source: Eurostat.

During the pandemic, the EU played an important role in supporting national short-time work schemes, but there is room for more action to support anti-poverty and inequality reducing measures. The signatories of the Porto social commitment recognise the increasing inequalities and the need to channel resources to, among others, reducing poverty and social exclusion. Attention should be paid to the communities most impacted, and to ensuring decent wages and working conditions.[12] To this end, and in respect of national traditions and social partners, the European Commission presented a proposal for a directive on adequate **minimum wages**[13] in October 2020.

1.2. Gender perspective in EU social policy

To assess the progress of gender equality in the EU, the gender equality index is used. In 2021, the EU scored 68 out of 100 points, 0.6 points more than in 2020. Most importantly, differences between countries are noted, as Sweden, Denmark, the Netherlands, France and Finland scored above 75, while Greece, Hungary and Romania scored below 55 points. The pandemic has only worsened the situation for women as they face a longer economic fallout.[14]

The most visible component – the gender pay gap – in the EU reached 13 % in 2020 (14.1 % in 2019), meaning that, on average women's gross hourly earnings were 13 % lower than those of men.[15] Despite a slight improvement at EU level, gender pay gap levels vary significantly across EU countries. Figure 2 shows these differences at national level, ranging from 0.7 % in Luxembourg to 22.3 % in Latvia.

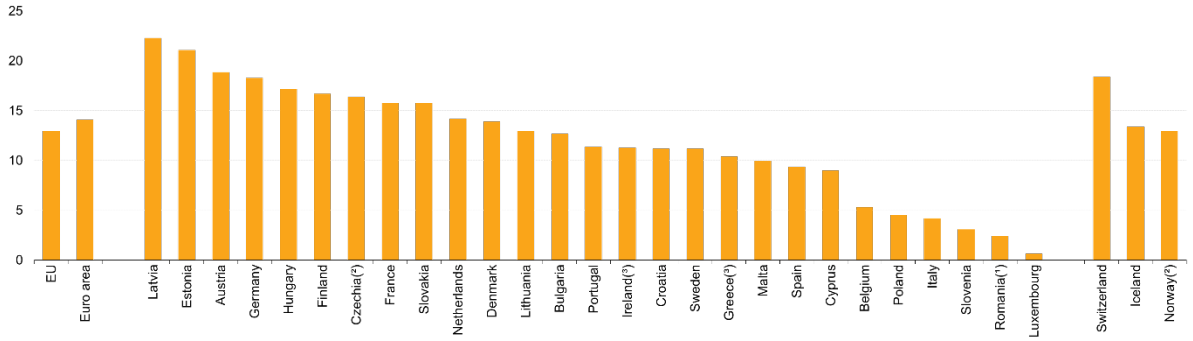
12 Porto social commitment, signed during the Porto Social Summit of 7 May 2021.

13 Proposal for a directive on adequate minimum wages in the European Union, COM(2020) 682, European Commission.

14 Gender Equality Index, European Institute for Gender Equality website.

15 Gender pay gap statistics for 2020, Eurostat, March 2022.

Figure 2: Unadjusted gender pay gap, 2020



Source: Eurostat. The graph shows the difference between average gross hourly earnings of male and female employees in % of male gross earnings. Czechia and Iceland are not included. Data from enterprises employing 10 or more employees; (1) estimated data; (2) definition differs; (3) 2018 data.

Looking at a broader perspective of employment, only 67 % of women in the EU are employed (compared with 78 % of men) and their pensions are 30.1 % lower than those of men.[16] According to recent Eurofound research, [17] female employment has increased in recent years. This increase, however, happened in a rather polarised way: it has been substantial among low-paid jobs, but has been greater than for men in the upper end of the wage scale. The most relevant contribution as regards medium- and high-paid women employment has been given by public-sector employment.

It is also important to note that 75 % of unpaid care and domestic work in the EU is done by women.[18] To address these large inequalities, the Commission has presented policy objectives and actions to achieve a gender-equal Europe by 2025, aimed at closing the gender pay gap, including binding pay transparency measures; closing the pension gap; and ensuring equal participation across different sectors of the EU economy. The strategy combines a dual approach of gender mainstreaming and intersectionality, as women might face discrimination on several grounds, such as race or disability.[19]

The pandemic has had a worse impact on women, as their jobs tend to be less protected from unemployment; and lockdowns in general have had more severe consequences on services involving contacts with clients, dominated by women (61 % of workers).[20] The pandemic's consequences, including lockdowns and closures of childcare facilities, have affected more single mothers, of whom almost 48 % were already before the pandemic at risk of poverty or social exclusion.[21] As further discussed in Sections 4.2.1 and 4.3.1, in particular, women are becoming increasingly present in low-paid jobs.

European Parliament has recalled that women continue facing inequalities on labour market such as in the form of gender pay gap and job insecurity as well as being more affected by poverty and social inclusion.[22] The Parliament has also pointed out that the risk of poverty and social exclusion

16 Striving for a Union of Equality: The Gender Equality Strategy 2020-2025, European Commission, March 2020.

17 European Jobs Monitor 2021: Gender gaps and the employment structure, Eurofound, 2021.

18 Striving for a Union of Equality: The Gender Equality Strategy 2020-2025.

19 ibid.

20 Four out of ten employees work in direct contact with clients, customers or patients, press release, Eurofound, 16 July 2020.

21 Review of the implementation of the Beijing Platform for Action, European Institute for Gender Equality, September 2016.

22 Resolution of 15 December 2020 on equality between women and men in the EU in 2018-2020, European Parliament.

has been higher for women (22.9 %) compared with men (20.9 %). In 2020, 42 % of single adult households with dependent children were at risk of poverty and social exclusion, while 85 % of these households were headed by women.[23] The Parliament also criticised the lack of ambition on equal pay between men and women in the context of the action plan for the implementation of the social pillar.[24] In its report on the proposal for a directive on the adequate minimum wages, the Parliament insists on the need to close the gender pay gap and reduce inequalities and discrimination.[25] Gender inequalities not only have social but also economic consequences. An EPRS study from 2018 estimates a potential net benefit of about €13 billion per year, should improved access to leave and flexible working arrangements be in place.[26] Assuming that the combined effect of these two measures could reduce the gender pay gap by two percentage points, this would amount to a potential GDP increase by €43 billion per year.[27]

More specifically on women's poverty, the Committee on Women's Rights and Gender Equality (FEMM) calls on the Commission to present an ambitious 2030 European anti-poverty strategy, including concrete poverty-reducing targets and focusing on eliminating women's poverty and the risk of intergenerational poverty. The draft report highlights the need to analyse women's poverty from an intersectional approach, including origin, age, race and gender orientation, and calls for the inclusion of the gender equality index[28] in the social scoreboard.[29] More broadly, gender aspects should be mainstreamed in a whole range of sectors, from climate adaptation and digital policies, to fiscal and pension policies.

Despite several legislative[30] and non-legislative initiatives[31] adopted at EU level to address female employment, a number of challenges remain. Further action is required to harmonise pension schemes, better reconciliation of family and career life, more flexible working arrangements, as well as the gender pay gap.[32]

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23 Resolution of 7 December 2021 on women's poverty in Europe, European Parliament.

24 MEPs want more ambition in Action Plan for implementation of European Pillar on Social Rights, Agence Europe, 6 March 2021.

25 Report on the proposal on the adequate minimum wages in the EU, European Parliament, November 2021.

26 W. van Ballegooij with J. Moxom, Equality and the Fight against Racism and Xenophobia: Cost of Non-Europe Report, EPRS, European Parliament, March 2018.

27 Europe's two trillion euro dividend: Mapping of the Cost of non-Europe 2019-2024, EPRS, European Parliament, April 2019.

28 The gender equality index has been developed by the European Institute for Gender Equality (EIGE).

29 Draft report on women's poverty in Europe, FEMM committee, European Parliament, 7 December 2021.

30 Such as for instance Directive 2019/1158 on work-life balance for parents and carers.

31 Such as the European Pillar of Social Rights, the Strategic engagement for gender equality (2016-2019), commitments in the European Commission's political guidelines on EU gender equality strategy.

32 M Kiss., Recent trends in female employment, EPRS, European Parliament, October 2020.

2. Economic rationale – Why should the EU act?

The previous section underlines that, despite advancements, major challenges still remain in the fight against poverty (including in-work poverty) and inequality in the EU. This will be further developed in Sections 4.1.1, 4.2.1 and 4.3.1. Several works argue that greater EU integration in some policy areas would bring benefits not only in terms of improved economic, social and environmental outcomes but also of greater protection of fundamental rights.[33] The Mapping of the Cost of Non-Europe 2019-2024[34] identified significant economic losses owing to the lack of both EU-level action and EU integration. Some examples in the social policy and employment area can be found in Table 1 below.

Table 1: Estimates of the cost of non-Europe in selected social and employment areas

Policy areas	Potential economic gain
Common unemployment insurance scheme	17 billion/year
Reducing the gender pay gap	43 billion/year
Better information for and consultation of workers	12 billion/year
Addressing health inequalities	72 billion/year

Data source: Europe's two trillion euro dividend: Mapping the Cost of Non-Europe 2019-2024, EPRS, April 2019.

This study explores the following policy areas:

1. short-time work schemes
2. anti-poverty and inequality-reduction measures
3. minimum wages.

In these areas, the analysis calculates and illustrates the 'budgetary waste rate' and how greater integration at the EU level could result in improved outcomes and better use of resources.

Related to the cost of non-Europe, the concept of budgetary waste rate is based on the thinking that changes in the governance of public policies can improve the performance of public policies in some areas, in particular by allowing better use of resources mobilised through public expenditure, and thus bring added value. More specifically, this study analyses the gains (EU added value) that could be obtained by greater European integration in the area of social policy.

'Waste rate' can be interpreted as the distance between the status quo in Member States in terms of the relation between inputs and outputs of public policies and a potential 'efficiency frontier'. The frontier is 'the minimum amount of public resources needed to achieve a fixed desired level of output/outcome or, conversely, the largest possible amount of output/outcome that can be obtained given a fixed level of input (e.g. public spending)' (Saulnier, 2020).[35] The 'waste' is the measure of how much would be gained if all Member States were on that frontier.

Therefore, 'waste rate' can be partly interpreted as the gain of a process of upward harmonisation in social policy: despite its focus on budgetary efficiency, the analysis can shed light on the gains

[33] Europe's two trillion euro dividend: Mapping the Cost of Non-Europe 2019-2024, EPRS, April 2019, and Mapping of the Cost of Non Europe – update, EPRS, forthcoming.

[34] Europe's two trillion euro dividend: Mapping the Cost of Non-Europe 2019-2024, EPRS, April 2019.

[35] J. Saulnier, Improving the quality of public spending in Europe - Budgetary Waste rates in EU Member States, European added value in action, European Parliamentary Research Service, October 2020.

achieved by bringing all Member States to the level of social policy outcomes of the 'best performers' (among Member States). As highlighted in other publications,[36] one of the sources of the cost of non-Europe could be the potential gains in upward harmonisation of social standards across the EU.

According to the subsidiarity principle, a policy should be assigned to the EU level only if the latter could offer the same outcomes as Member States in the most efficient way. The analysis of 'waste' can thus be linked to the subsidiarity analysis, and support (or mitigate) the claims that a certain policy could be addressed more adequately at the EU level. The factors that can support moving a policy area to a higher level, and that are consequently channels of European added value, include the following.

Supranational **public goods** that would not have been available if these competences were kept at the Member State level can be relevant in cases of strongly integrated economies, such as within the single market: higher social standards can be seen as EU-level public goods. Moreover, as underlined in Saulnier (2020), the creation of new additional capacity would by itself contribute directly to boosting European added value, even without any consideration of efficiency gains. Relatedly, aggregating budgetary resources at EU level could be the only and the most efficient option to integrate the economic impact of **externalities** and **cross-border spillover** effects (meaning that effects of policies in one Member State have an impact in neighbouring countries).

Efficiency gains could be realised by transferring budgetary resources to the EU level, either by establishing a new activity (e.g. introducing short-time work schemes in Member States in which they did not exist before), or by allowing better use of existing resources. Cases in which **economies of scale** are sizeable are a relevant area where efficiency can be boosted by transferring the policy to a higher level.

Aggregating budgetary resources at EU level could provide for more effective **risk sharing and risk pooling** between Member States; even more so in the case of an employment and income stabilisation mechanism, owing to imperfect correlation of business cycles in the EU: countries that are facing increases in unemployment can be supported by countries not facing such economic hardship at the same point in time. Moreover, the presence of heterogeneous social standards within an integrated single market risks leaving room for harmful competition practices.

Savings could sometimes be made by administering some projects at EU level when this allows a reduction in administrative costs, or when the **cost of financing** a specific policy is **lower** at the EU level; as discussed below, this has been proven particularly relevant in the case of the SURE instrument. With respect to some Member States, the EU faces a substantially lower cost of credit, and this reduces the costs of financing public policies.

As underlined by Saulnier (2020), these channels may generate productive capacity (for example by reducing the share of working poor in the EU), which can then increase both consumption and additional public resources through taxation, thereby generating second-round effects.

[36] C. Navarra, Corporate due diligence and corporate accountability, European added value assessment, EPRS, October 2020.

3. Methodology

After a section that 'sets the scene' of each policy area, following Saulnier (2020), the analysis consists of two steps:

1. comparing EU Member States in order to identify an 'efficiency frontier' in the selected areas of social policy;
2. discussing how EU action could bring all Member States closer to that frontier.

The first step uses the 'data envelopment analysis' (DEA) methodology (Saulnier, 2020 – see annexed paper). DEA is a benchmarking methodology that observes how different Member States spending the same amount of money obtain different outcomes; or, alternatively, by looking at how different Member States obtaining the same outcome actually spend different amounts of public money. This allows 'more' and 'less' effective countries to be identified. In the first case, the most effective countries are those obtaining the best outcome for a given level of spending, while in the second case, the most effective countries are those spending the smallest amount of money for a given outcome.

Benchmarking is a relative measure: it identifies countries having the best trade-off between spending and outcomes, and considers these countries as constituting the 'efficiency frontier'. They are identified by observing that no other country obtains a higher level of outcome spending the same amount, or achieves the same outcome spending less. This can be considered an EU common frontier, and the distance of Member States from it is the measure of the budgetary waste (i.e. the cost of non-Europe). This distance is measured through 'efficiency scores', where 1 means being 'on the efficiency frontier', or being efficient relative to other Member States.

Public spending for short-time work schemes, anti-poverty measures and an approximation for the potential budgetary cost of minimum wages are the input of the model, while several selected desirable outcomes are the output. The selection of indicators for output is highly relevant and reflects the assumptions made on the expected impacts of social policies (see Table 2).

Table 2: Indicators used as outcomes and types of impact they assume

Policy areas	Impact of the policy	Indicator used in the analysis
Short-time work schemes	Short-run mitigation of variation in employment and unemployment	Standard deviation of the employment rate
		Standard deviation of the unemployment rate
	Medium-run change in employment and unemployment between recession and recovery	Change in the level of the employment rate after recessions
		Change in the level of the unemployment rate after recessions
	Long-run effect on the level of employment and unemployment	Mean level of the employment rate
		Mean level of the unemployment rate
Anti-poverty schemes	Reduction of inequality	Gini index
		Income quintile ratio (inequality index)
	Reduction of poverty rates	At-risk-of-poverty-or-social-exclusion rate

Policy areas	Impact of the policy	Indicator used in the analysis
		At-risk-of-poverty rate before and after transfers
Minimum wage regulations	Reduction of in-work poverty	Share of low-wage earners
		In-work-at-risk-of-poverty rate
	Reduction of inequality	Gini index

Source: Compiled by the authors based on the CRILDA paper annexed to this study.

An interesting aspect of this technique: it may allow identification of which part of the 'inefficiency' is due to the fact that producing the same service at another scale would be beneficial. This can be a source of potential benefits of EU-level action.[37]

Despite these advantages, an important clarification regarding this methodology is that it is not a causal analysis: it correlates levels of spending (inputs) and some relevant outcomes (on the labour market, social protection and levels of poverty), without inquiring 'how' the former lead to the latter, and without inquiring if, within each country, the three policies as implemented are effective in reaching their respective goals. A way to partially incorporate the possible presence of other factors behind the outcomes consists of applying a 'second-stage analysis', as is done in this study: the DEA effectiveness scores can be partly explained by some common factors, and some of these are explored; this is why the 'net' scores will be presented. This alleviates in part the presence of possible 'confounding factors' that may influence outcomes; nevertheless, the exploration remains largely descriptive.

The 'waste rate' approach does not allow the interlinkages between the different policy areas to be observed. As mentioned above, these are, by contrast, particularly important in social policy. The present study complements this limitation with qualitative evidence.

[37] For a technical explanation, see Appendix A.1.1 to the annexed paper.

4. Analysis and key findings

4.1. Short-time work schemes

4.1.1. Analytical context

Short-time work (STW) schemes offer companies and employees advantages over the alternative of laying off workers in the event of a crisis. Companies avoid incurring costs for redundancies (funding social plans, where they exist) and, in the event of economic recovery, for re-instatement (recruitment). Well-rehearsed teams stay together and ensure productivity. Employees retain their employment relationships and thus the source of income and entitlements from seniority or other company benefits. In addition, they avoid losing professional qualifications and losses that are due to the need to reorganise their activities or relocate. Income losses incurred by workers are therefore significantly lower than in the event of unemployment.[38]

At the very beginning of the Covid-19 crisis, on 2 April 2020, the Commission proposed the SURE Regulation[39] as part of the EU's initial response to the pandemic. The EU issued 'European' bonds to finance SURE assistance to Member States.[40] All 27 Member States[41] agreed unanimously to provide the EU with bilateral guarantees so that it could borrow €100 billion from the markets under more favourable conditions, owing to the fact that the EU enjoys a credit rating with stable outlook.[42]

The Council adopted the SURE Regulation on 19 May 2020. The €100 billion financial envelope became available on 22 September 2020, after all Member States had signed the guarantee agreements. On 27 October 2020, the first disbursement took place – only five weeks after the financial envelope became available.[43] Since the instrument's introduction, 94 % of the total €100 billion (August 2021) have been allocated by the Council to 19 Member States. In mid-March 2021, six Member States (Belgium, Greece, Cyprus, Latvia, Lithuania and Malta) made a new request for additional funds.[44]

This had a positive impact on **macroeconomic stabilisation**. The purpose of SURE was to help Member States preserve employment of workers and the self-employed during the pandemic, protecting labour incomes and facilitating a swift recovery when the pandemic abates. The increase in unemployment rates during the 2020 crisis in beneficiary Member States was significantly lower than in 2009 during the financial crisis, despite a higher decrease in GDP. In 2020, real GDP growth fell by 6.8 % in the beneficiary Member States of SURE funding (see Figure 3); this is a sharper fall than the 4.1 % drop in 2009. Despite that, the unemployment rate increased by only 0.2 percentage points in 2020 compared with 2.8 percentage points in 2009. Looking at 2020-2021 together, the unemployment rate in SURE beneficiary Member States is forecast to rise at a much slower pace than during the global financial crisis (+2.0 percentage points in 2009 compared with the previous

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38 T. Pusch and H. Seifert, Kurzarbeit – Mehr als nur eine Beschäftigungsbrücke, WSI, 2021.

39 Council Regulation (EU) 2020/672 of 19 May 2020 on the establishment of a European instrument for temporary support to mitigate unemployment risks in an emergency (SURE) following the COVID-19 outbreak.

40 The EU as a borrower – investor relations, European Commission website.

41 Including the 'Frugal Four' – Denmark, the Netherlands, Austria and Sweden – and Germany, France, Luxembourg and Finland. They gave guarantees but are not beneficiaries of SURE.

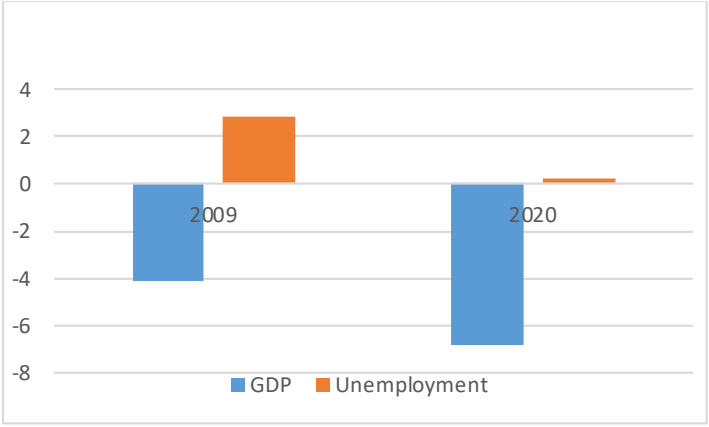
42 EU SURE Social Bond Framework, European Commission, 7 October 2020.

43 Report on the European instrument for Temporary Support to mitigate Unemployment Risks in an Emergency (SURE) following the COVID-19 outbreak: SURE: Taking Stock after Six Months, COM(2021) 148, European Commission, March 2021.

44 SURE: Taking Stock After Six Months, European Commission, March 2021. The other eight Member States – Denmark, Germany, France, Luxembourg, the Netherlands, Austria, Finland and Sweden – agreed to provide bilateral guarantees to the EU and financed their short-term work schemes from the national budget.

year). But there is a significant difference: the average GDP losses over the two years are set to be lower than during the global financial crisis (-1.1 % compared with -1.5 %). This suggests that keeping the available workforce connected with companies has also helped support a generally swift recovery.[45]

Figure 3: Changes in real GDP and unemployment in beneficiary Member States, 2009 and 2020



Data source: SURE: One Year On, European Commission, September 2021.

Companies and workers could continue to paying not only salaries but also taxes and social security contributions. The share of government total revenues remained stable, while public expenditures increased significantly.[46]

Table 3: Government revenue, expenditure and surplus/deficit

Seasonally adjusted* government revenue, expenditure and surplus/deficit in the euro area and EU

(% of GDP)	2019Q2	2019Q3	2019Q4	2020Q1	2020Q2	2020Q3	2020Q4	2021Q1p	2021Q2p
Euro area									
surplus (+) / deficit (-)	-0.4	-0.8	-1.0	-2.8	-12.3	-6.3	-7.9	-7.1	-6.9
total revenue	46.5	46.3	46.1	46.6	47.4	46.0	46.5	46.7	46.2
total expenditure	46.9	47.1	47.0	49.4	59.7	52.3	54.4	53.8	53.1
EU									
surplus (+) / deficit (-)	-0.3	-0.8	-0.9	-2.8	-12.0	-6.0	-7.4	-6.6	-6.3
total revenue	46.2	45.9	45.8	46.0	47.2	45.8	46.2	46.4	46.0
total expenditure	46.5	46.7	46.6	48.8	59.1	51.8	53.5	52.9	52.3

* Calendar day and seasonally adjusted Data are a combination of national and Eurostat estimates. p provisional data.

Source: Eurostat, October 2021.

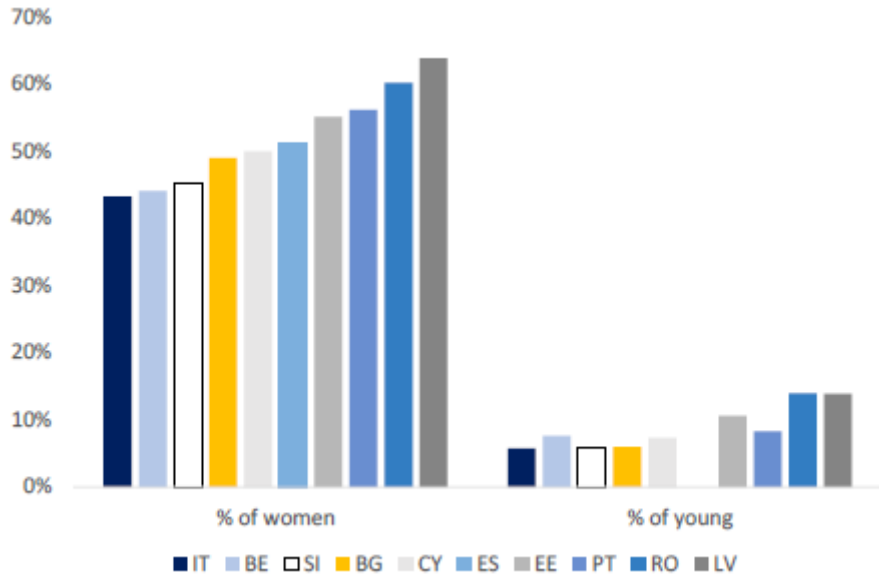
The highest numbers of supported jobs appeared in April and May 2020, with considerable declines coming in early autumn. The share of supported jobs in the Member States varied widely. Italy supported around 30 % of total employment; Belgium, Ireland, Portugal, Slovenia and Slovakia around 20 %; and Spain and Lithuania around 13 %. In other countries, levels were below 10 %; Croatia, with 43 %, reached the highest share.[47] Compared with the 2009 economic crisis, the participation of women and young people in short-time work increased. This reflects the change in the support's sectoral composition away from manufacturing and construction towards services and retail, i.e. sectors with a significantly higher share of women and young people in employment.

[45] SURE: One Year On, European Commission, September 2021.

[46] Seasonally adjusted government deficit at 6.9 % of GDP in the euro area and 6.3 % of GDP in the EU, Eurostat, October 2021.

[47] G. Fischer and G. Schmid, Unemployment in Europe and the United States under COVID-19, January 2021.

Figure 4: Average share of women and young (15-24) beneficiaries across STW schemes (2020/2021)



Source: SURE: One Year On, European Commission, September 2021. Employment Committee (EMCO) data collection 2020 and 2021. EMCO data not available for all countries covered by SURE. Data coverage from March 2020 (for each country), until most recent available data from EMCO, i.e. EL (November 2020), BG, IT, RO (December 2020), BE, CY, EE, LV (January 2021), and PT, SI (February 2021). Data for ES only available for share of women.

4.1.2. Waste rate analysis

STW schemes are expected to have positive effects on different time horizons (Table 2). STW schemes can be seen as **effective** in the short run if they reduce the volatility of labour market outcomes (employment and unemployment rate) as a macroeconomic stabiliser. In the medium and long run, STW schemes are effective if they facilitate an increase in employment after the recession, and allow for a lower structural unemployment level.

STW schemes can be seen as **efficient** in comparison with short-term work in another country if they allow for the maximum outcome (lower volatility of employment in the short run, for example) with the same spending as the other country, or the same outcome with less spending. There may be cases in which spending in short-term work does not lead to greater employment outcomes, because it simply postpones job losses or prevents reconversion of businesses and workers to other sectors.[48] For instance, Boeri and Bruecker (2011)[49] find that STW schemes helped reduce job losses during the financial crisis, even if the number of jobs saved was lower than the number of participants and full-time equivalent jobs that benefited from the scheme, implying the presence of inefficiencies and non-trivial deadweight costs.

While this analysis mainly focuses on efficiency (the relationship between means and outcomes), the impact of STW schemes was largely evaluated after the 2008-2009 financial crisis; overall, the related literature points to a positive effect of short-term work in preserving jobs. However, only countries with pre-existing STW schemes are 'able to fully exploit' the benefits of short-term work. Market participants need time to learn how to use a newly established STW scheme. A Europe-wide

[48] This reconversion is never frictionless, and other policies are called on to intervene in support of it.

[49] T. Boeri and H. Bruecker, Short-time work benefits revisited: some lessons from the Great Recession. *Economic Policy*, Vol. 26(68), October 2011, pp. 697-765.

evaluation of STW schemes concluded that the effect of short-term work 'is strongest when GDP growth is deeply negative', and STW schemes are most effective when used as a fast-responding automatic stabiliser. A STW scheme has to be boosted at the beginning of a recession and brought down quickly in the early recovery.[50]

For the waste-rate analysis, the main point of interest is the expenditure for STW schemes in relation to the desired outcomes in the three time horizons. The DEA methodology for STW schemes tries to explore how efficiently Member States use expenditure for these schemes to obtain desirable labour market outcomes, both in the short, medium and long run (the full list of impacts and how they are measured is shown in Table 2).

The relationship between expenditure in short-term work and the social outcomes is first illustrated by charts plotting the two variables, and then by the computation of the efficiency score. It should be borne in mind that the analysis is descriptive and does not inquire to what extent the outcomes depend on the policy; based on the literature, it is assumed that there is a relationship.

Short-run analysis

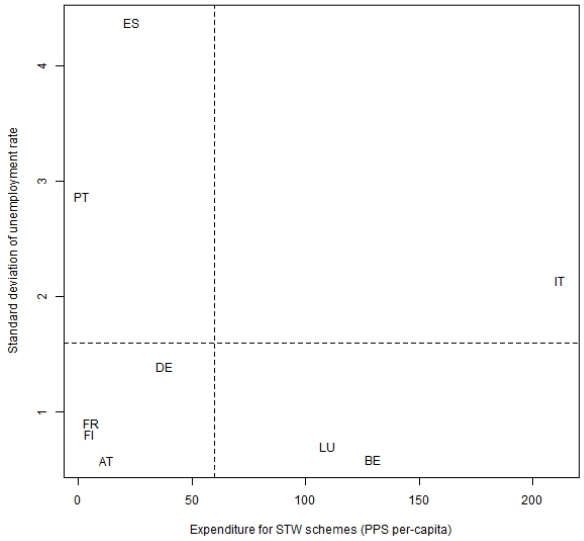
The main input indicator for the analysis is the 'mean expenditure for STW schemes' (over the 2008-2017 period).[51] The 'standard deviation of the unemployment rate' over the same period is the considered outcome.[52] The annexed paper also analyses the standard deviation of employment rates, obtaining similar results. The chart below (Figure 5) plots the expenses for STW (x-axis) and the variation of unemployment (y-axis). Countries in which unemployment varies less are those at the bottom of the chart. The chart does not analyse the extent to which the reduction in volatility can be ascribed to short-term work, although it is known from the literature that STW schemes play a role in this. The correlation between 'expenditure for STW schemes' and the 'standard deviation of the unemployment rate' is negative. On average, countries that spend more for STW schemes report a lower volatility of these labour market outcomes. In terms of efficiency, Figure 5 shows that the Member States with best combinations of the outcome 'standard deviation of the unemployment rate' and the input 'expenditure for STW schemes' (i.e. where lower volatility is achieved with lowest expenses) are France, Austria and Finland (bottom-left corner).

[50] B. Brey and M. Hertweck, The extension of short-time work schemes during the Great Recession: A story of success?, University of Konstanz, 2016; Klaus Müller, EU 27 support for national short-time work schemes, EPRS, European Parliament, April 2020.

[51] Each analysis is repeated twice. The results using expenditure for STW schemes measured in PPS per capita are reported in the main text, the ones using expenditure for STW schemes measured as a percentage of expenditure for labour market policies are reported in the appendix to the annexed paper.

[52] Volatility is a 'bad', not a 'good' outcome; hence, from a formal point of view, the output of the DEA is the inverse of the standard deviation.

Figure 5: Expenditure for STW schemes and standard deviation of the unemployment rate



Source: CRILDA paper annexed to this study.

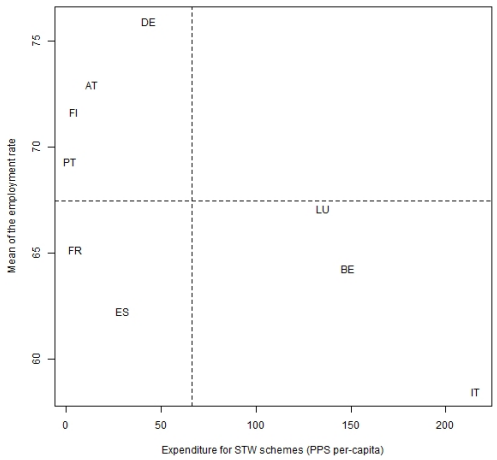
Medium- and long-run analysis

The picture slightly changes if one looks towards a medium- and long-term perspective, where it is assumed that short-term work may help recovery after a recession and the achievement of higher levels of employment. STW schemes are temporary by nature. A STW scheme has to be boosted at the beginning of a recession and brought down quickly in the early recovery. In other words, the support has to stop at the beginning of the recovery in order to avoid wasting money and deadweight costs when STW schemes are no longer necessary.

STW schemes can be considered effective if they help increase the employment rate and decrease the unemployment rate after the end of a recession (thus affecting the speed of recovery), and if they allow for a higher employment rate (lower unemployment rate) at some years' distance. The assumptions are that STW schemes can prevent the loss in human capital that occurs in cases of layoffs, and – by providing a safety net – can stabilise the relationship between a worker and an employer, thus increasing the average employment level over the years. The chart below (Figure 6) plots the long-run employment rate and the spending in short-term work during a recession (the other estimates can be found in the annexed paper). In this context, the indicators in focus are the 'difference between that 2017-2019 mean and the mean employment rate during previous recession periods' (2008-2009 and 2011-2013).

The desirable outcome is an employment rate as high as possible (top of the chart); the most efficient Member States appear to be those in the upper-left corner, where the employment rate is high and this is obtained with a relatively low expenditure, i.e. in Germany, Austria, Portugal and Finland.

Figure 6: Expenditure for STW schemes during recession (2008-2009-2011-2012-2013) and mean of the employment rate 2017-2019



Source: CRILDA paper annexed to this study.

Regarding the long-run analysis, it is even more relevant to underline that there may be other factors affecting the employment rates in the chart; based on the literature, it is reasonable to expect a positive role of short-term work, although the extent of this is not examined here. The important point is that STW schemes stop when they are no longer necessary, and the companies can (re-)start their business with rehearsed teams immediately, without losing time to recruit new staff. However, some downsides can be expected in the long run. Table 4 below presents the efficiency scores (see Section 3 of the annexed paper) for each Member State. In this context, it might be interesting to look at the efficiency scores of the two countries that spent the most between 2008 and 2017: Belgium and Italy. Belgium spent, on average, €130 per capita per year, while Italy spent €212. They are also the two countries with the highest per capita expenditure during the two recessions: €148 and €216, respectively.[53] While Belgium is the benchmark (i.e. most efficient) in reducing the volatility of employment and unemployment in the short run, and only slightly ineffective and inefficient in keeping a high (low) level of the employment (unemployment) rate in the long run, Italy is characterised by a lower score both in the short and long run. An explanation, supported by literature, could be that the Italian STW schemes have probably 'postponed unavoidable job and worker reallocations' (Boeri and Bruecker, 2011) rather that allowing firms to cushion temporary downturns. STW schemes in Italy show limitation as far as eligibility conditions and the replacement rate[54] are concerned – and turn out to be a disincentive for companies to invest, transform and convert to new activities, and for workers to reallocate to more productive jobs.[55] However, the degree of inefficiency appears to be low for all countries – including Belgium and Italy, which have an efficiency score of 0.88 and 0.77, respectively.

[53] See annexed paper by CRILDA.

[54] Share of the former salary paid in the case of less working hours.

[55] See annexed paper.

Table 4: STW schemes – Gross efficiency scores calculated through DEA analysis

	Unemployment rate (standard deviation) – short run	Employment rate (mean) – long run
AT	1	1
BE	0.98	0.85
FI	1	1
FR	0.85	0.91
DE	0.42	1
IT	0.27	0.77
LU	0.83	0.88
PT	1	1
ES	0.13	0.84

Source: CRILDA paper annexed to this study.

4.1.3. EU added value

The first source of added value of EU action is the possibility of providing an **EU macro stabilisation mechanism**: this has been the case with **SURE**.

As regards the **reduction of the 'waste rate'**, on average, the expenditure for STW schemes over the 2008-2017 period amounted, in absolute terms, to about €7.6 billion per year. The waste rate suggested is substantial: between €4.1 billion (54 %) and €4.8 billion (62.7 %) in the short run. However, medium- and long-run effects (available in the appendix to the annexed paper, provide a different picture, with the long-run estimates showing a significantly lower waste rate (in the range of 5-16 %). For example, 'when the considered outcome is the *"mean employment rate"* the estimated waste for Austria is zero, while when the considered outcome is the *"mean unemployment rate"* the estimated waste for Germany is zero".[56]

Table 5: STW schemes – Calculation of waste rate (long run)

	Input level	Change in employment rate		Change in unemployment rate		Mean employment rate		Mean unemployment rate	
AT	55.4	58.8 %	32.6	73.2 %	40.5	0.0 %	0.0	0.2 %	0.1
BE	647.4	44.2 %	286.2	46.5 %	301.1	15.4 %	99.7	2.3 %	14.9
FI	14.2	54.4 %	7.7	74.1 %	10.5	3.2 %	0.5	0.5 %	0.1
FR	171.6	68.8 %	118.0	70.1 %	120.3	9.2 %	15.8	1.9 %	3.3
DE	1550.2	10.3 %	159.7	26.9 %	417.0	0.8 %	12.4	0.0 %	0.0
IT	4778.8	64.6 %	3087.1	91.3 %	4363.1	23.0 %	1099.1	6.8 %	325.0
LU	30.8	50.0 %	15.4	74.5 %	23.0	11.7 %	3.6	1.7 %	0.5
PT	6.7	0.0 %	0.0	32.1 %	2.1	9.3 %	0.6	2.7 %	0.2
ES	392.7	19.4 %	76.2	0.0 %	0.0	16.0 %	62.8	11.7 %	45.9
TOTAL (EU)	7647.8		3782.9 (49.5 %)		5277.5 (69.0 %)		1294.5 (16.9 %)		389.9 (5.1 %)

Source: CRILDA paper annexed to this study.

[56] See paper by CRILDA annexed to this study.

The results of the past analysis (explained in Chapter 3 of the annexed paper) suggest that there is room for EU harmonisation and/or coordination that could improve effectiveness and efficiency and add value.

A further source of EU added value is the possibility of **saving on interest payments**.

Member States have saved a total of € 8.2billion on interest payments by receiving financial assistance through SURE, which offered Member States lower interest rates than those they would have paid if they had issued sovereign debt themselves. This is due to the EU's AAA credit rating and the liquidity of the bonds.[57]

Table 6: Interest rate savings by Member State

Member State	Amount disbursed (€ billion)	Average spread	Average maturity	Interest savings (€ billion)	Interest savings (%)
Belgium	8.2	0.06	14.7	0.14	1.7
Cyprus	0.6	0.62	14.7	0.06	9.5
Greece	5.3	0.73	14.6	0.51	9.8
Spain	21.3	0.44	14.7	1.59	7.4
Croatia	1.0	1.11	14.3	0.16	15.3
Hungary*	0.5	1.28	14.7	0.09	18.0
Italy	27.4	0.96	14.8	3.76	13.7
Lithuania	1.0	0.04	14.7	0.00	0.5
Latvia	0.3	0.10	14.6	0.00	1.5
Malta	0.4	0.56	14.6	0.04	8.4
Poland	8.2	0.35	13.0	0.42	5.0
Portugal	5.4	0.47	14.7	0.38	7.1
Romania	3.0	2.27	14.6	0.85	28.4
Slovenia	1.1	0.23	14.8	0.05	4.3
Slovakia	0.6	0.09	14.9	0.01	1.3
Bulgaria	0.5	0.37	15.0	0.03	6.7
Ireland	2.5	0.11	14.7	0.05	2.1
Czechia	2.0	0.23	10.1	0.04	1.9
Estonia**	0.2	0.0	15.2	0.00	0.0
Total	**89.6**	**0.63**	**14.5**	**8.18**	**9.1**

Source: European Commission.

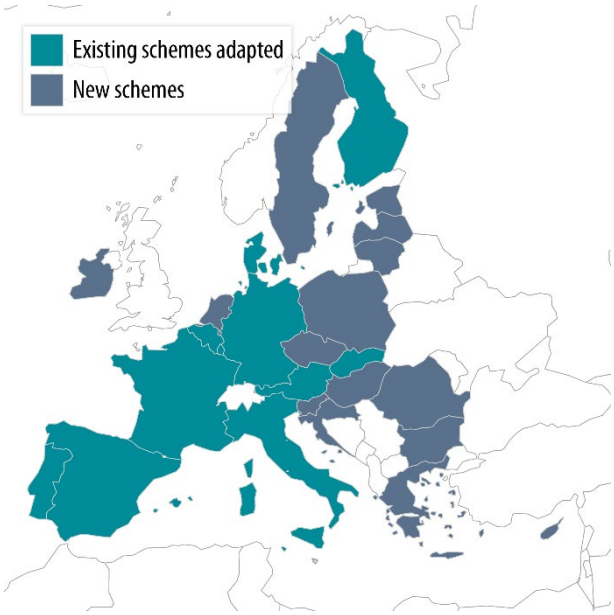
*Hungary has issued only two 10-year and 30-year euro-denominated bonds since 2020. Using these two bonds, the spread between the yield curves was extrapolated.

**Estonia has issued only one outstanding 10-year bond, no data was available for other maturities. The spread with the EU SURE social bond at these other maturities is assumed to be close to zero.

[57] SURE: One Year On, European Commission, September 2021.

Moreover, **SURE made more STW schemes possible, including by introducing them in some countries where they did not exist**. STW schemes are now – at least temporarily – part of the labour market policy in all 27 Member States. SURE itself is not an STW scheme, but a European financial instrument to support national systems. So far, 16 Member States benefiting from SURE have used this support to finance STW schemes. These schemes are in the majority of cases (11 **new** schemes) established on a temporary basis. Only five Member States already had short-time work schemes in place (Belgium, Spain, Italy, Portugal and Slovakia) and adapted them in response to the pandemic.

Figure 7: Member States shaded according to whether STW schemes are adapted from existing ones or new



Source: EPRS, based on Eurofound and European Commission. Graphic by Samy Chahri.

This had a positive impact on **macroeconomic stabilisation**. The increase in unemployment rates in beneficiary Member States in the 2020 crisis was significantly lower than during the financial crisis in 2009, despite a higher decrease in GDP. In 2020, real GDP growth fell by 6.8 % in the beneficiary Member States of SURE funding (see Figure 3 above); this is a sharper fall than the 4.1 % drop in 2009. Despite that, the unemployment rate increased by only 0.2 percentage points in 2020 compared with 2.8 percentage points in 2009.[58]

Based on a new Keynesian model, Dengler/Gehrke demonstrated that in recessions, STW schemes reduce the unemployment risk of workers,[59] mitigating their precautionary savings and therefore the reduction in aggregate demand. Using a quantitative model analysis, they 'show that this channel can increase the stabilisation potential of short-time work over the business cycle even more when monetary policy is constrained by the zero lower bound. Further, an increase of the short-time work replacement rate can be more effective compared to an increase of the unemployment benefit replacement rate'.[60]

[58] SURE: One Year On, European Commission, September 2021.

[59] In particular if it is payed under the condition of protection against dismissals, see COVID-19: Implications for employment and working life, Eurofound, 2021.

[60] T. Dengler and B. Gehrke, Short-Time Work and Precautionary Savings, Berlin and Rostock, 2021. See also T. Pusch and H. Seifert, Kurzarbeit – Mehr als nur eine Beschäftigungsbrücke, WSI 2021, and C. Schröder et al., Covid-19 is not affecting all working people equally, SOEPpapers on Multidisciplinary Panel Data Research, No. 1083, 2020.

Laszlo Andor, a former Commissioner for Employment, concludes:

> *With a clear conditionality that is strongly linked to cyclicality, SURE delivers something that has been missing from the EU architecture: a counter-cyclical fiscal capacity. In other words, this can be seen as an initial step in the direction that could eventually turn the MFF from its head to its feet, and lead to a proper stabilisation role at the community level.*[61]

A further source of EU added value that can be noted by observing SURE is the improved **EU 'fast-track' ability to respond effectively and efficiently to unprecedented social and economic developments**. It was not necessary to establish a new European administrative structure. It thereby contributed to the positive dynamic for the subsequent announcement of the Next Generation EU instrument and the Recovery and Resilience Facility (RRF).[62] However, only five Member States supported by SURE had their STW-schemes in place (Belgium, Spain, Italy, Portugal and Slovakia) at the beginning of the pandemic, and adapted them in response to the pandemic.

The EU, through the SURE programme, also supported the possibility of **reforming social protection systems**. The majority of Member States indicated that SURE played a role when they adopted (10) newly introduced STW schemes or modified (5) existing schemes.[63] Another important innovative point is that one third of SURE was spent for measures to support the self-employed. STW schemes normally cover only employees and not the self-employed.[64] The right of the self-employed to adequate social protection during a recession, under comparable conditions as employees, corresponds to Principle 12 of the European Pillar of Social Rights. This is also the case for some temporary staff, now also covered by STW schemes to a larger extent.[65] However, interim workers and workers with the most precarious contractual arrangements are still largely excluded from most of these arrangements.

Another additional point was conditionality, the link between STW schemes and the protection against dismissals. The leading question was whether the implementation of STW and similar schemes should be linked with the guarantee for employees to avoid dismissals beyond the direct support. Bulgaria, Estonia, Spain, Cyprus, Lithuania, Portugal, Romania, Slovenia and Slovakia extended the protection against dismissals beyond the period during which employees received short-time working or similar allowances. In Greece and Italy, this was extended to a specific date.[66]

4.2. Anti-poverty and inequality-reduction schemes

4.2.1. Analytical context

Poverty and inequality are two strongly interrelated concepts. The incidence of both is still a major challenge in the EU. The main indicator used is the measure of the share of population 'at risk of poverty or social exclusion' (AROPE), which has three components:[67]

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61 A. Laszlo, 'SURE – EU Capacity for Stabilising Employment and Incomes in the Pandemic', *Intereconomics*, Vol 55(3), May 2020.

62 SURE: Taking Stock After Six Months, European Commission, March 2021.

63 ibid.

64 SURE: One Year On, European Commission, September 2021.

65 Monitoring the implementation of the European Pillar of Social Rights, Principle 12 – Social protection, SWD(2018) 67, European Commission, March 2018. Principle 12 – Social protection – Regardless of the type and duration of their employment relationship, workers, and, under comparable conditions, the self-employed, have the right to adequate social protection.

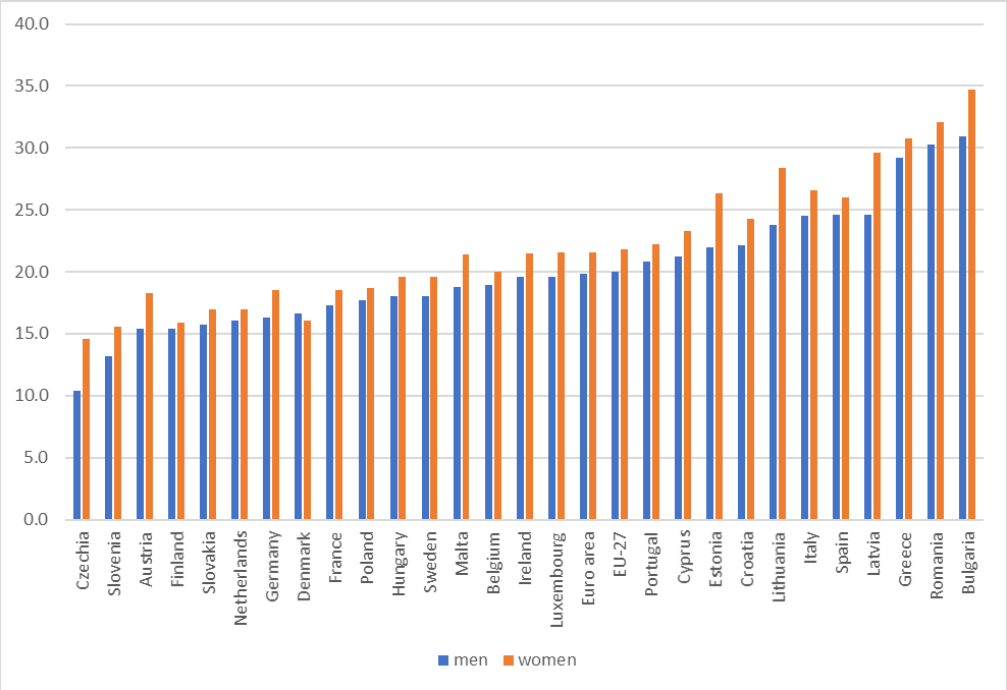
66 COVID-19: Implications for employment and working life, Eurofound, 2021.

67 People at risk of poverty or social exclusion were in at least one (but also in two or all the three).

- severe material deprivation (non-monetary and related to consumption, i.e. the inability to satisfy basic needs)
- living in households with very low work intensity (this measures access to employment and social exclusion)
- income poverty (it is the monetary dimension and relative to the rest of the population)

These three indicators reflect multiple facets of poverty, exclusion and inequality across Europe. As can be seen in Figure 8 below, on average about 20 % of the EU population lives in this condition, and the probability for women to experience it is on average higher than for men. While progress has been made across the EU in addressing the first two components (severe material deprivation and share of households living in very low work intensity),[68] income poverty remains stable, with about 16.5 % of the population falling below the national thresholds.

Figure 8: Share of population at risk of poverty and social exclusion by gender and Member State



Source: Authors' own calculation based on Eurostat data (year 2019).

The limited results obtained in reducing income poverty in the EU between 2010 and 2019 are closely related to the limited results in addressing inequalities (with income poverty a measure of relative poverty): Europe saw a major decrease in inequality during the decades after the Second World War, but this trend largely stopped from the 1990s on,[69] which is highlighted by the decline in the labour share of national income.[70] The rise in inequality from the beginning of the 1990s can be seen in Figure 9 below. According to Atkinson, the major factors that built the declining inequality between the Second World War and the 1980s included the expansion of social protection (and provision of public goods) financed by progressive taxation, the increase in the

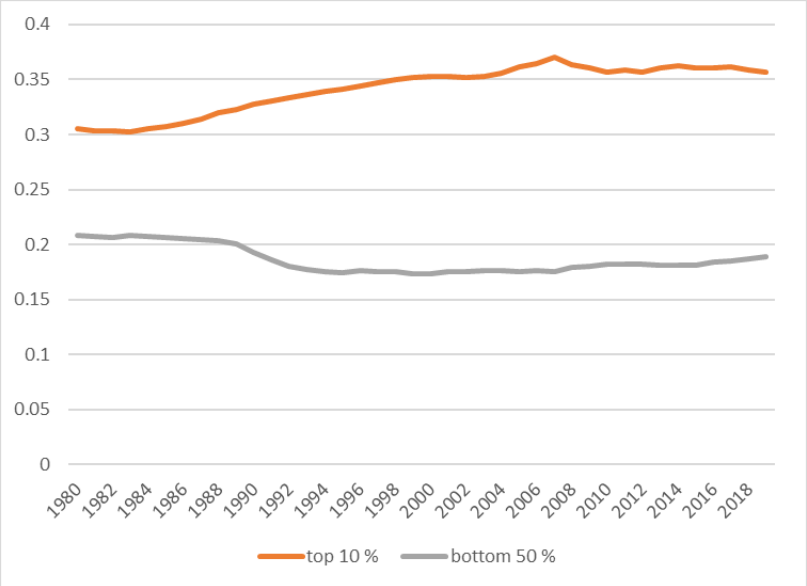
[68] This is not without exceptions, notably the case of Greece, where both indicators worsened substantially between 2010 and 2019 (harsh austerity measures are likely to have played a major role). Also, Italy shows that severe material deprivation did not improve in the same years (see forthcoming EPRS publication on the EU welfare systems and the challenges of poverty and inequalities).

[69] A. Atkinson, 'Inequality: What can be done', *Practice*, Vol. 40(2), 2016, pp. 289-292.

[70] The share of national income that goes to wages.

labour share of national income, sustained by labour market legislation, collective bargaining, and policy interventions intended to sustain the lower wages (e.g. minimum wages). This analysis shows the interlinkages between poverty analysis and labour market policies.

Figure 9: Inequality in Europe over time: Top 10 % and bottom 50 % of income distribution

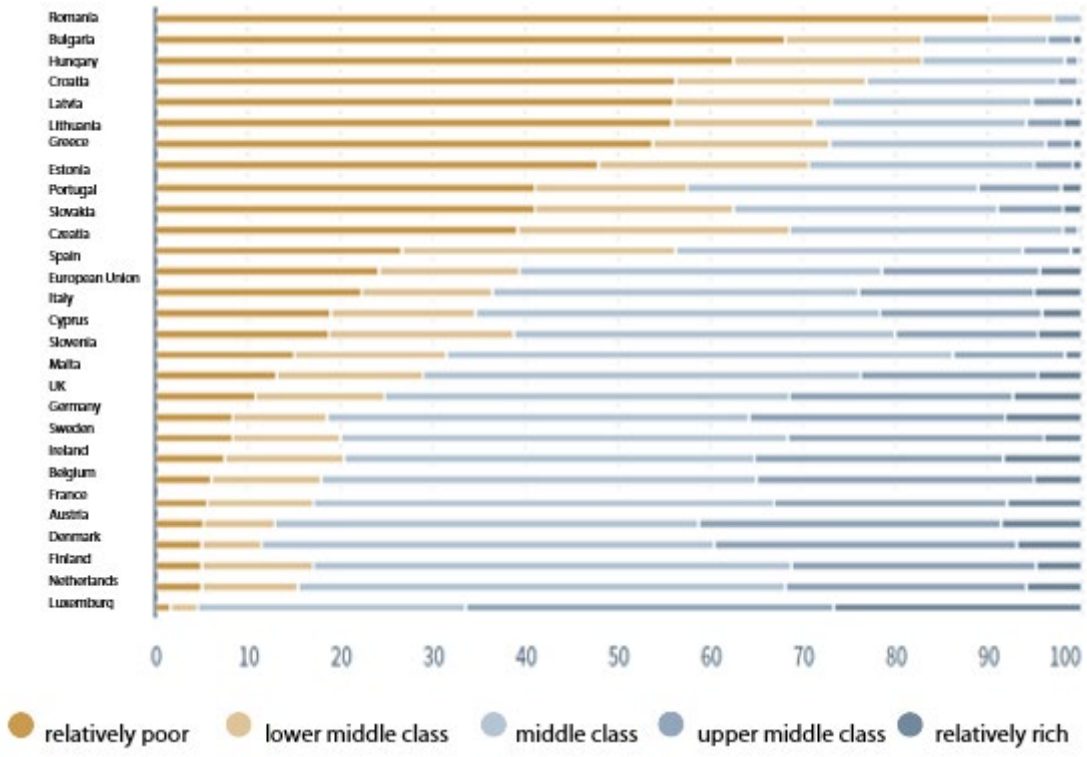


Source: Authors' own calculation based on World Inequality Database.

The analysis of poverty is linked to the national contexts: poverty thresholds are national and therefore measure people's income with respect to the income in each Member State. In the EU, where average incomes still differ substantially, it is important to have a two-fold perspective: within-country and across-country. If we computed a single EU poverty threshold, we would observe that more than half of the population of a number of countries (Bulgaria, Greece, Croatia, Latvia, Lithuania, Hungary and Romania) would be below this threshold (and even 90 % of the population in Romania).[71] Figure 10 illustrates this and represents an important measure of the differences still existing across Member States, despite some progress having been achieved towards convergence.

[71] J. Niehues, Einkommen in Europa: Arm und Reich ist auch eine Frage des Maßstabs, IW Köln, 2018.

Figure 10: Income groups – If Europe were only one country (2014)



Source: J. Niehues, Einkommen in Europa: Arm und Reich ist auch eine Frage des Maßstabs, IW Köln, 2018.

Anti-poverty measures aim to guarantee a minimum income and standard of living to everyone who lacks resources; the European Pillar of Social Rights supports them, stating that 'everyone lacking sufficient resources has the right to adequate minimum income benefits ensuring a life in dignity at all stages of life, and effective access to enabling goods and services'. They are therefore expected to reduce both poverty and inequality. All Member States have in place policies to provide support for the most vulnerable. Anti-poverty policies are implemented in all EU Member States; almost all of them also have minimum income schemes. The need to provide all citizens with 'adequate minimum income benefits' is one of the principles of the European Pillar of Social Rights. As discussed, overall good results have been obtained in some indicators, but major challenges remain.

Moreover, particularly vulnerable groups risk being excluded (or not being able to fully benefit) from some policies, as for example highlighted in the case of third-country national workers in the EU. A recent EPRS study underlines that the access to social benefits may be limited in some cases for these workers, thus limiting the guarantee of equal treatment.[72]

4.2.2. Waste rate analysis

Growth without redistributive policies and the proper governance tools does not lead to lower inequality.[73] These policies are particularly important under recessions, since there is evidence that poverty increases in economic crises,[74] and that the vulnerable suffer more from recessions than

[72] C. Navarra and M. Fernandes, Legal migration policy and law, European added value assessment, EPRS, European Parliament, September 2021.

[73] T. Piketty, *Capital in the twenty-first century*, Harvard University Press, 2018; M. Baldini, V. Peragine and L. Silvestri, 'Quality of government and subjective poverty in Europe', *CESifo Economic Studies*, Vol. 64(3), September 2018, pp. 371-395.

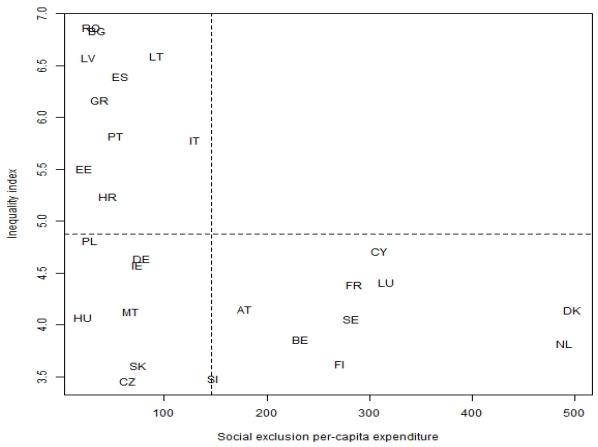
[74] ibid.

they gain during upturns.[75] At the same time, the tightening of public finances produces a retrenchment of social expenditure.[76]

Some possible downsides of these policies are discussed in the literature (e.g. social stigma), but evidence is found for instance that income support policies do not delay entry into employment, and that active labour market policies play a major role.[77]

The input used to measure the expenditure on anti-poverty policies is the social protection expenditure for the 'social exclusion', from the Eurostat social protection database.[78]

Figure 11: Correlation between social expenditure and inequality of income distribution



Source: Annexed CRILDA paper, based on Eurostat data.

Anti-poverty measures are **effective** if they manage to reduce both the incidence of poverty and inequality. In this study, these are translated into four outcomes:

As measures of inequality:

- Gini index;[79]
- inequality of income distribution, measured by the income quintile share ratio.[80]

As measures of poverty:

- the at-risk-of-poverty-or-social-exclusion rate, i.e. the sum of individuals who are: at risk of poverty or severely materially deprived, or living in households with very low work intensity;[81]
- the difference between the at-risk-of-poverty rate before and after social transfers, which measures the capacity of social transfers to combat poverty (to compensate the imbalances generated on the market).

Anti-poverty measures are **efficient** if they manage to obtain the desired social outcome (low inequality and low poverty) with the minimum possible expenditure. For instance, a Member State

75 B. Aiyemo, 'Recessions and the vulnerable', *World Development*, Vol. 132, August 2020, 104977.

76 R. Iacono, 'Minimum income schemes in Europe: is there a trade-off with activation policies?', *IZA Journal of European Labor Studies*, Vol. 6(1), January 2017, pp. 1-15; S. Marchal, I. Marx and N. Van Mechelen, Minimum income protection in the austerity tide, *IZA Journal of European Labor Studies*, Vol. 5(1), February 2016, pp. 1-20.

77 S. de la Rica and L. Gorjón, 'Assessing the impact of a minimum income scheme: the Basque Country case', *SERIEs*, Vol. 10(3), 2019, pp. 251-280.

78 Social protection encompasses all interventions from public or private bodies intended to relieve households and individuals of the burden of a defined set of risks or needs; the specific need considered here is social exclusion. Data are available from Eurostat on an annual basis for all EU Member States, from 2009 to 2018.

79 The Gini index is the ratio of the cumulative shares of the population arranged according to the level of equivalised disposable income, to the cumulative share of the equivalised total disposable income received by them. It has a theoretical range going from zero to one; the closer the Gini index is to one, the more unequal is the country.

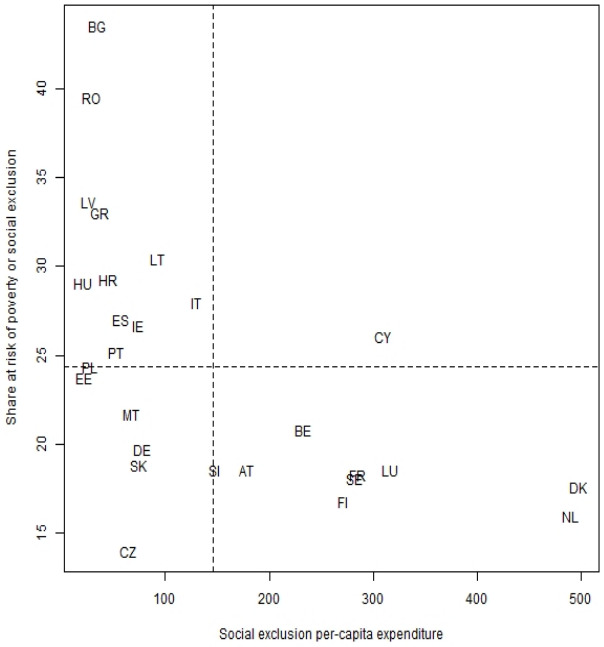
80 The ratio of total income received by the 20 % of the population with the highest income (top quintile) to that received by the 20 % of the population with the lowest income (bottom quintile).

81 For a detailed explanation of the three definitions, see annexed paper, Section 2.2.

is considered 'more efficient' than another if it obtains a lower level of inequality (or poverty) with the same amount of social expenditure. This is what is captured by the DEA analysis below.

Figure 11 and 12 illustrate the negative correlation between expenditure targeted to fight social exclusion and two selected outcomes, namely the inequality of income distribution to measure inequality, and the AROPE (at-risk-of-poverty-and-social-exclusion) rate to measure the incidence of poverty.[82]

Figure 12: Correlation between social expenditure and share of population at risk of poverty or social exclusion



Source: Annexed CRILDA paper, based on Eurostat data.

The benchmarking analysis produces results that are in line with the visual analysis of the scatterplots. It should be recalled that this analysis is not one of causality[83] and, moreover, it does not identify if countries are 'on average' poorer than the others: a country can have a low incidence of poverty with respect to its own poverty line, but this can be substantially lower than the poverty line in other Member States (see 4.2.1 for a discussion of the differences between national poverty lines and an EU-wide poverty line).

As regards the inequality measures, the 'benchmark' is provided by Slovenia. Inefficiency changes quite substantially according to the measure used: using the quantile share ratio, only six Member States have an efficiency score greater than 0.9, while when it comes to the Gini index, 19 Member States have scores above 0.9, and none has an efficiency score lower than 0.85. This impacts substantially the estimate of the waste rate, as can be seen in Table 7.

Regarding poverty measures, we find yet again differing extents of inefficiency according to the variable observed. Looking at the level of AROPE, inefficiency appears to be smaller than observing the change of AROPE between and after social transfer (the measure of the ability of a welfare system to lift people out of poverty). In the former case, the benchmark are the Netherlands, while in the latter, it is Finland.[84] Again, this difference explains the difference in waste rate calculated (see Table 7).

On average, expenditure for anti-poverty schemes over the 2009-2018 period amounted, in absolute terms, to about €62.8 billion per year. Using the above-mentioned 'efficiency frontier', the efficiency loss (the 'waste rate') ranges between €3.7 billion and €12.7 billion if one considers inequality outcomes, and between €3.3 billion and €18.7 billion if considering poverty outcomes. It appears that Member States that are more efficient in addressing poverty are also more efficient in

[82] For an analysis regarding the two other variables, see annexed paper by CRILDA.

[83] In order to take into account partially other possible confounding factors, the analysis controls for expenditure for labour market policies.

[84] In this case, Ireland has been excluded from the calculation, being an outlier; see annexed paper.

addressing inequality, indicating the strong interlinkages between the two. More details can be found in the paper by CRILDA annexed to this study.

Table 7: Summary of the results of waste rate analysis in anti-poverty measures

	Inequality		Poverty	
	Gini	Inequality in income distribution	AROPE	AROPE after/before social transfers
Benchmark Member State	SI	SI	NL	FI
Notes on Member State relative efficiency	Overall high efficiency: no Member State below 0.85	Relative low efficiency: only 6 Member States above 0.9	Overall high efficiency: no Member State below 0.7	Relative low efficiency: only 5 Member States above 0.8
Waste (billion €)	3.7	12.7	3.3	18.7
Waste %	5.9 %	20.3 %	5.2 %	29.8 %

Source: Author's own calculation based on the paper annexed to this study.

4.2.3. EU added value

The analysis above suggests that there is room for improving efficiency of anti-poverty policies; this could be done through greater coordination at the EU level, and would be in line with the European Pillar of Social Rights.

Action at the EU level could bring benefits, reduce the 'waste' calculated above and, beyond this, improve solidarity and the provision in EU Member States of anti-poverty measures aimed at reducing social exclusion. This could be done through several channels.

First, as it is the case for SWT, there could be savings in the **costs of financing**, since the EU can borrow at much more favourable rates than most Member States under current conditions. A calculation of potential savings is done in the annexed paper and leads to the results shown in Table 8 below. At the EU level, the overall savings could be of €3.8 billion (theoretically, this gain would be spread over several years; however, if the scheme were permanently in place, it would become a yearly gain).

Table 8: Anti-poverty schemes – (Potential) interest rate savings by Member State

Country	Interest savings (€ million, PPP)	Country	Interest savings (€ million, PPP)
Austria	21.7	Italy	2440.3
Belgium	51.3	Latvia	0.6
Bulgaria	18.4	Lithuania	1.0
Croatia	39.9	Luxembourg	1.4
Cyprus	21.4	Malta	2.6
Czechia	10.5	Netherlands	66.3
Denmark	12.2	Poland	157.0
Estonia	0.0	Portugal	37.0
Finland	19.9	Romania	105.6
France	428.1	Slovakia	3.7
Germany	0.0	Slovenia	19.3
Greece	91.8	Spain	229.0
Hungary	53.7	Sweden	36.7
Ireland	5.5	TOTAL	3874.8

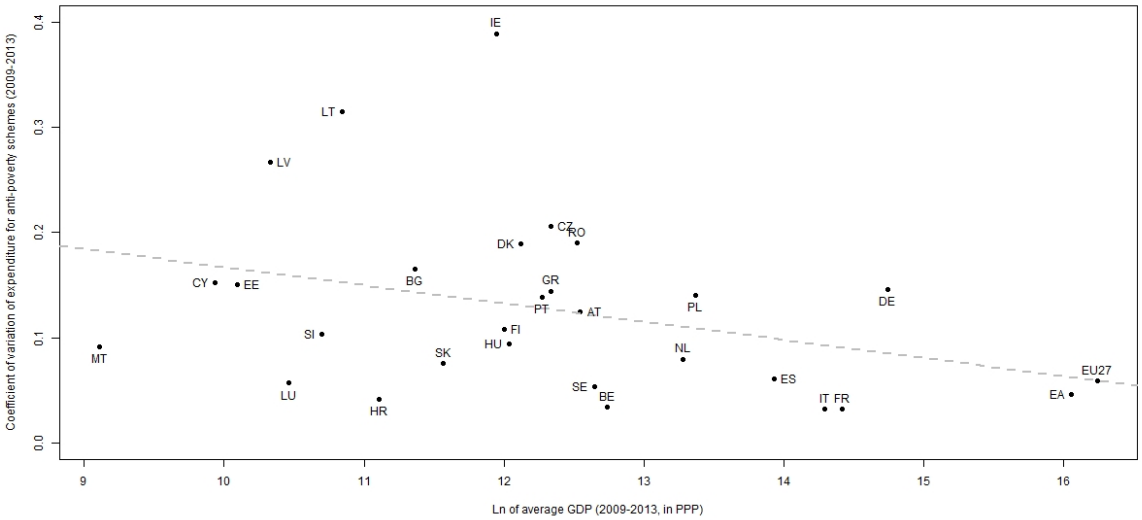
Source: .Annexed paper. 'PPP' stands for purchasing power parity (a monetary measure that takes into account the differences in price levels between countries).

A second source of EU added value is the possibility of **risk pooling**: this is supported by two observations: 1) business cycles within the EU are correlated imperfectly,[85] which allows for greater efficiency if the possibility of pooling expenses is in place; and 2) the variability of social expenses is lower within bigger economic areas. The latter means that pooling these social expenses at a supranational level could guarantee greater stability of anti-poverty measures, which would benefit the most vulnerable that are more exposed during recession.

The greater stability of anti-poverty expenditures in bigger economic areas can be observed in Figure 13. The chart shows that bigger economic areas, as measured by the size of GDP, have low variability of social expenditure: in the bottom-right corner, one can find the EU-27 and the euro area.

[85] See also Section 2.

Figure 13: Scatter plot of the size of GDP and variability of expenditure for anti-poverty schemes



Source: Annexed paper by CRILDA, based on Eurostat data. Variables are the natural logarithm of GDP (in purchasing power standard) and coefficient of variation of anti-poverty schemes expenditure (2008-2013). 'PPP' standard for purchasing power parity.

Finally, another source of EU added value is the efficiency that can be due to the scale of the policy: **implementing anti-poverty measures at a greater scale** can lower the cost of provision and thus lead to savings. The DEA methodology allows for a disaggregation of 'technical' inefficiency and 'scale' inefficiency, which serves precisely the purpose of identifying which share of the 'waste' could be reduced by increasing the scale of production of the public good. According to the calculations, the 'waste' due to scale inefficiency ranges between €25 and €52 billion, and is thus likely to represent the largest part of the 'waste' calculated.[86]

4.3. Minimum wage

4.3.1. Analytical context

Poor working conditions and wages that do not allow people to make ends meet are among the causes of the analysed evidence of poverty and inequality in the EU. For a relevant share of the EU population, jobs and working conditions are not sufficient to guarantee a standard of living above the poverty threshold.[87] In some cases, **in-work poverty** has increased over time: this was for instance the case in most countries between 2008 and 2016.

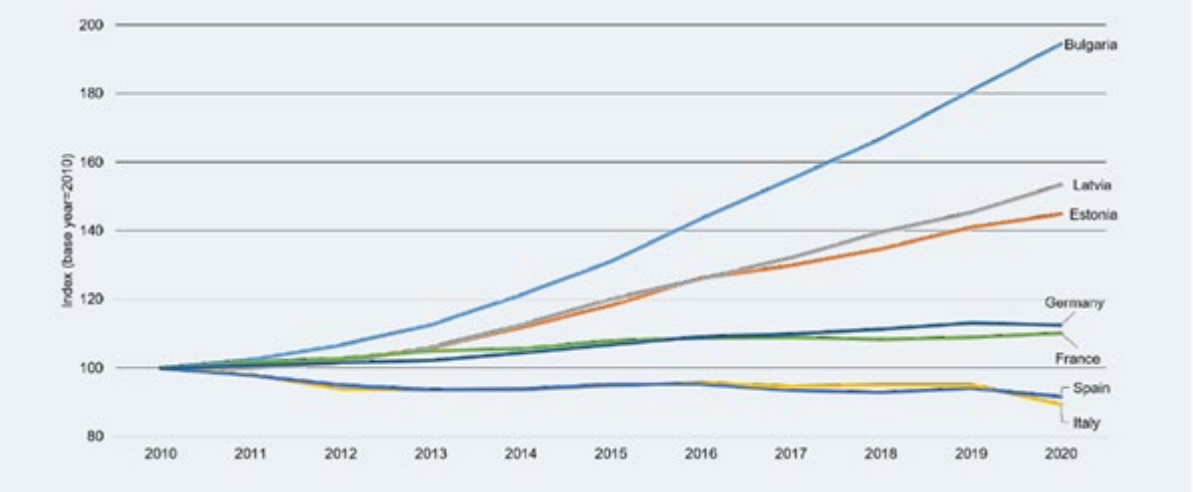
The inadequacy of wages for making a decent living has various roots. On the one hand, real wages have declined in several Member States over time in the past decade, as underlined by the International Labour Organization (ILO).[88] This is the case, in particular, in southern European countries (see Figure 14).

[86] For more details, see annexed paper.

[87] People who have an equivalised disposable income below the risk-of-poverty threshold, which is set at 60 % of the national median income.

[88] Global Wage Report 2020-21: Factsheet for the European Union, ILO, May 2021.

Figure 14: Average real wage index, change 2010-2020



Source: Global Wage Report 2020-21: Factsheet for the European Union (EU-27), ILO, based on ILOStat and ILO Global Watch Database (2020 data are preliminary estimates).

On average, the growth of wages was far below the growth in productivity, which signals an issue of redistribution away from labour. According to the ILO,[89] overall labour productivity (+12.3 %) increased more rapidly than real wages (+8.4 %) between 2009 and 2019.

In a context of low or stagnating wages, as it has been the case in the past decades for Italy and Spain for example, the decrease in purchasing power of wages is a further threat that risks increasing in-work poverty. After years of low inflation, the recent increase in energy prices is driving a new rise in overall prices owing to shortages and bottlenecks on the supply side.[90] The loss of purchasing power, in particular in poorer households, calls for renewed anti-poverty policies, including policies to sustain the purchasing power of wages.

Moreover, there is evidence of a significant share of EU workers being **low-wage earners**, i.e. earning two-thirds or less of the national median gross hourly earnings in a given country. Between 2009 and 2019, there were on average 160 million employees, out of which about 23 million low-wage earners.[91] Figure 15 below shows the share of low-wage earners of total employees (excluding apprentices). Low-wage earners represented 15.2 % of EU employees in 2018; in most countries (and on average in the EU), women are more likely to be part of this category.[92] There is indeed evidence of a process of 'feminisation' of low-paid jobs. According to the 2021 European Jobs Monitor,[93] women represent on average the majority of workers in the bottom wage quintile. Interestingly, in Spain, France, Italy and Sweden, for instance, employment in low-paid jobs was male-dominated in 1995 and female-dominated in 2019. The same study points out, on the other hand, that the biggest share of new employment generated for women at medium and high wage was been generated by the public sector (e.g. health sector).

89 ILO, ibid.

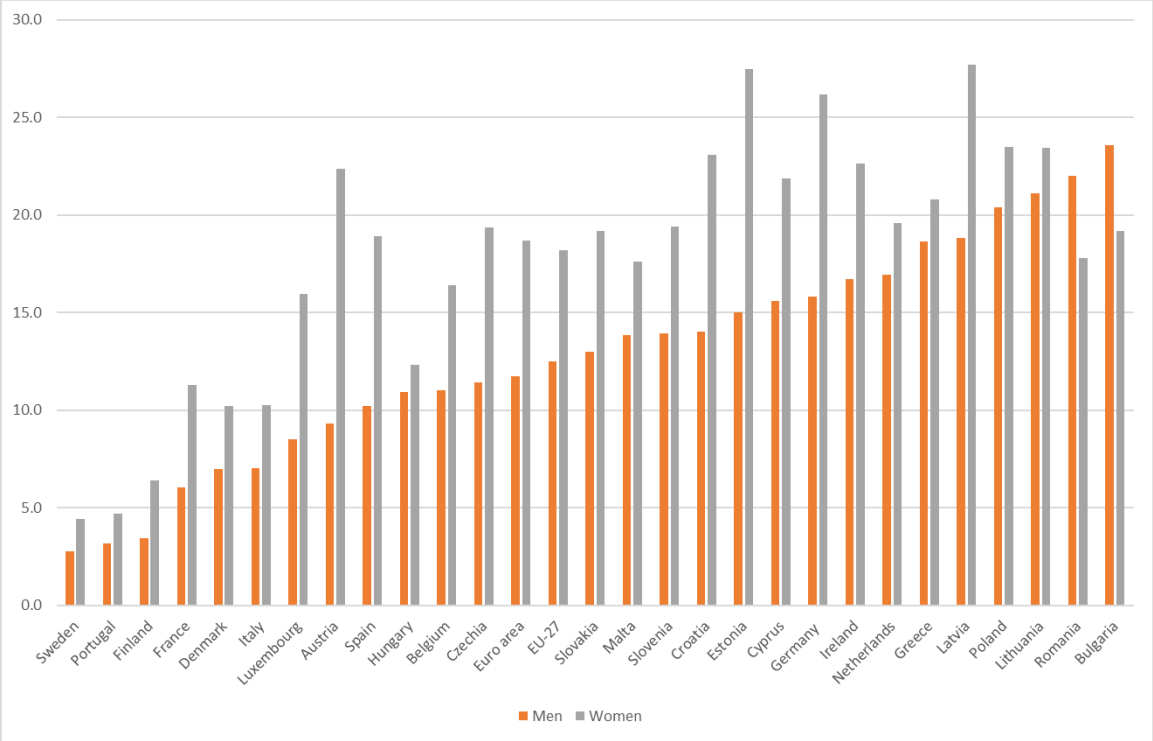
90 The 2022 Russian invasion of Ukraine with its economic and social consequences is a major factor in this process.

91 See annexed paper.

92 The share of men low-wage earners over men employed in the EU is 12.5 %, while for women this share is 18.2 % (Eurostat, EARN_SES).

93 European Jobs Monitor 2021: Gender gaps and the employment structure, Eurofound, 2021

Figure 15: Share of low-wage earners by gender and Member State

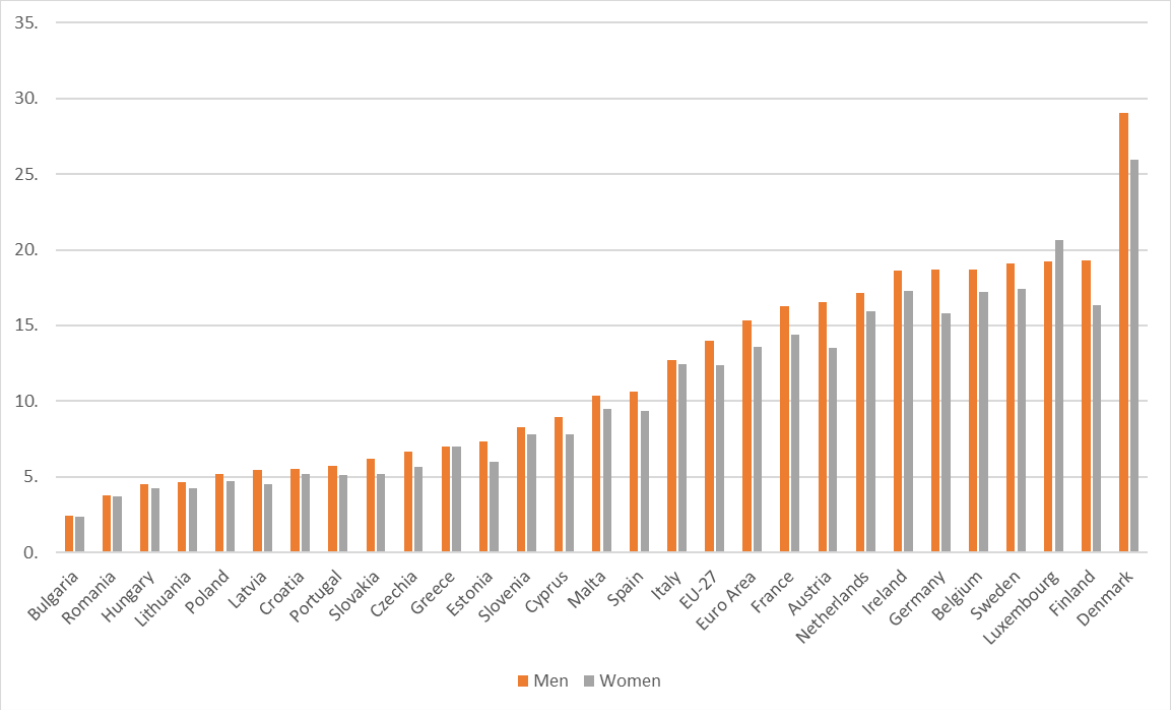


Source: Compiled by the authors based on Eurostat data (year 2018).

The wage distribution across Member States is very heterogeneous, and the same is true for the wage levels (see Figure 16 below). While some process towards convergence can be observed (countries with lower wages having a greater wage increase), considerable differences persist, with some countries not experiencing it, especially in southern Europe, where the wage growth has been limited if not absent. As already mentioned with regard to poverty and inequality in Section 4.2, a two-fold perspective is also needed regarding wages: on the one hand, wage adequacy and wage inequalities within a country, and, on the other, wage adequacy and wage inequalities between countries (from an EU perspective). In both cases, major challenges exist that put the protection and adequacy of living standards of relevant shares of workers at risk, and make room for a possible strategic organisation of value chains to exploit differences in labour standards, thus highlighting risks of a race to the bottom on social standards within the EU.[94]

[94] Despite intra-EU mobility and remittances towards the countries of origin allow to mitigate the costs of these imbalances, these latter represents a challenge to upward convergence and leaves room for low labour standards and risks of exploitative working conditions.

Figure 16: Median hourly earnings by gender and Member State



Source: Compiled by the authors based on Eurostat data (in euros, year 2018).

Another factor playing into the inadequacy of wages is the incidence of precarious employment, in the form, among others, of temporary contracts, the grey area of non-employee contracts, fake self-employment or self-employment out-of-necessity and involuntary part-time. As has been witnessed during the Covid-19 crisis, these are particularly vulnerable workers. The OECD Employment Outlook 2021 highlights this observation, in particular in the first wave of the pandemic, and raises the alarm on the limitation of social protection and job retention schemes for workers in non-standard employment, be it temporary or self-employed. This showed the tendency of several sectors relying heavily on temporary workers, and the intrinsic instability of these contracts, which allow workers to be laid-off with limited cost to the employer.[95] As shown by the ILO wage report,[96] sub-minimum and minimum wage earners are more likely to have temporary contracts and part-time jobs. Moreover, precarious employment is especially relevant in the case of women and migrant workers, indicating the intersectional dimension of the related vulnerabilities.[97] For example, three out of four part-time jobs in the EU are held by women.[98] Migrant workers, in particular third-country nationals, have systematically lower probability of having a permanent contract, facing, among other things, worse working conditions (also with respect to mobile EU workers) and barriers in access to employment.[99]

To address such a multifaceted issue, **multiple tools** already exist or can be put in place. These include anti-poverty measures (see Section 4.2; minimum income could reduce the need to accept salaries below the poverty threshold); wage indexation to address the loss of purchasing power due

95 OECD Employment Outlook, OECD, 2021.

96 ILO, ibid.

97 Precarious work from a gender and intersectionality perspective, and ways to combat it, Policy Department for Citizens' Rights and Constitutional Affairs, European Parliament, November 2020.

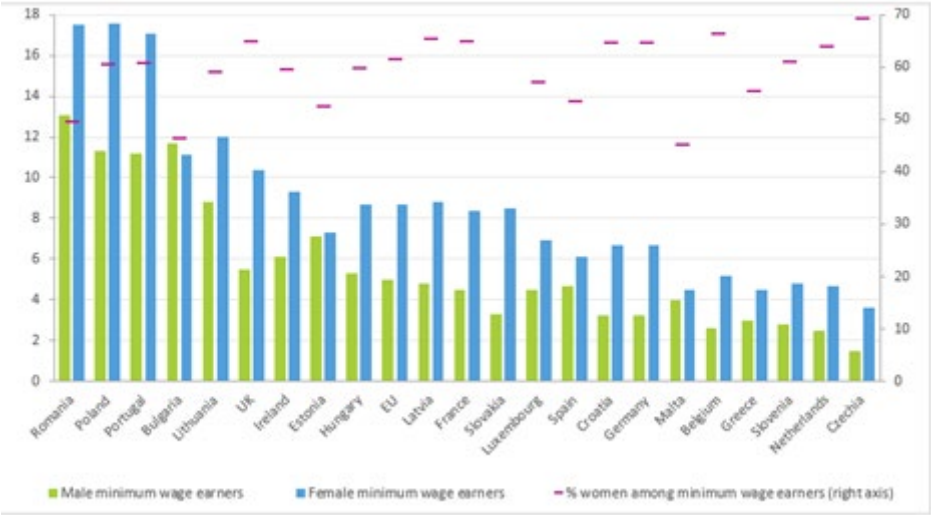
98 European Jobs Monitor, Gender gaps and the employment structure, Eurofound, 2021.

99 C. Navarra and M. Fernandes, Legal migration policy and law, European added value assessment, EPRS, September 2021.

to inflation; labour market reforms to reduce the incidence of non-standard employment contracts and temporary employment; minimum wage legislation; and support for employment in the public sector, which has proven to be an engine of 'good' employment for women. These tools are complementary and non-mutually exclusive.

The focus of this section is on minimum wage legislation. In the EU, 21 out of 27 Member States have statutory minimum wages,[100] while in Denmark, Italy, Cyprus, Austria, Finland and Sweden, minimum wages are set by collective agreements. The share of minimum wage earners varies substantially across Member States, with its incidence being higher among women than men.

Figure 17: Share of minimum wage earners by gender



Source: Eurofound based on EU-SILC 2019 (EU-SILC 2018 for EU aggregate, UK and Ireland). Member States considered are only those where statutory minimum wages exist.

In the past 10 years, minimum wages have increased substantially in some Member States,[101] showing some convergence pattern, particularly in eastern Europe. Unlike the central and eastern European countries, the Mediterranean Member States have failed to significantly catch up with those countries that have the highest minimum wage rates. Greece is a particularly dramatic case in point: its minimum wage was cut in 2012 and subsequently frozen until 2019. More recent developments in Spain, however, are positive, in particular the large increase in 2019 and the more recent one in early 2022.[102] As Eurofound notes, in 2021, the pandemic slowed down minimum wage increases (the median minimum wage increase in 2021 was 3 %, compared with 8.4 % the previous year). In 2022, increases have been bigger, but inflation may be threatening the purchasing power of minimum wages. Moreover, historically, the progress of minimum wages in real terms is much more modest than in nominal rates (especially in Belgium, Germany, Ireland, Greece, France, Luxembourg, Malta and the Netherlands).[103]

[100] In all Member States with statutory national minimum wages, collective agreements set wages above the statutory minimum wages in a number of sectors (see impact assessment accompanying the Commission proposal for an EU directive on adequate minimum wages in the EU).

[101] Minimum wages rise again, but the pandemic puts a brake on their growth, Eurofound, 2021, and Minimum wages in 2022: Bigger hikes this time around, Eurofond, 2022.

[102] El Gobierno eleva el Salario Mínimo Interprofesional a 1.000 euros, press release, Spanish Government, 22 February 2022.

[103] Minimum wage developments in the last decade, low-paid employees and minimum wage earners, Eurofound, 2021.

4.3.2. Waste rate analysis

Minimum wages are an important starting point for addressing in-work poverty and the incidence of low-wage earnings. They should be seen in conjunction with policies to address poor protection of workers' conditions, such as the proliferation of precarious hybrid working agreements and unwanted part-time, intersectional inequalities, the loss of purchasing power of wages, and the lack of redistribution of productivity gains.

The vast majority of relevant studies in empirical economic literature find that minimum wages have a positive effect on productivity and welfare.[104] Some studies still stress possible effects on the informal economy, and suggest exploring potential long-run effects of reduced profit margins. The main scientific debate is concerned with the question whether minimum wages lead to an increase in unemployment, and most studies find evidence that this is not the case. These include several studies by the recent Nobel Prize winner David Card.[105] Moreover, there is evidence that minimum wage can reduce inequality.[106] Results from an ILO simulation suggest that reaching a situation of full coverage and compliance, and increasing the level of the minimum wage to 67 % of the median, would have the potential to reduce income inequality in the EU.[107]

Minimum wage regulations are **effective** if they manage to reduce both in-work poverty and inequality. In this study, these are measured through three outcome variables (see Table 2 in Section 3):

- share of low-wage earners (those employees earning two-thirds or less of the national median gross hourly earnings in a given country);
- in-work at-risk-of-poverty rate (the share of individuals who are at work and have an equivalised disposable income below the risk-of-poverty threshold, which is set at 60 % of the national median income);
- Gini index (a widespread measure of inequality of income distribution).[108]

It is more difficult to analyse **efficiency**, and especially budgetary efficiency. As there is no public spending earmarked for minimum wage, it is not possible to estimate the budgetary waste for minimum wage in its strict sense, as in case of STW schemes and anti-poverty schemes. This is, of course, a limitation of this analysis, the results of which have to be taken with caution. Unlike for the two other policies, in this case, the input is not public spending, but a measure of the level of the minimum wage relative to the average wage in the economy (the 'bite' of the minimum wage, the Kaitz index).

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[104] D. Acemoglu, 'Good jobs versus bad jobs', *Journal of Labor Economics*, Vol. 19(1), 2001, pp. 1-21; D. Rodrik, 'Coordination failures and government policy: A model with applications to East Asia and Eastern Europe', *Journal of International Economics*, Vol. 40(1-2), February 1996, pp. 1-22.

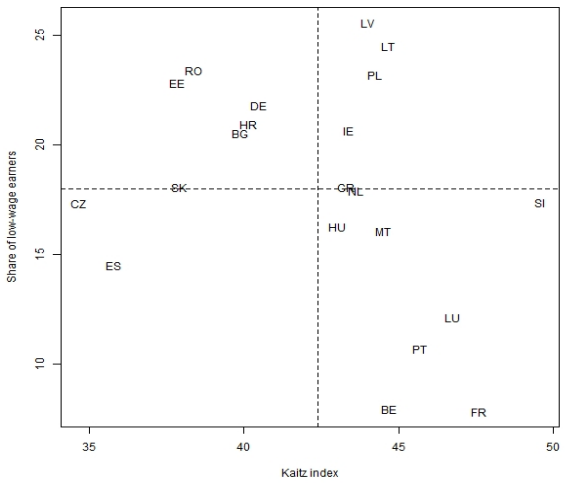
[105] D. Card and A. Krueger, 'Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania', *American Economic Review*, Vol. 84(4), September 1994, pp. 772-793; D. Card and A. Krueger, *Myth and Measurement: The New Economics of the Minimum Wage – Twentieth-Anniversary Edition*, Princeton University Press, 2015.

[106] R. Dickens, S. Machin and A. Manning, 'The effects of minimum wages on employment: Theory and evidence from Britain', *Journal of Labor Economics*, Vol. 17(1), 1999, pp. 1-22.

[107] ILO, ibid.

[108] The Gini index is the ratio of the cumulative shares of the population arranged according to the level of equivalised disposable income, to the cumulative share of the equivalised total disposable income received by them. It has a theoretical range going from zero to one; the closer the Gini index is to one, the more unequal is the country.

Figure 18: Kaitz index and share of low-wage earners



Source: Annexed paper by CRILDA, based on Eurostat data.

Input and output variable are plotted in Figure 18. The analysis is limited to countries with a legal minimum wage; however, some discussion regarding the others will be addressed below.[109]

There is a negative correlation between the 'bite' of the minimum wage and the share of low-wage earners: Belgium and France have indeed above-average Kaitz indexes and appear highly effective in reducing the share of low-wage earners. As already mentioned, this analysis does not examine the existence of a causal relation between input and output. Although some possible confounding factors are taken into account in computing the efficiency scores,[110] other elements may enter into the picture when explaining the incidence of low wages (see section above).

By looking at the efficiency scores[111] (Table 9 below), it becomes evident that the benchmark is represented by France, and several other countries are extremely close to the EU frontier (for example, Belgium with a score of 0.996, Portugal with a score of 0.969, and Spain with a score of 0.966). In more general terms, the level of ineffectiveness is limited, with no Member State reporting a score below 0.8.[112] This analysis does not take into account the differences of minimum wages across the EU, and Member States are ranked simply on the basis of the 'bite' of minimum wages with respect to *their* average wage; this is important to keep in mind while observing that Luxembourg and Portugal have a similar score, despite extremely different levels of minimum wage.

An alternative approach also has to be used to estimate a sort of 'waste rate' for minimum wage policy. It consists of computing the number of low-wage earners who would be able to leave the low-wage status if an effective minimum wage policy were in place. Table 9 shows that there are more than 23 million low-wage earners in the EU (first column). The efficiency score can give an indication of how many of these workers are in a low earning status because of inefficiencies of the minimum wage policy. Column 4 indicates that they are about 2.4 million, i.e. 10 % of the total number of low-wage earners. Although this already gives an indication of the consequences of this 'inefficiency', a monetary transformation can be made.[113] The estimated waste rate amounts to

[109] Minimum wage policies affect wage distribution to a greater extent than income distribution, therefore the results presented focus on the share of low-wage earners as outcome. For an analysis of the full set of indicators, see annexed paper.

[110] Employment rate and employment rate of individuals with a low educational attainment.

[111] The efficiency scores are calculated taking into account the potential impact of the country's employment rate and the share of low-educated employees over the population, which otherwise could be factors influencing the share of low-wage earners regardless of minimum wage policy (and would risk being confusing).

[112] Since income distribution is not only affected by wages, the results differ quite considerably when using the other two indicators, and the efficiency scores obtained for the share of low-wage earners are correlated weakly with those for the in-work at-risk-of-poverty rate and the Gini index (see annexed paper).

[113] It is assumed that a social transfer could be made by Member State authorities, through a lump-sum transfer, to lift wages of low-wage earners out of the low-wage status.

€6 billion, which could be seen as the cost of not having an adequate minimum wage policy, i.e. it represents the amount that would be needed to bring these workers out of the low-wage status.

Table 9: Calculation of the waste rate for minimum wage regulations

	Outcome level (thousands of low-wage earners)	Efficiency score	Inefficiency	Cost of inefficiency (thousands of low-wage earners)	Waste (€ million per year)
BE	308	0.996	0.4 %	1	2.6
BG	531	0.894	10.6 %	56	31.8
HR	278	0.888	11.2 %	31	38.2
CZ	764	0.929	7.1 %	54	104.6
EE	126	0.875	12.5 %	16	22.9
FR	1 933	1	0.0 %	0	0.0
DE	8 390	0.876	12.4 %	1 040	4 410.1
GR	560	0.9	10.0 %	56	77.4
HU	642	0.921	7.9 %	51	33.8
IE	346	0.871	12.9 %	45	123.2
LV	198	0.812	18.8 %	37	20.4
LT	287	0.817	18.3 %	52	23.1
LU	46	0.954	4.6 %	2	3.3
MT	28	0.911	8.9 %	2	2.6
NL	1 341	0.899	10.1 %	135	354.7
PL	2 892	0.835	16.5 %	477	300.4
PT	426	0.969	3.1 %	13	8.9
RO	1 441	0.868	13.2 %	190	171.9
SK	350	0.929	7.1 %	25	36.2
SI	136	0.897	10.3 %	14	1.0
ES	2 362	0.966	3.4 %	80	299.4
TOTAL	23 385			2 380 (10.2 %)	6 066.7

Source: Authors' own calculation based on the paper by CRILDA annexed to this study.

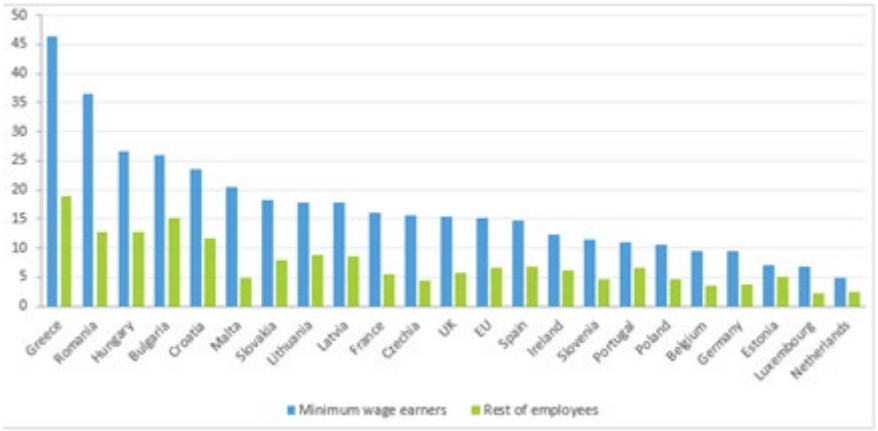
4.3.3. EU added value

The above calculations show that low-wage earners in the EU are more than 23 million. According to the DEA methodology, just over 10 % of them could exit from the 'low wage' status if inefficiencies in the minimum wage were addressed. With this approach, a possible reason for these inefficiencies

is that employers still hold **monopsony power** that allow them to keep wages low.[114] This could be prevented by adequate regulation and through EU action.

In the EU, 21 out of 27 Member States have statutory minimum wages,[115] while in Denmark, Italy, Cyprus, Austria, Finland and Sweden, minimum wages are set by collective agreements. As pointed out by the impact assessment[116] accompanying the Commission proposal for a minimum wage directive[117] in the EU, both in countries with and without statutory minimum wages, there are issues of **adequacy** and coverage of minimum wages. In-work poverty is higher among minimum wage earners: as of 2018, according to Eurofound,[118] a large number of minimum wage earners in the EU still had difficulties in making ends meet (23 %) or lived in materially deprived households (16 %). This indicates room for improvement in the level of minimum wages, to ensure that they guarantee good standards of living.

Figure 19: Share of employees who live in materially deprived households (minimum wage earners and others)



Source: Eurofound based on EU-SILC 2019 (EU-SILC 2018 for EU aggregate, UK and Ireland). Member States considered are only those where statutory minimum wages exist.

As shown in the annexed paper, minimum wages are systematically below 50 % of average gross wages.[119] The impact assessment of the Commission proposal provides an approximation of the minimum wage in the countries that do not have a statutory one (using information from collective agreements): in all these countries, with the exception of Sweden, minimum wages are below 50 % of average wages, and are below 40 % in the case of Italy (impact assessment, p. 4). The Commission impact assessment also underlines that current minimum wage provisions (both statutory and

[114] Wages could then get lower than the marginal productivity. See annexed paper.

[115] In all Member States with statutory national minimum wages, collective agreements set wages above the statutory minimum wages in a number of sectors (see impact assessment accompanying the Commission proposal on adequate minimum wages in the EU).

[116] Advancing the EU social market economy: adequate minimum wages for workers across Member States, press release, European Commission, 8 October 2020.

[117] Proposal for a directive on adequate minimum wages in the European Union, COM(2020) 682, European Commission, October 2020.

[118] Minimum wages in 2021: Annual review, Eurofound, June 2021.

[119] Considering an average of earnings between 2008 and 2019. According to the Commission impact assessment, statutory minimum wages are too low vis-à-vis other wages and/or to provide a decent living conditions in fourteen Member States (Bulgaria, Czechia, Germany, Estonia, Ireland, Greece, Croatia, Hungary, Latvia, Luxembourg, Malta, the Netherlands, Romania, Slovenia).

agreed in collective agreements) often do not allow for wages above the threshold indicating 'at risk of poverty'.

Coverage is another important issue that is also raised in the impact assessment: in countries that do not have a statutory minimum wage, more than 10 % of workers are excluded from the protection of wages set in collective agreements (in Denmark, Italy, Sweden and Finland), reaching 55 % in the case of Cyprus.[120] In Member States with a statutory national minimum wage, some workers are not protected by minimum wages because of exemptions (according to the impact assessment, this is the case in 12 Member States: Belgium, Czechia, Germany, Estonia, Ireland, Spain, France, Croatia, Latvia, Lithuania, the Netherlands and Poland). More broadly, precarious working arrangements and involuntary part-time work may facilitate ways around minimum wage legislation, which requires improved monitoring and synergies with action at several levels.

Moreover, the **loss of purchasing power** of minimum wages due to inflation (the risk of which has been increasing in the present crisis), raises the issue of a need for adequate indexation.

As discussed in Section 4.3.1, convergence is another major issue: minimum wage levels across Member States vary substantially. While some Member States give signs of convergence, this is not the case in all (particularly in southern Europe), and, even where there is convergence, wage levels remain very diverse. Differences also exist across sectors, which shows the limits of a sectorial approach to minimum wage legislation. Action at the EU level could improve **upward convergence**. The status quo **still lacks a level playing field**: the unequal treatment of posted workers is emblematic in this sense. Some sectors are also benefiting from a reorganisation of their supply chain within the EU, artificially improving their external competitiveness by exploiting lower standards, but failing to contribute to upward harmonisation of social standards and faster convergence, cohesion and solidarity within the EU. In some sectors, studies have highlighted the risks of labour exploitation in EU value chains, as for example in the textile sector.[121]

Furthermore, the Commission impact assessment argues that action at the Member State level has been insufficient to address the limited adequacy and coverage of minimum wages, both in countries with and without a statutory minimum wage. Failing concerted action at EU level, some Member States may have little incentive to improve their minimum wage settings because of the perception that this could affect their external cost competitiveness negatively. This poses challenges for ensuring a level playing field in the single market, as competition 'risks being more based on lowering social standards, rather than on innovation and productivity' (impact assessment, p. 24). EU action could avoid a **race to the bottom** pattern on wage and working conditions and ensure a move towards a higher standard of living for all people living in the EU.

[120] There is limited information about how many of these workers are earning low wages.

[121] C. Navarra, Corporate due diligence and corporate accountability, European added value assessment, EPRS, October 2020.

5. Conclusion

Social policy has been at the centre of EU discussions for many years, seen as the way to move towards an 'upward convergence' among EU countries. However, a number of crucial issues on social and labour conditions in the EU remain open, and major challenges remain in the capacity to protect employment in downturns and in granting wages that allow for adequate living conditions. Inequalities persist both within (based for instance on gender, migration status, occupation and contractual arrangements) and across Member States.

This study addresses the quantification of the 'cost of non-Europe' from the angle of 'budgetary waste rate' methodology. The idea is to measure the 'missed gain' that could be achieved through a more efficient management of resources allocated to social policy. It then analyses (both qualitatively and quantitatively, when possible) the channels through which action at the EU level could reduce that inefficiency and promote greater achievements in social policy outcomes.

The following policy areas are explored:

- short-time work schemes
- anti-poverty measures
- minimum wage regulations.

Table 10 below summarises the results of the first step of the analysis. For each policy area, several possible outcomes are selected. Depending on the variables used to better capture the desirable social outcome, the overall 'budgetary waste' for the EU-27 that could be reduced by EU action amounts to **between €9.8 billion and €30.1 billion**.

Table 10: Estimated budgetary 'waste' that could be reduced by EU coordination in social and labour policy areas

Policy areas	Impact of the policy	Indicator used in the analysis	Estimated waste rate	
			Share of total expenditure	€ billion
Short-time work schemes	Short-run mitigation of variation in employment and unemployment	Standard deviation of the employment rate	54.0 %	4.1
		Standard deviation of the unemployment rate	**62.7 %**	**4.8**
	Medium-run change in employment and unemployment between recession and recovery	Change in the level of the employment rate after recessions	49.5 %	3.8
		Change in the level of the unemployment rate after recessions	69.0 %	5.3
	Long-run effect on the level of	**Mean level of the employment rate**	**16.9 %**	**1.3**

Policy areas	Impact of the policy	Indicator used in the analysis	Estimated waste rate	
			Share of total expenditure	€ billion
	employment and unemployment	Mean level of the unemployment rate	5.1 %	0.4
Anti-Poverty Schemes	Reduction of inequality	Gini index	5.9 %	3.7
		Income quintile ratio (Inequality index)	**20.3 %**	**12.7**
	Reduction of poverty rates	**At-risk-of-poverty-or-social-exclusion rate**	**5.2 %**	**3.3**
		At-risk-of-poverty rate before and after transfers	29.8 %	18.7
Minimum wage regulations	Reduction of in-work poverty	**Share of low-wage earners**	**10.2 %**	**6.1**
		In-work at-risk-of-poverty rate	NA	
	Reduction of inequality	Gini index	NA	

Source: Compiled by the authors based on the CRILDA paper annexed to this study.

Short-time work schemes offer companies and employees advantages over the alternative of laying off of workers in of a crisis. Companies avoid incurring costs for redundancies and, in the event of economic recovery, are ready for reinstatement. Well-rehearsed teams stay together and ensure productivity. Employees avoid the loss of professional qualifications, and income losses incurred are significantly lower than in the event of unemployment. Over time, the participation of women and young people in short-time work has increased; this reflects the change in the sectoral composition of the support away from manufacturing and construction towards services and retail, i.e. sectors with a significantly higher share of women and young people in employment.

SURE as a European financial instrument supports national systems. All 27 Member States [122] agreed unanimously to provide bilateral guarantees to the EU so it can borrow €100 billion from the markets under better conditions than any single Member State, and enabled significantly more STW schemes in the EU-27. Member States have saved a total of €8.2 billion on interest payments by receiving financial assistance through SURE, which offered Member States lower interest rates than those they would have paid if they had issued sovereign debt themselves. On average, expenditure for STW schemes over the 2008-2017 period amounted, in absolute terms, to about €7.6 billion per year. The waste rate suggested is substantial: between €4.1 billion (54 %) and €4.8 billion (62.7 %) in the short run. Medium- and long-run effects, available in the annex, show qualitatively a similar picture, even though the long-run waste rate estimate is significantly lower (in the range of 5-16 %).

[122] Including the 'Frugal Four' – Denmark, the Netherlands, Austria and Sweden – and Germany, France, Luxembourg and Finland. They gave guarantees but are not beneficiaries of SURE.

The European financial instrument SURE has made more STW schemes possible. With its clear conditionality, the link between STW schemes and the protection against dismissals, the added value of SURE can be seen in:

- counter-cyclical fiscal capacity;
- enhancement of solidarity between Member States;
- the possibility for millions of EU workers of not being confronted with the permanent scars of revenue losses and precarity;
- macroeconomic stabilisation – the increase in unemployment rates in the 2020 crisis was significantly lower than during the 2009 financial crisis, despite a higher decrease in GDP;
- social innovation, with the majority of Member States indicating that SURE played a role when they adopted new STW schemes or modified existing ones;
- an improvement of the EU's 'fast-track' ability and management to respond effectively and efficiently to unprecedented social and economic developments.

Anti-poverty measures aim to guarantee a minimum income and standard of living to everyone lacking resources. Several Member States already have minimum income policies in place. While progress has been made across the EU in addressing material deprivation (albeit with considerable variation among countries), income poverty has remained stable, with about 16.5 % of the population falling below the national thresholds. Social protection expenditure aimed at combating social exclusion is expected to reduce both poverty and inequality, and higher expenditure to fight social exclusion is indeed associated with lower poverty and lower inequality (measured by the Gini index, the inequality index, the AROPE rate and the difference between the AROPE rate before and after social transfer). The size of the inefficiency resulting from the analysis is between €3.3 billion and €18.7 billion, depending on the indicator used. Through EU action, this 'waste' can be reduced, and social outcomes can be improved (thus reducing the incidence of poverty and inequality). This can happen because of several mechanisms, including the following:

- support for broad approaches to tackling poverty and intersectional inequalities, including gender aspects, in the EU;
- savings in the costs of financing, since the EU can borrow at much more favourable conditions than some Member States alone;
- the possibility of risk pooling, since business cycles within the EU are correlated imperfectly, and there is evidence that the variability of social expenses is lower within bigger economic areas (and, indeed, lower in the EU-27 than in each Member State);
- the implementation of anti-poverty measures at a greater scale, which can lower the cost of provision;
- the promotion of greater solidarity and a more cohesive society, in which less favoured regions, sectors and individuals are not left behind.

Minimum wage legislation that sets statutory minimum wages is an important starting point for addressing in-work poverty: many workers in the EU are classified as low-wage earners and working poor. In-work poverty and the incidence of low wages have several roots (such as declining or stagnating real wages, precarisation of employment, gender inequalities, lack of care services and measures of work-life balance). Minimum wage measures are among the tools expected to reduce the shares of low-wage earners and working poor, and to reduce inequality. When observing EU Member States, a negative correlation between the 'bite' of the minimum wage (its level with respect to the median wage in the country) and the share of low-wage earners becomes apparent. The 'waste' rate analysis in this case is different from the other measures (and has several limitations), since there is no budgetary implication of minimum wage measures. It is nevertheless possible to compute the number of low-wage earners who would be able to leave the low-wage status if an effective minimum wage policy were in place: there are more than 23 million low-wage earners in

the EU, of which about 10 % could increase their earnings if these inefficiencies were addressed. More united and ambitious EU action in this area could contribute to reducing these inefficiency. The EU added value stems from a number of channels, including:

- the possibility of increasing the level of minimum wages to guarantee adequate living standards; this would have a specific impact on gender inequalities, given the feminisation of low-paid jobs; and support for the positive impacts of these levels on the level of median and average wages;
- the possibility of improving coverage of minimum wages: in the EU, six Member States do not have minimum wage regulations, and the other 21 appear to have both adequacy and coverage issues that still leave an important share of workers in low-wage status and poverty;
- supporting, together with minimum wage legislation, other actions to address the other root causes of in-work poverty, including precarious employment and poor protection of several categories of workers (e.g. migrant and posted workers, fake self-employed or self-employed out of necessity, platform workers);
- supporting actions to address gender inequalities in the labour market, taking into account the relevance of care work and the positive impact of public sector employment on the increase in mid and high-wage employment for women;
- favouring upward convergence in minimum wages across the EU. Relatedly, levelling the playing field in the single market through upward harmonisation and avoiding a race to the bottom on wage and working conditions (including the proliferation of unwanted part-time arrangements at the expense of workers, and labour market fragmentation).

Overall, the potential from EU action appears substantial. Addressing social inequalities in an economically integrated area such as the EU single market is particularly relevant to avoid race-to-the-bottom trajectories, and to trigger upward convergence in social standards. This implies addressing inequalities with an intersectional perspective, both within and between Member States.

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Annex

Identifying and computing budgetary waste rate by EU Member States in social policy

This report focuses on the concept of 'waste' applied to social policies. We estimate the rate of the resources that could have been saved if a given public policy had been delivered in the most effective way. In this context, in line with the work of Saulnier (2020), we show that it could be possible to reduce waste, and generate added value for EU citizens, through coordination or harmonisation at the EU level. In particular, we focus the analysis on short-time work schemes, anti-poverty schemes and minimum wage regulations, which are currently administered at the Member State level. We discuss the different channels through which coordination and harmonisation can work in practice. The evidence presented in this study reports a relevant overall budgetary waste for Member States in the social policies considered, ranging from 5.1 % to 69.0 % of the allocated budget, corresponding to between €9.8 and €30.1 billion. We argue that this waste could be reduced through higher EU-level coordination, as well as closing the gap between national policies and the effective EU benchmark. The benefits of such a coordination would accrue in particular to the Member States that are currently lagging behind in terms of policy effectiveness, thus enhancing upward convergence in the European Union.

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Executive summary

The concept of "waste" and the one of "effectiveness" are strictly interrelated. *Waste* is actually related to the amount of resources that could have been saved if a given good or service had been produced in the *most effective* way. In other words, waste is the difference between what we really get and the best we can get in practice. This idea applies to government spending and the production of public goods and services as well. In this report, we discuss how it could be possible to reduce *waste* in social policies and generate *added value* for EU citizens, by a better coordination and harmonization at the EU level of policies currently administered at the Member State (MS) level.

There are several channels through which coordination and harmonization at the EU level can work in practice. For example, depending on the specific policy under analysis, one channel could be the provision of new "public goods", that would not have been available if these competences were kept at the Member State (MS) level. Alternatively, effectiveness gains, obtainable allowing access to information for a better use of existing resources, or savings related to administrative costs associated with better procedures and administrative process to reduce red-tape costs. Other channel are integration of cross-border externalities and spillovers, as well as risk pooling related to the imperfect correlation of business cycles and economic shocks across MS.

Following the previous work of Saulnier (*Improving the quality of public spending in Europe - Budgetary 'waste rates' in EU MS*. EPRS, October 2020), we identify and compute waste in MS spending for three specific branches of social policy: 'short-time work' schemes, 'anti-poverty' schemes and 'minimum wage' regulations. More specifically, we apply a benchmarking technique, Data Envelopment Analysis (DEA), to understand how the different policies implemented by MS can improve labour market outcomes. DEA compares MS starting from the definition of input (in general, public spending for a specific social policy) and outcome (a goal pursued by MS with the public policy), assuming the existence of a common "frontier" at the EU level. While DEA allows to describe the distance from the common frontier and to compute the waste in public budgets, it is not suitable to investigate the (causal) effect of a social policy on the expected outcomes. The above mentioned social policies are currently implemented in the large majority of EU MS. They are helpful tools to further strengthen the social rights listed in the 20 principles of the European Pillar of Social Rights. In particular, some of these principles are directly affected by the policies we consider, such as 'Secure and adaptable employment', 'Wages', 'Social protection' and 'Minimum income'. There is a lively debate concerning these social policies in light of the ongoing COVID-19 pandemics, especially 'short-time work' schemes and 'anti-poverty' schemes. The biannual report on the implementation of the SURE mechanism (Support to mitigate Unemployment Risks in an Emergency), drafted by the European Commission, provides frequent updates on the role of SURE for labour market performance and public finances of beneficiary MS. The assessment of the Commission on the effectiveness of the scheme points to overall positive effects, also emphasizing the relevant role of EU support in encouraging MS to introduce new short-time work schemes, when these were not previously implemented; or strengthening the existing ones, along with measures similar to 'short-time work schemes', such as: wage subsidy schemes, support for self-employed workers, special parental leave benefits, support for seasonal workers, support for training linked to short-time work, support and health-related expenditure directly related to the COVID-19 emergency. Even if not directly related to the ongoing pandemics, there is also a discussion on the EU minimum wage regulations that roots on the *Proposal for a Directive of the European Parliament and of the Council on adequate minimum wages in the European Union* in October 2020. The term 'adequate' recalls the necessity of minimum wage earners to avoid in-work poverty. Indeed, according to Eurofound (2021a), a non-trivial share of minimum wage earners in the EU reported difficulties in making ends meet (23%) or lived in materially deprived households

(16%).[1] Also among other groups of wage earners, a non-negligible share reports difficulties in making ends meet (11.5% and 6%, respectively) (Eurofound, 2021a).

Table 1 Estimated waste in influencing labour market outcomes at national level

Policy areas	Targets	Estimated waste at the MS level	
		Rate on total expenditure	€ bn
Short-Time Work Schemes	Standard deviation of the employment rate	54.0%	4.1
	Standard deviation of the unemployment rate	62.7%	4.8
	Change in the level of the employment rate after recessions	49.5%	3.8
	Change in the level of the unemployment rate after recessions	69.0%	5.3
	Mean level of the employment rate	16.9%	1.3
	Mean level of the unemployment rate	5.1%	0.4
Anti-Poverty Schemes	Gini index	5.9%	3.7
	Income quintile ratio (Inequality index)	20.3%	12.7
	At-risk-of-poverty or social exclusion rate	5.2%	3.3
	At-risk-of-poverty rate before and after transfers	29.8%	18.7
Minimum Wage Regulation	Share of low-wage earners	10.2%	6.1

Our analysis takes a broader perspective, as we evaluate the role of short-time work schemes, anti-poverty policies and minimum wage over a period of more than ten years, encompassing different phases of the business cycle. The evidence presented in the present Report, summarized in Table 1, concludes that, for the three social policies considered, there is a relevant budgetary waste: summing across the three policy areas, this amounts to between €9.8 and €30.1 billion. This waste could be reduced by a higher EU-level coordination capable of closing the gap between MS policies and the most effective benchmarks. In particular, the benefits of such EU-level coordination would accrue to MS that are currently lagging behind in terms of policy effectiveness, enhancing the *upward convergence* aimed by the European Commission (Mascherini et al. 2021).

Short-Time Work schemes. We investigated whether national spending on these schemes were effective in reducing the volatility of labour market outcomes (employment and unemployment rate) in the short-run. We also look at whether, in the medium-run, short-time work schemes are effective in increasing the employment rate and decreasing the unemployment rate after recessions. Finally, we investigated whether short-time work schemes are effective in increasing the structural level of the employment rate, and decreasing the structural level of the unemployment rate, in the long-run. While short-time work schemes are mainly conceived as a short-time counter-cyclical policy measures, some MS extended their use also to buffer the increase (decrease) in the unemployment (employment) rate during intense restructuring phases, with ambiguous effects on labour market outcomes and a controversial assessment of their long-term effectiveness.

[1] Please note that the former (making ends meet) is a subjective indicator, while the latter (material deprivation) is an objective one.

We find a relevant degree of heterogeneity in effectiveness, with budgetary waste in the MS considered ranging between 5.1% and 69.0% of the total allocated budget (€0.4 to €5.3 billion). This implies that, while an EU-level coordination/harmonization may substantially increase the added value for EU citizens, too generous schemes may turn out to be less effective compared with schemes that balance the temporary support with (implicit) incentives to relocate workers to more productive jobs. Evidence from the SURE mechanism suggest that the EU-level coordination encouraged MS to introduce new STW schemes or potentiate existing ones. A higher level of effectiveness, coupled with a greater availability of resources, may result in a preferable outcome and facilitate the *upward convergence* aimed by the European Commission (Mascherini et al. 2021).

Anti-Poverty schemes. We analysed whether national spending to fight poverty and social exclusion are able to improve difficulties in making ends meet, and reduce inequality and poverty measures. We find a nontrivial budgetary waste rate, ranging between 5.2% and 29.8%, of the total allocated budget, according to the different inequality/poverty measures considered, corresponding to between €3.3 and €18.7 billion waste. Hence, despite in relative terms the waste rate is lower, compared with the one detected for short-time work schemes, in absolute value the total waste associated with this policy, at the EU level, is also highly relevant.

Minimum Wage regulation. In the case of Minimum Wage regulations, it is not possible to estimate the *budgetary waste* in strict sense, since there is no public budget explicitly spent for such policy. Therefore, we investigate how MSs, that do have a statutory minimum wage (i.e. 21 MS), are able to contain the share of low-wage earners among their employees. In this respect, we estimate that approximately 2.3 million, out of the 23 million workers in the EU that are considered low-wage earners (10.2%), could be directly related to an ineffective minimum wage regulation – i.e. either because such regulation is lacking, or due to a low level of the minimum wage relative to the average wage. Back-of-the-envelope calculations suggest that in order to achieve a sizeable reduction of the share of low wage earners, MS should spend about €6 billion in pecuniary transfers to low wage workers, to bring those out of low-wage poverty. In other words, the €6 billion overall budget could be regarded as the implicit cost (waste) associated with non-adequate minimum wage standards.

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1. Introduction

1.1. The concepts of budgetary waste and added-value

The ideas of "waste" and "efficiency" are central in economics. In microeconomic terms, looking at *private* firms operating in *private* markets, waste is related to the amount of inputs that could have been saved if an output (a given good or service) had been produced in the most efficient way, meaning at the lowest possible cost given the quantity and the quality of output. However, starting from the theory of production and the analysis of private firms' efficiency, these concepts have been extended to *public* firms' and even to *entire countries* (Afonso et al., 2005).

The general extended model considers government spending as an input in the production of public goods and services (like the number of patients or the number of students at school, the *output* of public spending), or in reaching specific final goals of public policies (like the health of citizens or students' ability and knowledge, the *outcome* of public spending). In this framework, the literature on performance evaluation (carried out via benchmarking exercises) refers to the *efficiency* of public spending, thus considering the relationship between public spending and output, while it identifies the *effectiveness* of public spending in the relationship between public spending and a number of economic outcomes. In the analysis of entire countries, inefficient (ineffective) countries are those that waste money, in the sense that they spend more than a benchmark to obtain the same level of output (to reach the same level of outcome). The potential for "added value" is naturally connected to the presence of waste. Eliminating or, at least, reducing waste will generate additional value for citizens, the final recipients of public policies.

Saulnier (2020) further extended the idea of comparing different countries to the case of Member States of the European Union (MS from now on). The main idea of identifying waste in specific public policies, currently managed at the country level, was to consider how changes in the governance of specific policies, from MS to the European Union, could improve the performance (i.e., reduce budgetary waste) to the advantage of EU citizens. The change in governance applied to specific policies was intended to identify a common "EU production frontier" allowing to identify the best input/outcome combinations and to compute the scale of waste that coordination or harmonization of a given policy at the EU level could eliminate, generating added value for EU citizens. There are several ways through which coordination and harmonization can work in practice, depending on the specific policy under analysis: provision of 'new public goods', that would not have been available if these competences are kept at the MS level. Alternatively, efficiency gains, obtainable allowing access to information for a better use of existing resources, or savings related to administrative costs allowing access to better procedures and administrative process to reduce red-tape. Finally, an integration of cross-border externalities and spillovers, as well as risk pooling, related to the imperfect correlation of business cycles and economic shocks across MS.

The identification of budgetary waste provided in Saulnier (2020) relies on a benchmarking exercise based on Data Envelopment Analysis (DEA), one of the available methodologies that allow to identify the best input/outcome combinations among EU MS. Saulnier (2020) defines budgetary waste as "*the minimum amount of public resources needed to achieve a fixed desired level of output/outcome or, conversely, the largest possible amount of output/outcome that can be obtained given a fixed level of input (e.g. public spending)*". The starting point is that there is substantial heterogeneity in the policies currently implemented by EU MS both in the level of resources allocated (i.e., public spending), and in the main outcomes associated with such policies. These differences partly reflect different preferences of citizens across MS, but they also partly reflect differences in effectiveness, including fixed administrative costs that absorb resources, the

impossibility to provide a given public good, externalities from other MS, or the difficulty in facing a given shock relying only on the resources of that MS. In this context, moving the coordination of a given policy area to the EU level could preserve the heterogeneity of preferences of the different MS, also allowing a common framework for the implementation of policies as close as possible to the EU frontier. The potential to do so, and the associated waste reduction, are related to how many channels the EU coordination/harmonization may activate.

Hence, budgetary waste can be computed for policy areas that are currently managed at the MS level but may be harmonized, or at least coordinated, at the EU level. The larger the waste, the stronger the economic rationale to move coordination of the policy at the supranational level. The absence of harmonization/coordination across EU member countries is often referred as the "cost of non-Europe". Besides the implementation of the DEA methodology, Saulnier (2020) also proposes a number of applications to policy areas such as healthcare, energy and climate change, social insurance and defence. The key result stemming from these applications is that the budgetary waste rate in the EU is large and there is significant room to generate added value moving the design and implementation of selected policies from MS to the EU level. It is then a political decision whether to move in this direction or not, depending on the political preferences of EU citizens.

1.2. Applications to Short-Time Work schemes, Anti-Poverty schemes, and Minimum Wage regulations

In this work, we extend the application of the concept of budgetary waste rate to a number of policies of interest for EU policies, namely social policies strictly connected to the working of the European labour markets (Saulnier 2020). A specific focus will be placed onto three different policy measures and regulations, namely: Short Time Work (STW), Anti-Poverty schemes (AP) and Minimum Wage (MW) regulations. Following the DEA methodology, we shall consider public spending for the above listed schemes as the 'input' used by MS to improve a number of labour market 'outcomes'. In other words, the empirical exercise consists in estimating a EU common frontier relating, for each policy, public spending with the selected labour market outcome, and assessing how *effective* are MS in reaching specific outcomes with respect to the EU frontier. The distance between the estimated MS's policy *effectiveness* and that that could be obtained by the coordination and harmonization of such policy at the EU level is the measure of budgetary waste (i.e., the cost of non-Europe).

One recent example of such policy coordination is the experience of the SURE mechanism, that we will discuss extensively in the Results section. The SURE mechanism is a clear example of how EU coordination could help MS in saving money, improving the effectiveness of public policies. As is well known, in the case of SURE the coordination role of the EU was limited to the procurement of funds required to finance nationally defined schemes, still the more favourable conditions met on financial markets by the EU Social Bonds with respect to sovereign bonds have encouraged beneficiary MS to employ more resources, achieving – at least on aggregate terms – a better outcome for their citizens. Hence, a higher amount of resources from EU borrowing and a higher degree of effectiveness from EU coordination could reinforce each other and facilitate the *upward convergence* aimed by the European Commission (Mascherini et al. 2021). On a similar tone, Saulnier (2020) has already highlighted that the positive but incomplete correlation of business cycles across EU MS can create room for risk pooling, suggesting that there are other channels for improving effectiveness of MS social policies.

1.2.1. Short-Time Work schemes

Short-time work schemes are defined as 'public programmes that allow firms experiencing economic difficulties to temporarily reduce the hours worked while providing their employees

with income support from the State for the hours not worked' (European Commission regulation proposal, 2020).[2] The adoption of STW schemes in several EU MS has been spurred by two recent economic crisis (the Great Recession in 2008-09 and the current COVID-19 crisis), also thanks to the introduction of SURE mechanism.

In the context of the COVID-19 pandemic the European Union introduced a new instrument to support the reduction in hours worked following the introduction of lockdown measures across EU MS. This instrument, called SURE (Support to mitigate Unemployment Risks in an Emergency) had an overall budget of €100 billion and granted support to 19 MS over the pandemic crisis. For the first time, the EU issued Social Bonds to finance the SURE scheme. SURE did not introduce any new European STW scheme, it mainly supported national schemes – both existing ones and newly introduced ones – to protect jobs and workers' incomes. While SURE primarily financed STW schemes, other measures akin to STW schemes were also supported, such as: 'wage subsidy schemes', 'measures for the self-employed', 'special parental leave schemes', 'support for seasonal workers', 'support for training linked to STW support' and 'health-related expenditure' directly connected to the COVID-19 emergency. As we discuss more extensively in Section 4, the support granted by SURE encouraged some MSs to introduce STW schemes, or to improve existing ones. To date, the majority of MSs has a STW scheme in place; of those, thirteen MSs have established schemes, while four MSs have schemes that can be activated on need ("EU-27 support for national short-time work schemes"; EPRS, 2020).[3]

Despite STW schemes being designed at the national level and reflecting different preferences across MS, some common features of these schemes can be detected. Programme characteristics are summarized in Annex 2 of Mosley (2020).[4] Firms can activate STW for their workers in the case of downturn or, more in general, for verifiable economic reasons. With few exceptions, STW provides at least 50% of full salary for hours not worked, for at least one month. However, some MS are far more generous: for example, as for the amount, Denmark and Hungary provide 90% and 100% of previous earnings up to a cap, respectively; as for the duration, in Croatia, Germany and Italy STW schemes can last even up to 24 months, if certain conditions are met.

The combination of *i)* circumstances covered, *ii)* eligibility condition, *iii)* level and *iv)* duration of benefits reflects a trade-off between the pros and the cons of STW that we discuss extensively in the following Section 1.3.1. On the positive side, STW schemes allow the possibility to smooth employment over the business cycle, preventing firms going through temporary demand shock to fire workers. Also a reduction in unemployment rate fluctuation over crisis periods can be expected from the implementation of STW schemes. In our empirical exercise below, we shall consider different indicators of (un)employment as main 'outcomes', considering expenditure for STW as the 'input' in our DEA benchmarking exercise. On the negative side, when the crisis is persistent and structural, STW schemes can slow down the reallocation of workers from contracting industries and areas, such as the so-called 'zombie' firms, to expanding industries and growing firms, thus impeding the adjustment process. In other words, STW schemes should be considered only as a temporary buffer and should not be used to sustain employment permanently[5], as workers who receive too generous benefits, have low incentives to relocate to other jobs and remain stuck in dead-end jobs. Despite the importance of these issues, exploring these potential

[2] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52020PC0139&from=EN

[3] https://www.europarl.europa.eu/RegData/etudes/ATAG/2020/642826/EPRS_ATA(2020)642826_EN.pdf

[4] OECD (2020) has a focus on job retention schemes, including STW, during the first wave of COVID-19.

[5] Being a temporary buffer, STW can certainly help in creating a bridge toward, e.g., more structural EU interventions like those proposed within the REACT-EU package and the Recovery and Resilience Facility.

inefficiencies of STW schemes remains out of the scope of the current analysis, and we only look at the literature to characterize these problems[6].

1.2.2. Anti-Poverty schemes

Anti-poverty policies are implemented in all EU MS; almost all of them do also have a minimum income scheme. The necessity to provide all citizens with "adequate minimum income benefits" is one of the principles of the European Pillar of Social Rights. In our empirical applications below, we explore the effectiveness of anti-poverty policies on two alternative outcomes, namely: income inequality and the incidence of poverty. One implication of anti-poverty policies, such as a guaranteed minimum income, is that when their design is too generous, it may constitute a disincentive to work. While we do not provide any empirical evidence on the relevance of incentives in the context of antipoverty policies, we review the literature on the effects of public transfers to the poor on different labour market outcomes. We also provide evidence on the current debate about the opportunity to coordinate anti-poverty policies at a more centralized, or decentralized, level.

1.2.3. Minimum Wage regulations

Minimum wage regulations are currently present in 21 out of 27 MS. In the six MS that do not have a minimum wage regulation, minimum wage standards are determined through collective bargaining. Statutory minimum wages regulate wage determination for workers employed in low-paid jobs, and try to protect frail and less-skilled workers from excessive competitive pressures and employers' monopsony power. The levels at which national minimum wages are set vary considerably across MS, ranging from 35% to 60% of the mean wage in each country. While there is not an agreed "golden rule" for the level at which the minimum wage should be fixed relative to the average wage, the level that is conventionally taken as reference in international studies is close to 50% of the national average wage (or alternatively two-thirds of the median wage). It is worth noticing that in most EU MSs the current level of the national statutory minimum wage is often set *below* the relative low-pay threshold conventionally agreed, also recalled in the EU Minimum Wage Directive proposal (i.e. 50% of the national average wage), so there is ample room for policies and regulations to improve the state of working poverty in the EU. Hence, the effects of the statutory minimum wage regulations in different MSs, on the wage distribution and on indicators of relative poverty is another way of assessing which role an EU regulation on minimum wage standards could play in reducing in-work poverty across MSs.

1.3. Literature review

In this section, we briefly review the large economic literature on the impact of STW schemes, anti-poverty schemes and MW regulations. Most of this modern economic literature builds on counterfactuals to identify the causal impact of specific public policies. Reviewing this literature is then helpful in identifying the target of policies, which are the outcomes of the 'production process' modelled in our DEA exercise. According to Saulnier (2020), it is worth remembering that our empirical application does not carry any causal meaning; it is a descriptive benchmarking exercise aimed at identifying the "waste" in MS policies, based on the assumption that coordination and harmonization of policies at the EU level will result in a common frontier across countries.

[6] Notice that inefficiencies due to workers disincentives, are a totally different concept with respect to inefficiencies related to the provision of public services discussed in Section 1.1, linking public spending to outputs. The analysis of workers' disincentives would require a completely different empirical analysis, with the definition of a proper counterfactual. We will discuss this issue further in Section 1.3, reviewing the relevant literature.

1.3.1. Short-Time Work schemes

The ongoing crisis caused by COVID-19 pandemics has exacerbated the relevance of short-time work schemes to try to sustain employment levels. In this regard, the EU has introduced a new mechanism (SURE) to help MS in supporting employment. Some very recent papers are trying to identify the economic effects of current STW schemes. Fischer and Schmid (2021), comparing US and EU responses to the crisis, claim that EU MS were able to reduce the *rise in unemployment* relying on short-time work schemes, or similar measures, but that as months are passing the limitations of short-time work schemes are emerging. Another example in this direction is Drahokoupil and Muller (2021), who focus on job-retention schemes (short-time work schemes, furlough schemes, and wage subsidies). However, Drahokoupil and Muller (2021), referring also to other recent studies (e.g. OECD 2021, Eurofound 2021b), claim that those early assessments qualitatively point to job-saving effects, but the point estimate of the positive effects are still uncertain from a quantitative point of view. Similarly, the European Commission highlights that "national labour market measures supported by SURE have likely reduced unemployment by almost 1½ million people in 2020" (European Commission 2021, p. 4).

However, the impact of STW schemes was largely assessed also during the Great Recession (2008-09). The lesson of the Great Recession might be quite useful to make both theoretical and empirical considerations, and to discuss how STW schemes may affect labour market outcomes during and after the pandemic. Overall, *this literature points to a positive effect of STW in preserving jobs*. For example, Eurofund (2010) emphasize that – despite some negative aspects may emerge during an upturn in the business cycle – short-time work schemes "appear to have been a successful business-cycle instrument", as well as that "publicly subsidised short-time working schemes provide perhaps the best example of how the costs of labour market adjustment can be more widely shared." Brenke et al. (2013), with reference to the German experience, state that STW allowed to cushion the impact of lost working hours, pretty much halving the increase in the unemployment rate. Cahuc and Carcillo (2011) have similar arguments, studying the relevance of STW in OECD countries. They claim that short-time work schemes have been beneficial in preserving jobs during the financial crisis; and suggest that it may be worthwhile to introduce STW in countries that do not have a similar policy.

While effective in preserving jobs, STW might be inefficient in the sense that they create perverse incentives. For instance, Boeri and Bruecker (2011) find that STW contributed to reduce job losses during the financial crisis, even if the number of jobs saved is lower than the number of participants and full-time equivalent jobs that benefited from the scheme, implying the presence of inefficiencies and non-trivial deadweight costs. Also Balleer et al. (2016) claim that STW can be effective but not necessarily efficient in creating good incentives for workers: it is necessary to distinguish between rule-based ones, which are a cost-efficient job saver, and discretionary measures that are completely inefficient.

The literature points out also additional limitations of STW. Brenke et al. (2013) highlight that the effect they estimate for Germany during the Great Recession cannot be generalized: the ability of this policy instrument to help to cushion the labour market impact of an economic recession depends on the circumstances. In this sense, French data suggest that STW is not able to save jobs in severely-hit firms, and generate windfall effects in firms facing a limited decrease in revenues, whose jobs are not at risk of being destroyed, but which use STW anyway (Cahuc et al., 2021). In the same line, Boeri and Bruecker (2011) argue that STW schemes can be effective in reducing employment losses during severe downturns, but can also have opposite effects under milder recessions and during upturns, if the scheme ends up preventing workers to reallocate to other (more productive) jobs. Similarly Balleer et al. (2016) suggest that a discretionary loosening of STW criteria only benefits firms (and jobs) that would have survived anyway, while rules "both have a

direct effect on unemployment through a reduction of the firing threshold and indirectly affect firm's hiring and firing decisions via future expectations." More in general, as suggested both by Brenke et al. (2013) and by Cahuc et al. (2011), short-time work schemes have to be designed during normal times, in order to avoid the influence of pressure groups during more turbulent times.

Short-time work schemes may also lead to more general inefficiencies: inefficient reduction in working hours, and reduced reallocation of workers to more productive jobs (Cahuc et al, 2011). These inefficiencies call for the introduction of "experience rating" into short-time work schemes: like in many insurance schemes, contributions paid by a given employer to the State increase proportionally with the use made of STW schemes in the past. Such mechanism is expected to create incentives for employers to use STW schemes more efficiently (Cahuc et al, 2011). The role of inefficiencies and the importance to address them, through experience-rating and disincentives to 100% reductions in working hours, is recognized also by Boeri and Bruecker (2011). Boeri and Bruecker (2011) also suggest that plant-level bargaining about wage, labour conditions and flexibility might be more effective than a more centralized bargaining, since it would allow to take idiosyncratic factors characterizing each firm into account.

However, in a labour market with frictions and search costs, STW schemes can play a positive role since there are rents associated with a good match between a worker and an employer (see, among others, Pissarides 2000, 2011). The value of this rent is foregone in case of a separation between the worker and the employer as a consequence of a temporary downturn, and finding a comparable good match during the subsequent upturn would be costly. Among empirical studies, Kopp and Siegenthaler (2021), using Swiss data concerning the Great Recession, find that STW increases establishment survival and prevents rather than postpones job losses, and that spending on STW benefits might have been compensated by the savings on unemployment benefits. Cahuc et al. (2021) analyse French data, finding that STW may save jobs in firms hit by strong negative revenue shocks, also preserving the specific investments made by both the firm and the worker in a labour market characterised by several frictions and search costs.

The general conclusion is that there is no one-fits-all formula for STW design, as the demand for STW depends, for example, on employment protection legislation, on the generosity of unemployment benefits and on the degree of centralization of collective bargaining. Similarly, Balleer et al. (2016) point out that the possibility to bargaining wages at the individual or collective level, by providing an additional margin of adjustment, could ease the adjustment process in case of idiosyncratic shocks, making less costly for the employer to stabilize employment, and decreasing the need to resort to STW. Finally, it is important to remember that short-time work schemes can only provide temporary respite, and cannot address the structural causes of economic downturns (Torres, 2010).

1.3.2. Anti-Poverty schemes

The fourteenth principle of the European Pillar of Social Rights claims that "*Everyone lacking sufficient resources has the right to adequate minimum income benefits ensuring a life in dignity at all stages of life, and effective access to enabling goods and services. For those who can work, minimum income benefits should be combined with incentives to (re)integrate into the labour market.*" Building on this principle, anti-poverty policies are considered as important tools to protect the poor and the socially excluded and to help them improving their socioeconomic status. Marx et al (2015) provide a review on the welfare state and antipoverty policy in rich countries.[7] There is evidence

[7] Several other recent empirical studies focus on developing countries. An example is Colombian Conditional cash transfers (CCT) program, Familias en Acción (FA): Conover et al (2020) shows that it increased political participation and support for the incumbent party candidate among recipients of the cash transfer; Pena et al (2017) that the program had positive effects on the demobilisation of combatants; Tovar and Urrutia (2017) that recipients save

of the existence of a virtuous circle of growth and equity: it is true both that economic growth and macroeconomic stability allow to decrease absolute and relative poverty (see Ravallion, 2010, and Ayemo, 2020), as well as that income support policies and the consequent inequality reduction contribute to economic growth (Baldini et al., 2018a; Keeley, 2015).[8] Moreover, rising inequality lowers subsequent growth rates among the poorer income percentiles, exacerbating poverty problems (Van der Weide and Milanovic, 2014).

However, antipoverty policies and income support measures may also have undesired effects on the labour market, *de facto* distorting the work-inactivity trade-off, decreasing labour supply and creating "poverty traps" for the marginally poor. A stream of empirical literature focuses on this issue. De La Rica and Gorjón (2019) find, despite some heterogeneity for different groups, no delay entry into employment for beneficiaries of minimum income schemes, while active labour market policies for those beneficiaries do have a significant positive impact on their employment. Cumming et al (2020), in a study on US data, find that antipoverty public policy that encourage work can be detrimental to entrepreneurial activity, for reasons explained in Banerjee and Newman (1994): low wages dictated by an high share of poors constitute an incentive to become an entrepreneur and hire labor; conversely, when wages are high, incentives to be an employee increase. At the same time, there is also evidence that these entrepreneurs may be "entrepreneurs by necessity" (UNCTAD, 2018), who become entrepreneurs because of lack of possibilities to make a livelihood on the labour market. Girardi et al. (2019), in a study on the social assistance beneficiaries in Luxembourg, find that even though their work for welfare on "public works" allows them to be perceived to be integrated in the labour market in terms of the functions and tasks they perform, other factors limit their social inclusion, given the institutional and informal stigma associated to their position and to the different treatment they receive with respect to other employees.

The evaluation of poverty measures crucially depend on the criteria that are adopted.[9] Ravallion (2008) claims that no single method for program evaluation dominates; Ayala and Barcena-Martin (2018) suggest to combine adequacy (benefits over poverty thresholds) and coverage (proportion of recipients over potential claimants) measures.[10]

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more than non-recipients because recipients favorably adjust their expenditure patterns; Ramirez et al (2017) that there is a causal and diminishing effect of property tax revenues on the poverty headcount ratio and gap.

8 Ravallion (2018) reviews the pros and the cons of employment guarantees and income guarantees, as tools for for poverty reduction in a developing economy. On the one hand, he reports that the employment guarantee scheme implemented in India seems not to be particularly effective, also due to the influence of local leaders. On the other hand, he claims that cash transfers have targeting methods that tend to miss many poor people, "and can discourage those reached from earning extra income". A previous work of him (Ravallion, 2009a) suggests that in the design and evaluation of antipoverty policies, it would be preferable to consider the outcomes of the program for poor people, rather than to rely on prevailing measures of targeting. Ravallion (2018) also reports that a universal basic income, rather than workfare or finely-targeted transfers, may be an alternative to reduce poverty, but an empirical analysis would be needed in this respect.

9 Several theoretical works focus on optimal antipoverty policy designs. For example, Bourguignona and Field (1997) claim that measures with discountinuous jumps should allocate the antipoverty budget either to the richest of the poor, or to the poorest of the poor, or to both. Chakravarty and Mukherjee (1998), who assume that the objective is to minimize an exogenously given poverty index, show that a "poorer poor" should receive a higher amount of subsidy than a "richer poor", in order to decrease inequality; at the very same time, the amounts should assure that the ranks of the individuals in the pre- and post-subsidized distributions are preserved, in order not to create perverse incentives.

10 As intuitive, the efficiency of antipoverty-schemes expenditure depend on how well the scheme is targeted. For example, Golan et al (2017) focus on China's rural minimum living standard guarantee (dibao) program, and find "that the program provides sufficient income to poor beneficiaries but does not substantially reduce the overall level of poverty". They also show that there are targeting errors (both inclusionary and exclusionary) and, through simulations, that a different program design that expands coverage could yield greater poverty reduction than one

Recessions affect antipoverty policies, both due to the impact of recessions on the vulnerability of poor and socially excluded individuals, and to the tightening of public finances. Results of Ayemo (2020) indicate that the vulnerable are impacted more negatively by recession than positively by periods of sustained growth; hence, safety nets are especially relevant during recession periods. Baldini et al (2018a), focusing on Italy, report that the incidence of both relative and absolute poverty has increased as a consequence of the economic crisis. Marchal et al. (2016) consider MIP (Minimum Income Protection) Schemes for 23 EU countries around the financial crisis period; they find that, although the trends of social assistance benefit did not have a discontinuity as a consequence of the economic crisis, retrenchment still did occur through changes in more technical issues as, for example, less generous indexation mechanisms or different equivalence scales. In several countries, as Hungary, Italy, Portugal and Romania, the consequences on minimum income beneficiaries have been notable. Similarly, Iacono (2017), who focus on 22 European countries for the 1990-2013 period, the support for low-income inactive individuals has been less and less adequate since 1994. He also shows that there is no trade-off between the adequacy of out-of-work benefits and the public expenditure on active labor market policies (ALMPs).

Moreover, there is a debate in the current literature on whether antipoverty policies should be conducted at a more centralized or decentralized level. Empirical studies return mixed evidence. Ravallion (2009b) highlights that a subnational level of government would have an informational advantage if eligibility criteria were decentralized, but this may come at a cost of lower benefits for the poor in the poorest areas.[11] Golan et al (2017) report that the gains of centralization would depend on the efficiency of targeting. Bardhan and Mookherje (2005) show that centralized systems are more prone to bureaucratic corruption, while decentralizing the delivery system may be cost-effective and improve intraregional targeting, but deteriorate the interregional one: grants to high-poverty regions shrink, and there is the risk of local elite capture. Gallo (2021), in a study on national and regional minimum income schemes in Italy, finds that they allow to at least slightly decrease in the incidence and intensity of poverty, and that programme complementarities and multi-level government interventions are to be taken into account while evaluating the impact of a policy, highlighting the relevance of both central and local level.

Antipoverty policies are currently widely implemented among EU MS. Europe 2020 target was to decrease by 20 million the number of poor and socially excluded EU citizens (EC, 2014). As of 2017, all EU MSs have either a minimum income schemes or similar means-tested programmes (see, European Parliament, 2017), even though they are quite heterogeneous in terms of generosity, adequacy and low-income targeting (Cantillon et al. 2014; Frazer and Marlier 2016). Moreover, the related thresholds are much lower than the respective national poverty lines (Baldini et al., 2018a): this implies that these schemes improve the condition of the poor and of the socially excluded, but the standard of living they guarantee are not sufficient to reduce income inequalities or elevate individuals out of their poverty condition.

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that increases transfer amounts. Gonzalez-Flores et al. (2012) report similar targeting issues for Mexico. A less recent work (Coady et al., 2004) examines 122 targeted antipoverty interventions in 48 developing countries. They find that targeting quality depends on country characteristics: it is usually better in countries that are richer, where governments are more accountable, or where inequality is higher. They also show that the share of recipients being actually poor is higher in case of interventions that use means testing, geographic targeting, and self-selection based on a work requirement. Other good alternatives, but with more heterogeneous results, are proxy-means testing, community-based selection, and demographic targeting to children.

[11] He brings China's Di Bao program as an example: poorer municipalities adopt systematically lower thresholds "roughly negating intercity differences in need for the program and generating considerable horizontal inequity, so that poor families in rich cities fare better." Hernandez-Trillo (2016), focusing on Mexico, reports that decentralization has not improved the efficacy of measures due to the low political accountability at the subnational level, and that the introduction of accountability may allow a subnational government to perform well.

1.3.3. Minimum Wage regulations

The relevance of minimum wage is a consequence of the observed wage distribution. The level of the minimum wage is an important issue since many workers are classified as *low-wage earners*, and in-work poor represent a non-trivial share of workers. On this regard, Peña-Casas et al. (2019), in a study for the European Commission, have emphasized that for certain categories ("young, low educated, non-standard workers, poor households with children including lone parents, workers and households with low work intensity") the risk of being an in-work poor is relatively higher than for other categories.

The role of minimum wage has been explored by a theoretical literature aimed at understanding the welfare implications of minimum wage regulation. The basic premise is that, according to standard microeconomic reasoning, imposing a wage above the market clearing level is likely to cause demand shortage and unemployment. Contrary to this standard view, Acemoglu (2001) argues that minimum wage regulation, together with unemployment benefits, allows to "increase average labor productivity and may improve welfare"; Flinn (2006) explains that, under certain conditions, the presence of a minimum wage can increase the efficiency of the allocation in the labour market. Also Rodrik (1996) claims a minimum-wage policy can constitute an incentive to move from the production of standardized and labor-intensive commodities to sectors or product with higher added value, enhancing welfare.

An additional insight from the basic microeconomic model is that a wage above the market clearing level creates incentives for firms to move part of their activities into the informal sector. This is the conclusion of the model by Rauch (1991), who shows that the level of minimum wage may affect the size of the informal and formal sectors; notably, the higher the level of minimum wage with respect to the 'market-clearing' wage in the absence of regulation, the higher the incentives for a firm to be in the informal sector. Similarly, Ram et al. (2001) conclude that an increase in minimum wage sharpens the divide between the formal and the informal sectors.

Besides these theoretical contributions, there is an extensive empirical literature focusing on labour market implications of minimum wage. The evidence of this empirical literature is mixed. In a seminal contribution, Card and Krueger (1994) find no evidence of a decrease in employment as a consequence of an increase in the minimum wage in New Jersey, that occurred in 1992. In a nutshell, their work exploits a 'natural experiment' comparing the dynamics of employment in fast-food restaurants that pay the minimum wage in New Jersey, with the ones of fast-food restaurants that pay the minimum wage in the neighbour Eastern Pennsylvania, before and after the increase in the minimum wage in New Jersey.

The result was considered surprising and contrary to standard microeconomic reasoning, fostering a fierce academic debate. For example Neumark and Wascher (2000),[12] in a comment to Card and Krueger (1994), use a different dataset to prove that the increase in minimum wage in New Jersey actually decreased employment, while Card and Krueger (2000), replying to this comment, conduct an analysis using a third dataset and confirm their original results. A new work by Card and Krueger (2015), examining the literature on minimum wage, finds little support for the hypothesis that a higher minimum wage leads to less jobs available. This evidence is confirmed by Dube et al (2010), comparing all contiguous county-pairs in the United States between 1990 and 2006 and controlling for spatial autocorrelation, finding no detectable employment losses as a consequence of the minimum wage increases in the US over the considered period; in a subsequent work, Dube et al (2016) also highlight that minimum wage does not have any effect on employment stocks, but decreases flows (separations and accessions). Similarly, Allegretto et

[12] They reinforce their conclusion in Neumark et al (2004), Neumark and Wascher (2007) and Neumark et al (2014).

al. (2011) obtain employment and hours elasticities with respect to minimum wage which are not distinguishable from zero.

A result more in line with the standard microeconomic model is found by Kawaguchi and Mori (2009), focusing on Japan. The authors find that "an increase in the minimum wage moderately reduces the employment of male teenagers and middle-aged married women", also concluding that an increase in the minimum wage would not be an effective antipoverty policy since only a low share (20%) of minimum wage earners belong to poor households, and it would reduce the employment of low-earning workers, too.

As for Europe, most of the evidence is limited to UK and goes in the direction of no effects on employment. For instance, Dickens et al (1999), in a study on UK data between 1975 and 1992, find that minimum wages affect inequality, by compressing the distribution of earnings, while not leading to a decrease in employment levels. More recently, Draca et al (2011) exploit a quasi-experimental setting in UK to explore the relation between minimum wage and firm profitability, finding that a minimum wage increase does not reduce employment but directly maps into a decrease in profit margins. This reduction in profitability, in turn, may affect the net entry of firms in the long run, suggesting that it may be necessary to evaluate the effects of minimum wage changes also at a longer horizon. In this respect, Meer and West (2016) argue that minimum wage affects economic growth and may therefore influence employment dynamics in the medium/long run.

Looking more generally at Europe, Nickell and Layard (1999) argue that the presence and the level of minimum wage do not harden labour market flexibility in Europe, which is much more influenced by the presence of unions and the role of active labour market policies in social security systems. Along these lines, Dolado et al. (1996), looking at the period between mid '60s and mid '90s in Europe, conclude that minimum wages did not reduce employment, with the possible exception of young workers; moreover, higher minimum wages caused higher unemployment only when they impeded a "necessary fall in the wages of the low paid".

An additional important issue that can influence the results in terms of employment is that minimum wage, if not adjusted to account for inflation, can decline in real terms. DiNardo et al (1996) find that the decline in the real value of the minimum wage observed in US between 1979 and 1988 has been a relevant factor for the increase in wage inequality over that period, particularly for women. A similar point on the erosion of the real value of minimum wage has been made by Bartels (2009), Lee (1999) and Brown (1999), even though the latter also argues that minimum wage has a limited ability to equalize family incomes, since only a fraction of minimum wage earners belong to poor families. Conversely, Autor et al (2008, 2016) claim that the real-value deterioration of minimum wage had tiny role in the increase in wage inequality, since this was mainly led by wage dynamics above the median.

As of 2020, the large majority of MSs has a statutory minimum wage (21 out of 27), while the wage levels of the remaining six ones are the result of collective bargaining (Lecerf, 2020). Vacas (2021), analysing the dynamics of national minimum wages during the last decade, reports that, on average, minimum wages in EU countries increased more than the corresponding average wages, with few exceptions – that he reports to be Belgium, Germany, France, Ireland, Luxembourg and Malta. Vacas (2021) also highlights the presence of a strong convergence between EU countries, with a negative correlation between country-level minimum wage in 2009 (in purchasing power standard) and growth rate of country-level minimum wages between 2009 and 2021.[13]

[13] Austria, Cyprus, Italy, Denmark, Sweden and Finland have no statutory minimum wage. For these countries, Vacas (2021) the average of "the three lowest collectively agreed minimum wages identified by Eurofound's Network of Correspondents."

With the proclamation of the European Pillar of Social Rights, in November 2017, the European Union committed to fair wages for workers (Lecerf, 2020). This has been followed, in 2019, by the announcement of the EC President Ursula von der Leyen of a legal proposal to make sure that every worker in the EU has the right to a (minimum) wage that makes affordable an acceptable standard of living (Eurofound, 2021a), which ended up in the *Proposal for a Directive of the European Parliament and of the Council on adequate minimum wages in the European Union* in October 2020 (henceforth, the Directive proposal). The term 'adequate' recalls the necessity of minimum wage earners to avoid in-work poverty: conversely, as of 2018, according to Eurofound (2021a) a non-trivial share of minimum wage earners in the EU found difficulties in making ends meet (23%) or lived in materially deprived households (16%);[14] among the rest of employees, these shares were still non-zero but anyway much lower (11.5% and 6%, respectively). In this sense, the Directive proposal mentions two examples adopted in the economic literature: 50% of the average and 60% of the median gross wage (Eurofound, 2021a).

[14] Please note that the former (making ends meet) is a subjective indicator, while the latter (material deprivation) is an objective one.

2. Data, Definition and Measurement

The literature surveyed in the previous section makes clear the goals to be attained by STW schemes, anti-poverty policies and MW regulations. This section describes the data used, along with the official Eurostat definitions and measurement criteria adopted in the following benchmarking exercises.[15]

2.1. Short-Time Work schemes

For the analysis of budgetary waste concerning STW schemes, the main variable of interest is expenditure for STW schemes. As in Mosley (2020), the data were extracted based on category 8.2 ("partial unemployment benefits") in the Labour Market Policies (LMP, hereafter) database. Partial unemployment benefits are defined as "benefits compensating for the loss of wage or salary due to formal short-time working arrangements, and/or intermittent work schedules, irrespective of their cause (business recession or slow-down, breakdown of equipment, climatic conditions, accidents and so on), and where the employer/employee relationship continues".

We consider this expenditure expressed either in Purchasing Power Standard *per employed person (hereafter, per capita)*, or as a share of spending for all labour market policies.[16] Data are available with sufficient continuity only for a small set of nine countries (*Austria, Belgium, Finland, France, Germany, Luxembourg, Italy, Portugal and Spain*) that have complete time series for STW expenditure from 2008 to 2017, with few exceptions.[17] The remaining countries present shorter time series – having introduced STW schemes later – or, more in general, do not have STW expenditure data available: according to Mosley (2020), this is the case of four MS (Denmark, Hungary, the Netherlands and Sweden).

Expenditure for STW schemes in per-capita terms and as a share of LMP expenditure are depicted in Figure 2.1. It is possible to appreciate that, even though the presence of a STW scheme is a common feature of most EU MS, the level of spending allocated to such schemes is quite heterogeneous. For example, there is a difference of about two orders of magnitude between expenditure in Portugal and expenditure in Italy, both in per-capita terms (i.e. per employed person) and as a share of entire labour market policies expenditure. Differences across countries also persist after the financial crisis, with some countries restoring the use of STW schemes to the pre-crisis levels, while other countries continuing their support to industries and firms undergoing deep restructuring with a generous use of STW schemes. Due to this heterogeneity in the implementation of STW schemes, across countries and over the short- and long-run, it is important to consider both outcomes that capture the change in (un)employment as well as the level of the (un)employment rate. Available data over the period 2008-2017 allows to consider the impact of

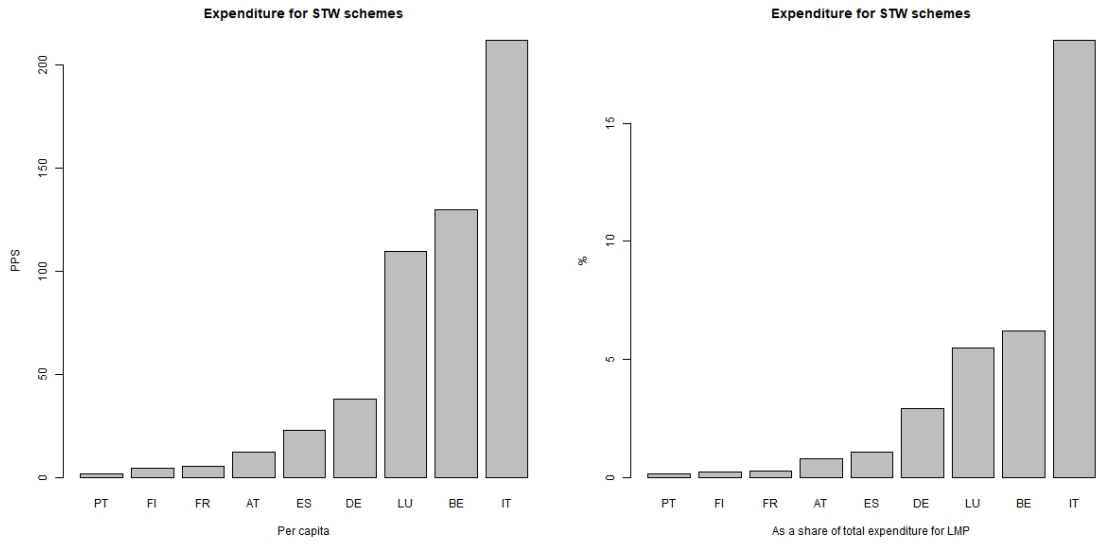
[15] Unless differently specified, the definition for each variable is taken from the explanatory texts or the data description available in the Eurostat database.

[16] The figure in PPS per capita has been obtained by authors, starting from expenditure for 'partial unemployment benefits' in million euros. The number of employed persons (i.e. all persons who worked at least one hour for pay or profit during the reference week or were temporarily absent from such work) considered is the number of individuals aged 15-64 years old who are employed. Purchasing power parities (PPPs) are indicators of price level differences across countries. PPPs tell us how many currency units a given quantity of goods and services costs in different countries. PPPs can thus be used as currency conversion rates to convert expenditures expressed in national currencies into an artificial common currency (the Purchasing Power Standard, PPS), eliminating the effect of price level differences across countries. Employment data has been extracted on 02/09/2021 (https://ec.europa.eu/eurostat/databrowser/view/LFSI_EMP_A_H/default/table). The Price level indices for Purchasing power parities (PPPs) has been extracted on 02/09/2021 (https://ec.europa.eu/eurostat/databrowser/view/PRC_PPP_IND/default/table).

[17] More in detail, for Portugal there is a missing value for 2014, while for Italy there are missing values for expenditure as a share of LMP expenditure for years 2016 and 2017, since LMP expenditure data are missing for these two years.

expenditure during the financial crisis (2008-09) and the sovereign debt crisis (2011-13), but do not allow an analysis for the ongoing pandemic crisis, nor for the last years right before COVID-19 (2018-19). Hence, we will take into account possible differences in spending during recession and non-recession periods, by running the robustness checks also for different subperiods that include mostly recession years or that include mostly non-recession years.

Figure 2.1: Expenditure for STW schemes.



Average of annual values 2008-17. Source: Eurostat LMP database.

In our STW benchmarking exercise, we consider the following indicators: employment rate, unemployment rate, as well as expenditure for labour market policies and unemployment benefits. The employment rate is total employment (resident population concept – see Labour Force Survey) as a percentage of total population aged 15 to 64 years old. Employed persons are all persons who worked at least one hour for pay or profit during the reference week or were temporarily absent from such work. The employment rate is available among the Labour Force Survey (LFS) main indicators and is based on the results of the European Labour Force Survey (EU-LFS), in few cases integrated with data sources like national accounts employment or registered unemployment.[18]

The unemployment rate is the number of unemployed persons as a percentage of the active population (labour force). Unemployed persons are all persons 15 to 64 years of age (16 to 64 years in ES, IT and the UK) who were not employed during the reference week, had actively sought work during the past four weeks and were available to begin working immediately or within two weeks. The active population (labour force) is defined as the sum of employed and unemployed persons.[19]

As far as the expenditure for labour market policies is concerned, European Commission's LMP database provides information on labour market interventions, which are government actions to help and support the unemployed and other disadvantaged groups in the transition from unemployment or inactivity to work. The unit of observation in the LMP database is the labour market intervention and data on the expenditure for each intervention are collected annually from

[18] Data extracted on 19/06/2020 https://ec.europa.eu/eurostat/databrowser/view/LFSI_EMP_A/default/table

[19] Data extracted on 29/10/2021 https://ec.europa.eu/eurostat/databrowser/view/UNE_RT_A_H/default/table

administrative sources in each country. Data are available in million euros from LMP database and have been transformed by authors in such a way to obtain a figure in PPS per capita.[20]

Unemployment cash benefits correspond to public expenditure for those benefits paid to unemployed persons in cash, rather than in kind. Data are available in PPS per inhabitant from Eurostat Social Protection Database, and have been transformed by authors in PPS per employed person.[21]

Finally, data mentioned in the discussion about the SURE programme (amount disbursed and interest savings) are taken from the Second report on the implementation of SURE (European Commission, 2021).

2.2. Anti-Poverty schemes

For anti-poverty schemes, the main variable of interest is social protection expenditure for the 'social exclusion' function, retrieved from Eurostat social protection database. Social Protection encompasses all interventions from public or private bodies intended to relieve households and individuals of the burden of a defined set of risks or needs, provided that there is neither a simultaneous reciprocal nor an individual arrangement involved. There is a list of eight risks or needs that may give rise to social protection; among those, we are interested on Social Exclusion.[22] Data are available on an annual basis for all 27 EU MS, from 2009 to 2018, and are expressed as expenditure in Purchasing Power Standard terms per capita.

Average expenditure per country for the period 2009-2018 are reported in Figure 2.2.[23] Even normalising for the different price levels in the different MS, expenditure per capita appears to be in the range 0-100 PPS per capita for most MS. On the other extreme, we have two outliers in the distribution - Denmark and the Netherlands - with more than 400 PPS spent per capita in order to fight social exclusion.

For our empirical analysis, we consider also the Gini index, the inequality of income distribution, the at-risk-of-poverty or social exclusion rate, the at-risk-of-poverty rate before social transfers, the at-risk-of-poverty rate before after transfers and the expenditure for labour market policies. The Gini index (or Gini coefficient) is a measure of statistical dispersion, and it proxies income (or wealth) inequality within a country/society. The Gini index is defined as the relationship of cumulative shares of the population arranged according to the level of equivalised disposable income, to the cumulative share of the equivalised total disposable income received by them. It has a theoretical range going from zero to one; the closer the Gini index to one, the more unequal is the country.[24]

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[20] Data (in million euros) have been extracted on 07/09/2021 https://webgate.ec.europa.eu/empl/redisstat/databrowser/view/LMP_EXPSUMM/default/table. See footnote 12 for details on data transformation.

[21] Data extracted on 15/10/2021 https://ec.europa.eu/eurostat/databrowser/view/SPR_EXP_FUN/default/table. Population on 1 January by age and sex, used to transform data from a per inhabitant figure to a per employed person figure, have been extracted on 02/09/2021 here https://ec.europa.eu/eurostat/databrowser/view/DEMO_PJAN/default/table The recommended definition is the 'usually resident population' and represents the number of inhabitants of a given area on 1 January of the year in question (or, in some cases, on 31st December of the previous year). However, the population transmitted by the countries can also be either based on data from the most recent census adjusted by the components of population change produced since the last census, either based on population registers. Usual residence means the place where a person normally spends the daily period of rest, regardless of temporary absences for purposes of recreation, holidays, visits to friends and relatives, business, medical treatment or religious pilgrimage.

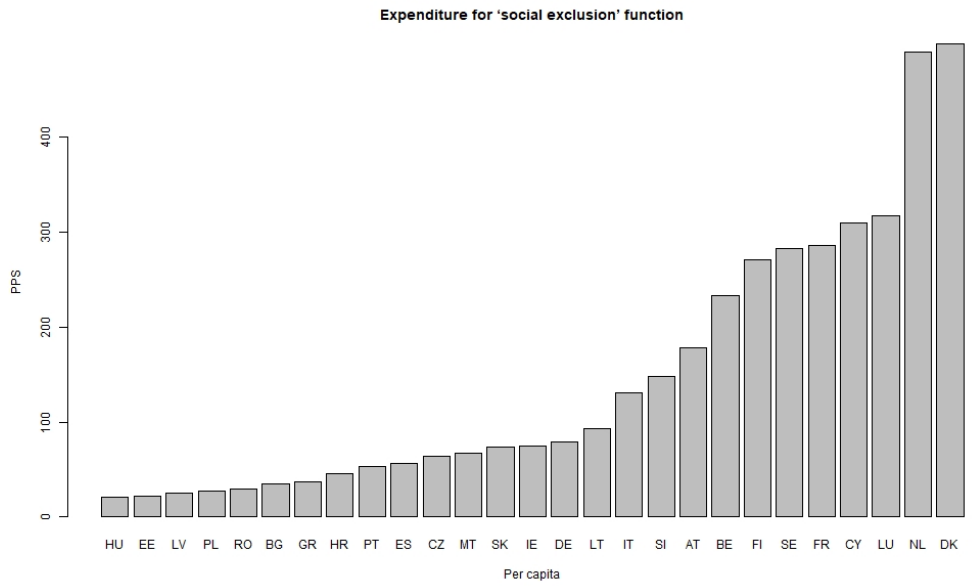
[22] Data extracted on 12/10/2021 https://ec.europa.eu/eurostat/databrowser/view/SPR_EXP_PPSH/default/table

[23] Year 2008 is not considered since we do not have inequality output indicators available

[24] Data extracted on 12/10/2021 https://ec.europa.eu/eurostat/databrowser/view/TESSI190/default/table

The inequality of income distribution is the "income quintile share ratio". According to the Eurostat definition, is equal to "the ratio of total income received by the 20% of the population with the highest income (top quintile) to that received by the 20% of the population with the lowest income (bottom quintile). Income must be understood as equivalised disposable income". By construction, it has a lower bound corresponding to one – a perfectly equal society in which all individuals receive the same income – and no theoretical upper bound.[25]

Figure 2.2: Expenditure for social benefits on 'social exclusion' function.



Average of annual values, 2009-18. Source: Eurostat Social Protection database.

At-risk-of-poverty or social exclusion rate corresponds to the sum of persons who are: at risk of poverty or severely materially deprived or living in households with very low work intensity. Persons are only counted once even if they are present in several sub-indicators. At risk-of-poverty are persons with an equivalised disposable income below the risk-of-poverty threshold, which is set at 60 % of the national median equivalised disposable income (after social transfers). Material deprivation covers indicators relating to economic strain and durables. Severely materially deprived persons have living conditions severely constrained by a lack of resources, they experience at least 4 out of 9 following deprivations items: cannot afford i) to pay rent or utility bills, ii) keep home adequately warm, iii) face unexpected expenses, iv) eat meat, fish or a protein equivalent every second day, v) a week holiday away from home, vi) a car, vii) a washing machine, viii) a colour TV, or ix) a telephone. People living in households with very low work intensity are those aged 0-59 living in households where the adults (aged 18-59) work 20% or less of their total work potential during the past year.[26]

At-risk-of-poverty rate after social transfers corresponds to the share of persons with an equivalised disposable income below the risk-of-poverty threshold, which is set at 60 % of the national median equivalised disposable income (after social transfers).[27]

[25] Data extracted on 12/10/2021 https://ec.europa.eu/eurostat/databrowser/view/TESPM151/default/table

[26] Data extracted on 12/10/2021 https://ec.europa.eu/eurostat/databrowser/view/T2020_50/default/table

[27] Data extracted on 12/10/2021 https://ec.europa.eu/eurostat/databrowser/view/T2020_52/default/table

At-risk-of-poverty rate before social transfers corresponds to the share of persons with an equivalised disposable income, before social transfers, below the at-risk-of-poverty threshold. Retirement and survivor's pensions are counted as income before transfers and not as social transfers. The indicator is based upon EU-SILC survey data.[28]

The expenditure for labour market policies has already been defined in Section 2.1.

2.3. Minimum Wage regulations

As mentioned in the literature review, minimum wage regulations are currently adopted in the large majority of EU MS; the exceptions are Austria, Cyprus, Italy, Denmark, Sweden and Finland. A standardized measure for minimum wages that is widely adopted in the literature, and also mentioned in the proposal for a Directive on Minimum Wages, is the Kaitz index, which is equal to the ratio between the minimum wage and the mean wage.[29] The measure is basically a normalisation of the minimum wage with respect to the productivity level of the country, which is not directly observable but can be proxied by the central moments of the wage distribution. The Directive proposal mentions 50% as a possible threshold for this ratio.

On this regard, Eurostat provides the monthly minimum wage as a proportion of average monthly earnings, from 2008 onwards. According to Eurostat definition, average monthly earnings refer to NACE (Rev. 2) sections B to S (industry, construction and services, except activities of households as employers and extra-territorial organisations and bodies).[30]

Figure 2.3 reports the average over the period 2008-2019 of monthly minimum wage as a proportion of mean monthly earnings. The red dotted horizontal line represents the tentative threshold mentioned in the directive proposal (50%). The presence of this horizontal line highlights that most EU countries have been below this tentative threshold over the considered period, and several are far below.

In our empirical analysis we will also consider low-wage earners as a proportion of all employees, the in-work at-risk-of-poverty rate, and the Gini index. We also consider, to account for compositional effects, the employment rate of individuals with a low educational attainment level and more generally the employment rate.

The share of low-wage earners as a proportion of all employees is an indicator based on the Structure of Earnings Survey (SES) and is available every four years, starting from 2006 – hence, years 2006, 2010, 2014 and 2018. Low-wage earners are defined as those employees (excluding apprentices) earning two-thirds or less of the national median gross hourly earnings in that particular country. Employees are all persons, irrespective of their nationality or the length of their working time in the country, who have a direct employment contract with the enterprise or local unit (whether the agreement is formal or informal) and receive remuneration, irrespective of the type of work performed, the number of hours worked (full-time or part-time) and the duration of the contract (fixed or indefinite).[31]

The in-work at-risk-of-poverty rate is the share of persons who are at work and have an equivalised disposable income below the risk-of-poverty threshold, which is set at 60 % of the national median equivalised disposable income. It is is based on the EU-SILC (statistics on income, social inclusion

[28] Data extracted on 12/10/2021 https://ec.europa.eu/eurostat/databrowser/view/TESOV250/default/table

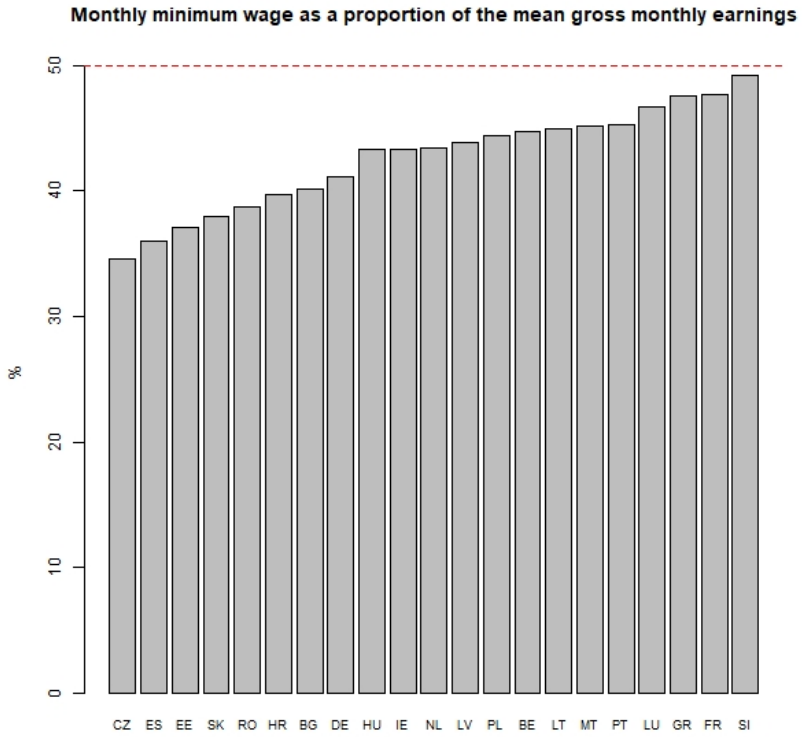
[29] An alternative formulation of the Kaitz index would be the ratio between the minimum wage and the median wage. However, this indicator is available only for 13 of the 21 countries having a statutory minimum wage. The Directive proposal mentions a tentative threshold of 60% for this ratio.

[30] Data extracted on 27/10/2021 https://ec.europa.eu/eurostat/databrowser/view/earn_mw_avgr2/default/table . For Greece data are available until 2011, for Germany since 2015

[31] Data extracted on 27/10/2021 https://ec.europa.eu/eurostat/databrowser/view/EARN_SES_PUB1S/default/table

and living conditions) and – with the exception of Croatia, whose time series starts in 2010 – annual data available for all EU Members States between 2008 and 2019.[32]

Figure 2.3: Monthly minimum wage as a proportion of the mean gross monthly earnings



Average of annual values, 2008-19. Source: Eurostat

The employment rate has already been defined in Section 2.1,[33] while the Gini index in Section 2.2.[34]

The employment rate of individuals with a low educational attainment level is equal to the number of employed persons with less than primary, primary and lower secondary education (corresponding to ISCED levels 0 to 2) divided by of total population aged 20 to 64 years old.[35]

[32] Data extracted on 12/10/2021 https://ec.europa.eu/eurostat/databrowser/view/TESOV110/default/table

[33] Data extracted on 19/06/2020 https://ec.europa.eu/eurostat/databrowser/view/LFSI_EMP_A/default/table

[34] Data extracted on 12/10/2021 https://ec.europa.eu/eurostat/databrowser/view/TESSI190/default/table

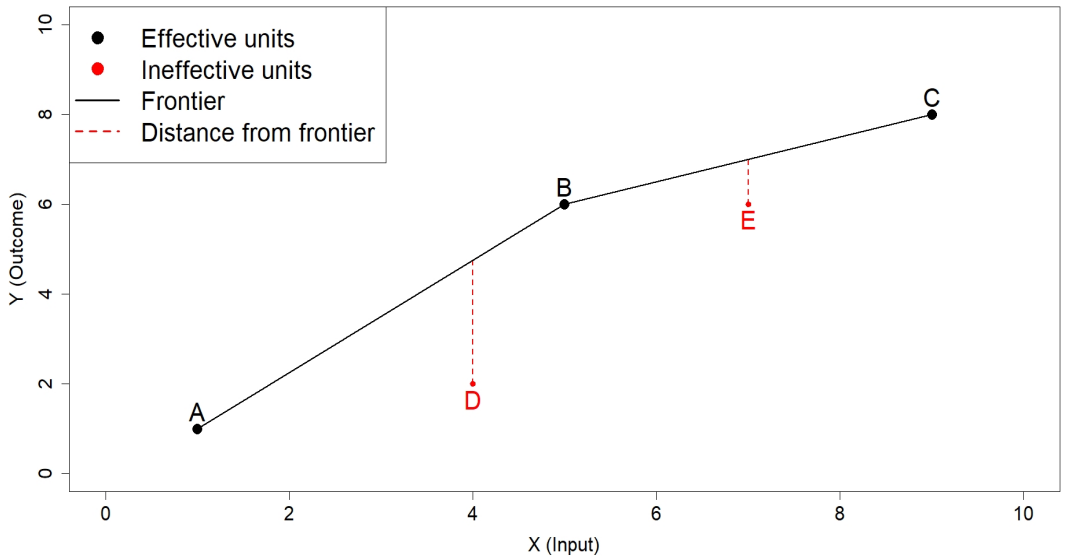
[35] Data extracted on 28/10/2021 https://ec.europa.eu/eurostat/databrowser/view/LFSI_EDUC_A/default/table For the definition of employed person, it is the same reported in Section 2.1: employed persons are all persons who worked at least one hour for pay or profit during the reference week or were temporarily absent from such work.

3. Methodology

This work adopts the methodology proposed by Saulnier (2020) to estimate budgetary waste rate to social policies directly related to the working of European labour markets. As discussed in more details in the technical Appendix A.1, the general idea is to extend DEA models to estimate how the consumption of public resources (i.e., public spending) is transformed into desirable outputs and outcomes for citizens.[36] Depending on the specific policies under analysis, one can consider the number of services provided to citizens (output) or to move one step further to consider the outcomes of public policies. For instance, healthcare policies can be analysed by simply looking at the number of inpatient services offered by hospitals (output), or by considering citizens' health (outcome), the final goal of spending public monies in healthcare policies. In this general framework, public spending is an easy (and summary) measure of the inputs consumed in the production process. Efficiency of public spending is evaluated by considering the output of spending, while effectiveness of spending is evaluated by considering the outcomes of spending. *In the following empirical exercises, we will consider labour market outcomes and we will look at effectiveness in managing public resources.*

The unit of analysis is each MS. In a nutshell, the DEA analysis allows to identify how effectively MS (our Decision Making Units) consume inputs to obtain outcomes through a benchmarking exercise, comparing the performance of the different MS. The common "EU production frontier" is allowed by the coordination and the harmonization of policies at the EU level. In this sense, the identification of benchmarks operating at the frontier of the production set defines the budgetary "waste" rate for MS operating below the production frontier, on the assumption that the EU governance will be able to bring each MS on the production frontier via its role of coordination and harmonization of specific policies.

Figure 3.1 Example of frontier



In general terms, benchmarks are identified by looking at how different MS *spending the same amount of money* obtain different outcomes; or, alternatively, by looking at how different MS

[36] For an extensive treatment, we also refer the interested readers to Chapter III of the Annex to Saulnier (2020)

obtaining the same outcome really spend different amounts of public monies. In the first case, the most effective countries are those obtaining the best outcome for a given level of spending. In the second case, the most effective countries are those spending the lowest amount of money for a given outcome. This makes particularly clear that a crucial step in the application of the methodology is to clarify what are the inputs and the outcomes to be considered in the empirical applications below.

Figure 3.1 provides an example to help the reader grab the intuition behind the DEA methodology. In this example, there are five units (the MS in the applications below, denoted as A, B, C, D and E) that consume a given level of input (reported on the horizontal axis; the level of public spending) and achieve a given level of outcome (reported on the vertical axis). Of those five production units, "A", "B" and "C" are *effective*, i.e., they present a better trade-off between public spending and desirable outcomes. The reason for this is because no other Decision Making Unit achieves a higher level of outcome by spending the same amount of money, or consume a lower amount of input by obtaining the same level of outcome. More in general, the EU "frontier" is the locus of those effective MS, or linear combinations of these effective MS, leading to the highest possible outcome level.

Conversely, units D and E are *ineffective*, since they are dominated by an effective unit, or by a linear combination of effective units. In this sense, they waste money relative to the EU "frontier". For example, E obtains the same level of outcome of B, but uses a higher level of input than the latter – hence, E cannot be considered effective. Similarly, D is ineffective, since its input/outcome combination is dominated by a linear combination of unit A and unit B.

The Data Envelopment Analysis would precisely classify units A, B and C as "*effective*" by assigning a DEA score equal to 1. The DEA score is actually closer to the value of 1 the closer the DMU is to the EU "frontier", and exactly equal to 1 if the DMU lies on the frontier. Conversely, for *ineffective* units D and E, the DEA returns a score which is positive, but lower than 1. In the example represented in Figure 3.1, the DEA score is actually equal to 0.42 for unit D and 0.86 for unit E, respectively.[37]

The degree of ineffectiveness is clearly a concept derived from the DEA score. In particular, the distance of the DEA score from 1 would be proportional to the relative distance of the two DMU from the EU "frontier". For outcome-oriented models, the DEA score is equal to the ratio of the outcome of the ineffective unit and the outcome of a *real (or synthetic)* effective unit adopting the same level of inputs. This distance is represented by the dotted red line in Figure 3.1 and it is the complement to 1 of the DEA score (1 minus the DEA score). Hence, for effective units (as A, B or C) the degree of ineffectiveness is equal to zero; for ineffective units D and E it is equal to 58% (1-0.42) and 14% (1-0.86), respectively.

Finally, the concept of *waste (in input terms)* identifies how much resources can be saved[38]. Hence, it is equal to the level of input used by a given unit times its degree of ineffectiveness. For effective units, waste is trivially equal to zero; while for unit D waste is equal to 2.32 unit of inputs (58% of 4) and for unit E is equal to 0.98 unit of inputs (14% of 7). Hence, the five production units are wasting, together, 3.3 units of input, corresponding to 13% of the 26 units of input they are using; hence,

[37] For input-oriented models, it would be the distance between the inefficient unit and a theoretical or real efficient unit achieving the same level of output.

[38] Technically, this implies the assumption that the boundary of best combinations of the input/outcome is characterised by a constant returns to scale technology. Interested readers can refer to Appendix A.1 for a discussion on returns to scale.

the *aggregate waste rate* is equal to 13%. Table 3.1 summarizes the calculation of the waste rate in the case of the example represented in Figure 3.1.

DEA (ineffectiveness) scores can be partly explained by observable variables using regression models, which considers the censored/truncated nature of the scores. The literature refers to this as to the second-stage analysis; and Simar and Wilson (2007) developed a widely used two-stage estimator to overcome technical issues that arise in this type of analysis. We will briefly discuss these issues in the technical Appendix A.1. In our empirical exercises below, we compute "net" DEA scores from "gross" DEA scores in a regression-like framework, controlling for "additional inputs" to be specified in each exercise (Simar and Wilson, 2007).

Notice that the estimate of effectiveness, and consequently of waste, may be strongly influenced by the presence of outliers (i.e. extreme data) especially if the input/outcome combination of the outlier shapes the frontier. Hence, after running each DEA analysis, we use boxplots of the DEA scores to check for the presence of outliers,[39] and eventually repeat the analysis excluding those abnormal observations. As discussed in detail in Section 4, we detect the presence of outliers only in one exercise.

Table 3.1 Example of waste rate estimation through a Data Envelopment Analysis

Unit	Input	Outcome	DEA Score	Ineffectiveness (1- DEA Score)	Waste (Input× ineffectiveness)
A	1	1	1	0	0
B	5	6	1	0	0
C	9	8	1	0	0
D	4	2	0.42	58%	2.32
E	7	6	0.86	14%	0.98
TOTAL	26				3.3 (13% of 26)

3.1. Short-Time Work schemes: Input, Outcome and Expected Results

The application of the DEA methodology to Short-Time Work (STW) schemes aims at exploring how effectively MS use expenditure for STW schemes to gain labour market outcomes, both in the short run and in the long run. Details of the data and related sources have been presented in Section 2.1.

For reasons briefly explained in Section 2.1, our analysis will be limited to a subset of nine countries (Austria, Belgium, Finland, France, Germany, Luxembourg, Italy, Portugal and Spain) for the time period 2008-2017. It is important to highlight that this time interval includes two different recession periods, as identified by Eurostat Business Cycle Clock: one related to the Great Recession (2008-09) and one to the sovereign debt crisis (2011-2013).[40] We will explore the importance of these two recessions in several robustness exercises below.

[39] Boxplots are not available in the report

[40] https://ec.europa.eu/eurostat/cache/bcc/bcc.html

Short-run Analysis

As the main input for our analysis, we consider the "*mean expenditure for STW schemes*" (over the period 2008-2017).[41] When using the two-stage estimator of Simar and Wilson (2007), we also control for the "*expenditure for unemployment cash benefits*", and the "*expenditure for labour market policies*".

The "*standard deviation of the employment rate*" over the same period is the considered outcome; an alternative exercise considers the "*standard deviation of the unemployment rate*" as the outcome.[42] The intuition for these two exercises is related to short-run effect of STW schemes during recessions: as discussed in Section 1.3.1, STW schemes aim at stabilizing labour input over the business cycle, mainly in the short-run. By subsidizing a reduction in hours worked for all or part of the firm's workforce, STW schemes serve as a buffer to preserve the employment level and contain the increase in unemployment during recessions. In aggregate terms, when an effective STW scheme is in place, we should observe limited dispersion in the employment rate and the unemployment rate over the business cycle, and this dispersion should be lower the higher the amount of resources allocated to STW schemes.

This intuition is confirmed by stylized facts showed in Figure 3.2 and 3.3: on the horizontal axis we report "*expenditure for STW schemes*", in per capita terms (that, in this context, is defined as per employed person), while on the vertical axis we report the "*standard deviation of the employment rate*" (Figure 3.2) and the "*standard deviation of the unemployment rate*" (Figure 3.3). The horizontal dashed line represents the average outcome value across selected countries, while the vertical dashed line represents the average input value. There is a negative correlation between "*expenditure for STW schemes*" and the "*standard deviation of the employment rate*" (Figure 3.2) and the "*standard deviation of the unemployment rate*" (Figure 3.3): on average, countries that spend more for STW schemes report a lower volatility of these labour market outcomes. From Figure 3.2, it is also possible to identify Portugal, France and Belgium as those countries achieving the best possible outcome (i.e., in this context, a *standard deviation* as low as possible) given the amount of resources allocated. Similarly, from Figure 3.3, MS showing the best combinations of the outcome "*standard deviation of the unemployment rate*" and the input "*expenditure for STW schemes*" are Portugal, Finland and Austria. Unsurprisingly, better performing countries are likely different for different exercises, since the benchmark clearly depends on the specific outcome identified to measure labour market performance.

Medium-run and Long-run Analysis

The short-run analysis focuses on the primary role of STW schemes, that are meant to stabilize the labour market in the short-run during recessions. Nevertheless, a second-order effect of STW is to enhance labour market performance also during the other phases of the business cycle as an indirect effect of the reduction of labour market frictions.

The presence of frictions and specific human capital investment, in the presence of transaction costs, can deliver higher (lower) structural unemployment (employment) rates. Hence, the 'safety-net' role of effective STW schemes may allow to reach a higher structural level of the employment rate, and a lower structural level of the unemployment rate. The safety net is both for employees, who face a lower risk of becoming unemployed as the consequence of a temporary downturn and for employers, who face a lower risk of having to lay off workers – losing their experience and know-

[41] Each analysis is repeated twice. The results using expenditure for STW schemes measured in PPS per capita are reported in the main text, the ones using expenditure for STW schemes measured as a percentage of expenditure for labour market policies are reported in the Appendix.

[42] Volatility is a 'bad', not a 'good'; hence, from a formal point of view, the output of the DEA is the inverse of the standard deviation.

how – due to a temporary economic difficulty. Moreover, as already mentioned in the literature review, in a labour market with frictions and search costs, there are rents associated with a good match between a worker and an employer (see, among others, Pissarides 2000, 2011) which can be lost in the case of a layoff due to a temporary downturn. Similarly, preventing the deterioration of human capital may allow a fast recovery of employment, and a fast reduction of unemployment, after recessions. Notice that the long-run effects of STW on aggregate labour market can be controversial, as the "structural" effects are likely to depend both on the amount of resources, as well as the duration of the scheme after the recession. Indeed, by preserving the employment relations between workers and jobs, STW tends to reduce the natural reallocation taking place over the business-cycle between contracting and expanding firms. Thus, prolonging short-time schemes for too long, risks of compromising the resilience of economic systems. Therefore, it is worth inspecting the existence of possible indirect structural effects (either beneficial or adverse) that can descend from the existence of a STW scheme on the level of "potential" employment and unemployment in the economy. We investigate this alternative channel of structural effects of STW schemes on employment rates and unemployment rates.[43]

In order to account for these aspects, we compare STW spending during the two recession periods (2008-2009 and 2011-2013) with labour market outcomes during non-recession periods, as the one recorded just before the beginning of Covid-19 crisis (2017-2019). As main input for STW we consider the "*mean expenditure for STW schemes*" related to the financial crisis period (2008-09) and the sovereign debt crisis period (2011-2013). When using the two-stage estimator we also control for the "*expenditure for unemployment cash benefits*", and the "*expenditure for labour market policies*" over the same period.

We consider two different outcomes for employment: the "*mean employment rate*" for years 2017-2019, and the "*difference between that 2017-2019 mean and the mean employment rate during previous recession periods*" (2008-09 and 2011-13). Similarly, for the unemployment rate, we consider the "*mean unemployment rate*" for years 2017-2019, and the "*difference between that 2017-2019 mean and the mean unemployment rate during previous recession periods*" (2008-09 and 2011-13).

The relations between these variables are depicted in Figure 3.4, 3.5, 3.6 and 3.7. For all these four figures, on the horizontal axis we report STW expenditure, and on the vertical axis the different labour market outcomes. More in details, in Figure 3.4, on the horizontal axis we report "*STW expenditure per capita*" during recessions, and on the vertical axis we have the "*mean of the employment rate*" between 2017 and 2019. An employment rate as high as possible is the desirable outcome; hence, the best combinations of the input/outcome are those of Portugal, Finland, Austria and Germany. Notably, none of the countries spending more than the average provides one of these combinations, and they also lie below the horizontal dashed line, meaning that their employment rate is below the mean of analysed countries. In addition, as we already mentioned, best combinations of input/outcome in this long-run analysis does not need to be the same as in the short-run analysis.

In Figure 3.5, on the horizontal axis we report "*STW expenditure per capita*" during recessions and on the vertical axis we have the "*mean of the unemployment rate*" between 2017 and 2019. Even though the relation is reversed – low values of unemployment are preferred – again Portugal, Austria and Germany provide the best combinations of input/outcome at the EU level. Even in this

[43] The unemployment rate is a 'bad'; not a 'good'; hence, from a formal point of view, the output of the DEA is the complement of the mean of the employment rate (one hundred minus the mean of the employment rate) and the opposite of the variation in the mean. For the latter, since some countries had a positive variation (i.e. an increase) in the unemployment rate, we shift the vector by a value of 2 in other to have non-negative values (DEA analysis does not accept negative values of the inputs or of the outputs).

analysis, none of the countries spending more than the average provide one of these best combinations.

In Figure 3.6, on the horizontal axis we report "*STW expenditure per capita* during recessions and on the vertical axis we report the "*change in the employment rate between recessions and 2017-2019*". As all values are positive, it is actually the *increase* in the employment rate between recessions and 2017-2019. An increase in the employment rate as high as possible is clearly the best possible outcome. In this context, Portugal shows the highest increase in employment despite one of the lowest expenditure levels, identifying the best input/outcome combination.

The intuition for Figure 3.7 is similar. On the horizontal axis we report "*STW expenditure per capita*" during recessions (2008-09 and 2011-13), as in the previous scatterplots. On the vertical axis we report the "*change in the unemployment rate between recessions and 2017-2019*". Intuitively, the best outcome is the largest decrease in the unemployment rate. While for the employment rate we observed only positive changes (i.e., increases in employment), for the changes in the unemployment rate we have both positive and negative changes: while most countries had a negative change, i.e., a decrease in the unemployment rate, for a few countries – those in the upper part of the figure – we observed a positive change. Even in this case, Portugal shows the largest decrease in unemployment combined with one of the lowest expenditure levels.

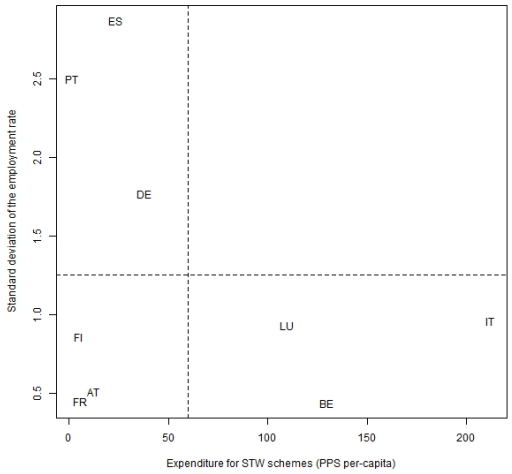
Table 3.2 summarizes our empirical models distinguishing between short- and long-run analysis.

Table 3.2: Budgetary waste rate for STW schemes: summary of methodological approach

Input	Additional Input(s)	Outcome	Expected effect
Short-run			
Mean expenditure for STW schemes (2008-2017)	Mean unemployment benefits expenditure (2008-2017), Mean expenditure for LMP (2008-2017)	Standard deviation of the employment rate (2008-2017)	Effective STW schemes reduce volatility of the employment rate over the business cycle
Mean expenditure for STW schemes (2008-2017)	Mean unemployment benefits expenditure (2008-2017), Mean expenditure for LMP (2008-2017)	Standard deviation of the unemployment rate (2008-2017)	Effective STW schemes contain volatility of the unemployment rate over the business cycle
Medium-Run - Long-run			
Mean expenditure for STW schemes (2008-2009 and 2011-2013)	Mean unemployment benefits expenditure (2008-2009 and 2011-2013), Mean expenditure for LMP (mean, 2008-2009 and 2011-2013)	Change in the (mean) employment rate between recession periods (2008-2009 and 2011-2013) and 2017-2019	Effective STW schemes prevent deterioration of human capital and allow a fast recovery of employment after recessions
Mean expenditure for STW schemes (2008-2009 and 2011-2013)	Mean unemployment benefits expenditure (2008-2009 and 2011-2013), Mean expenditure for LMP (mean, 2008-2009 and 2011-2013)	Change in the (mean) unemployment rate between recession periods (2008-2009 and 2011-2013) and 2017-2019	Effective STW schemes may prevent deterioration of human capital and allow a fast reduction of unemployment after recession
Mean expenditure for STW schemes (2008-2009 and 2011-2013)	Mean unemployment benefits expenditure (2008-2009 and 2011-2013), Mean expenditure for LMP (2008-2009 and 2011-2013)	Mean level of the employment rate (2017-2019)	'Safety-net' role of effective STW schemes allows to reach an higher structural level of the employment rate
Mean expenditure for STW schemes (2008-2009 and 2011-2013)	Mean unemployment benefits expenditure (2008-2009 and 2011-2013), Mean expenditure for LMP (mean, 2008-2009 and 2011-2013)	Mean level of the unemployment rate (2017-2019)	'Safety-net' role of effective STW schemes allows to reach a lower structural level of the unemployment rate

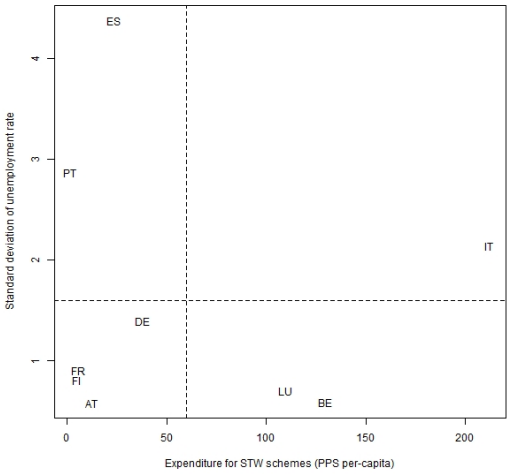
Better outcomes require 1) a low standard deviation of the employment rate, 2) a low standard deviation of the unemployment rate, 3) a positive and high change of the employment rate, 4) a negative and high change of the unemployment rate, 5) an high mean of the employment rate and 6 5) a low mean of the employment rate. (3) and (5) are hence to be maximized, (1), (2), (4) and (6) to be minimized. DEA methodology requires an outcome to be maximized. Hence, for (1) and (2) we consider the inverse of the standard deviation, for (4) we consider the opposite of the change of the unemployment rate, and for (6) we consider the inverse of the mean of the unemployment rate.

Figure 3.2 Expenditure for STW schemes and standard deviation of the employment rate



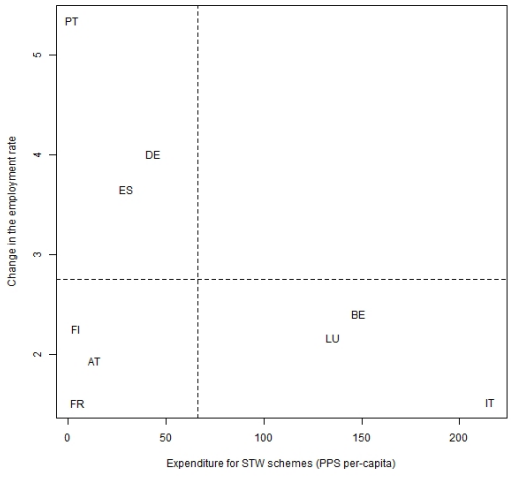
Source: Eurostat .

Figure 3.3: Expenditure for STW schemes and standard deviation of the unemployment rate



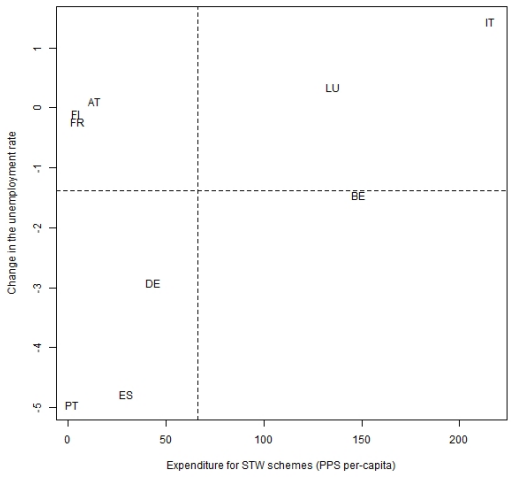
Source: Eurostat.

Figure 3.5 Expenditure for STW schemes and the change of the employment rate between recession (2008-2009-2011-2012-2013) and 2017-2019



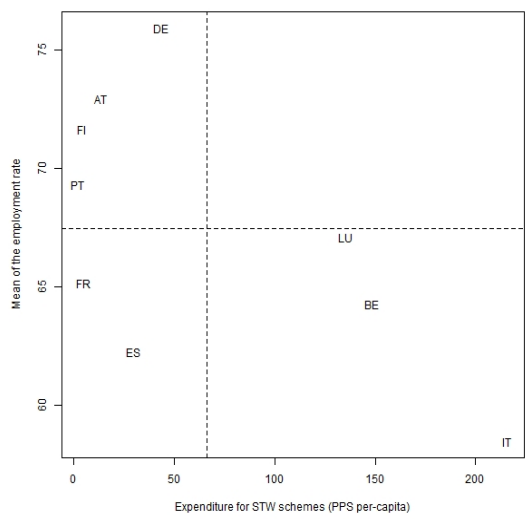
Source: Eurostat.

Figure 3.4 Expenditure for STW schemes and the change of the unemployment rate between recession (2008-2009-2011-2012-2013) and 2017-2019



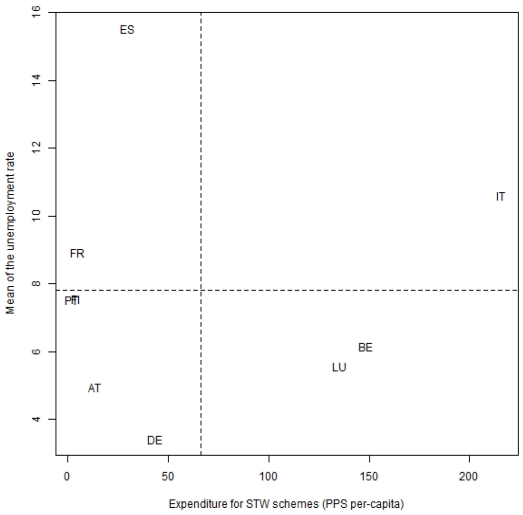
Source: Eurostat .

Figure 3.7: Expenditure for STW schemes during recession (2008-2009-2011-2012-2013) and mean of the employment rate 2017-19



Source: Eurostat

Figure 3.6: Expenditure for STW schemes during recession (2008-2009-2011-2012-2013) and mean of the unemployment rate 2017-19



Source: Eurostat

3.2. Anti-Poverty schemes: Input, Outcome and Expected Results

The application of the DEA methodology to Anti-Poverty (AP) schemes aims at exploring how effectively MS use expenditure for AP schemes to reduce inequality and the risk of poverty and social exclusion. Details of the data and related sources have been presented in Section 2.1.

We consider the relation between social benefits expenditure for 'social exclusion' function, and inequality and poverty indicators. Social benefits expenditure for 'social exclusion' can be roughly seen as a transfer, either in cash or in kind, to individuals and households at the bottom of the income and of the wealth distribution. An effective use of these resources should result in a decrease in inequality indicators, since social benefits expenditure is a form of redistribution; specifically, the outcome is to reduce the share of the population at risk of poverty or social exclusion.

Formally, we consider "*mean expenditure for 'social exclusion' function*", expressed in per capita terms and accounting for purchasing power, as the input. We consider four possible outcome measures in four different exercises: inequality indicators - the "*mean Gini index*", and the "*mean inequality of income distribution*" ("*mean Inequality Index*") - or poverty measures - the "*mean at-risk-of-poverty or social exclusion rate*", and the "*mean difference between the at-risk-of-poverty rate before social transfers and the at-risk-of-poverty rate after social transfers*".[44] The exogenous

[44] Given that the first three considered outputs are not 'goods', but 'bads', we assume that countries would like to minimize the value of those 'bads'. Hence, from a formal point of view, the output of the DEA for the Gini index or the inequality in income distribution are use the inverse of the actual indicator, while the at-risk-of-poverty or social exclusion rate we use the complement value (one hundred minus the at-risk-of-poverty or social exclusion rate).

additional input to differentiate gross and net DEA scores is the "*mean expenditure for labour market policies*".

For inequality indicators, the assumption is that a higher anti-poverty (AP) expenditure allows to decrease inequality. The relations between AP expenditure and inequality outcomes are represented in Figure 3.8 and 3.9. Figure 3.8 represents "*mean expenditure for 'social exclusion' function*" – the input – on the horizontal axis and "*mean Gini Index*" – the outcome – on the vertical axis. As before, the horizontal dashed line represents the average outcome value across selected countries, while the vertical dashed line represents the average input value. It is possible to observe that the countries with higher values of the input have, on average, a lower value of the Gini index – meaning that they are less unequal. Reducing inequality (measured through the Gini index) is the desirable outcome. Hence, Figure 3.8 shows that Hungary, the Czech Republic, Slovakia and Slovenia are those MS with the lower inequality conditional on the amount of resources they are allocating to AP schemes.

Similarly, Figure 3.9 represents "*mean expenditure for 'social exclusion' function*" – the input – on the horizontal axis and "*mean Inequality of income distribution*" – the outcome – on the vertical axis. The income-quintile ratio increases the greater, in relative terms, the income of the top quintile is with respect to the income of the bottom quintile of the population. Hence, a higher value of the "*mean Inequality of income distribution*" implies more inequality. If a country wants to reduce inequality, it should therefore aim for a lower value of the "*mean Inequality of income distribution*". In this sense, MS that lie below the horizontal dashed line are less unequal than the average MS. It appears that countries with higher values of "*mean expenditure for 'social exclusion' function*" have, on average, a lower inequality of the income distribution – hence, again, they are less unequal. From Figure 3.9, Hungary and the Czech Republic present the best combination of input and outcome in this case.

For poverty indicators, the assumption is that a higher level of social benefits expenditure for 'social exclusion' function allows to decrease poverty indicators. Figure 3.10 represents "*mean expenditure for 'social exclusion' function*" – the input – on the horizontal axis and the "*mean at-risk-of-poverty or social exclusion rate*" – the outcome – on the vertical axis. Reducing the poverty rate is a desirable outcome. It is possible to observe that countries with higher values of the input have, on average, a lower share of individuals at risk of poverty or social exclusion. From Figure 3.10, Hungary, Estonia and the Czech Republic identify the best combination between spending and the outcome.

Finally, Figure 3.11 represents "*mean expenditure for 'social exclusion' function*" – the input – on the horizontal axis and the "*mean difference between the at-risk-of-poverty rate before social transfers and the at-risk-of-poverty rate after social transfers*" – the outcome – on the vertical axis. Also in this case, it is possible to observe that countries with higher values of the input have, on average, a higher difference in the share of individuals who are at risk of poverty before social transfers, and the share of those who are at risk of poverty after social transfers. Bringing individuals above the poverty threshold thanks to social transfers, hence having a "*mean difference between the at-risk-of-poverty rate before social transfers and the at-risk-of-poverty rate after social transfers*" as high as possible, is the desirable outcome. In this sense, according to Fig. 3.11, Ireland present the best input/outcome combination.

Expenditure for labour market policies is included as additional input since it is possible to reduce inequality, poverty and social exclusion either indirectly through labour market policies to increase employment and stabilize unemployment, or directly through policies that try to fight social exclusion. Therefore, including the expenditure for labour market policies allows to take into account this indirect channel that contrasts inequality, poverty and social exclusion, in definingnet DEA scores.

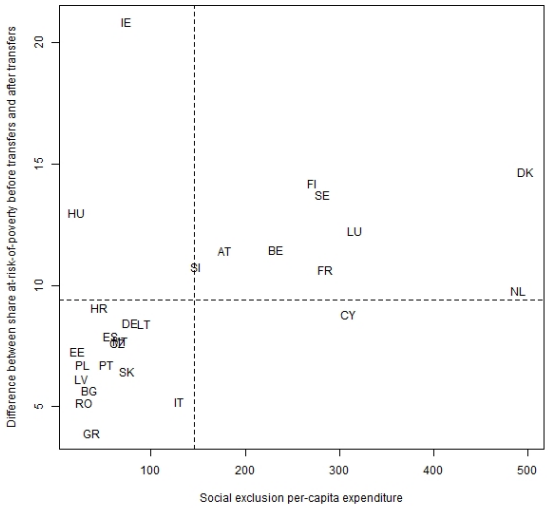
Our empirical strategy is summarized in Table 3.3.

Table 3.3 Budgetary waste rate for Anti-Poverty schemes: summary of methodological approach

Input	Additional Input(s)	Outcome	Expected result
Mean of social benefits expenditure for 'social exclusion' (2009-2018)	Mean expenditure for labour market policies (2009-2018)	Mean value of Gini index (2009-2018)	Expenditure to fight poverty and social exclusion decreases inequality
Mean of social benefits expenditure for 'social exclusion' (2009-2018)	Mean expenditure for labour market policies (2009-2018)	Mean value of inequality of income distribution (2009-2018)	
Mean of social benefits expenditure for 'social exclusion' (2009-2018)	Mean expenditure for labour market policies (2009-2018)	Mean value of at-risk-of-poverty or social exclusion rate (2009-2018)	Expenditure to fight poverty and social exclusion decreases the share of individuals at risk of poverty or socially excluded
Mean of social benefits expenditure for 'social exclusion' (2009-2018)	Mean expenditure for labour market policies (2009-2018)	Mean value of difference in the at-risk of-poverty-rate before and after social transfers (2009-2018)	

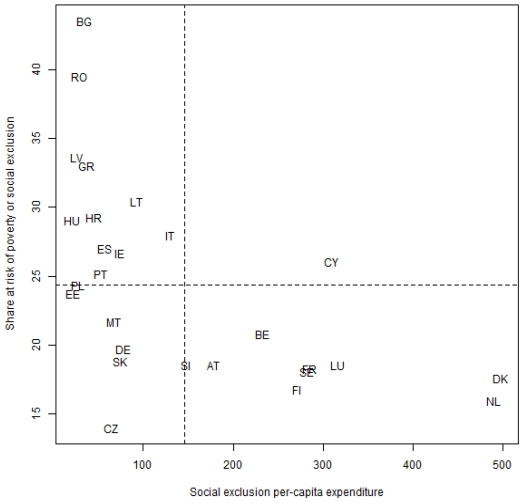
Better outcomes require 1) a low value of the Gini index, 2) a low value of inequality of income distribution, 3) a low value of at-risk-of-poverty or social exclusion rate, 4) an high value of difference in the at-risk of-poverty-rate before and after social transfers. DEA methodology requires an outcome to be maximized. Hence, for (1) and (3) we consider the complement to 100% of the Gini index and the at-risk-of-poverty or social exclusion rate, for (2) we consider the inverse of the mean of the inequality of income distribution inverse of the standard deviation, for (4) we consider the mean value.

Figure 3.11: Social benefits expenditure for 'social exclusion' function and the difference in the at-risk-of-poverty rate, before and after social transfers



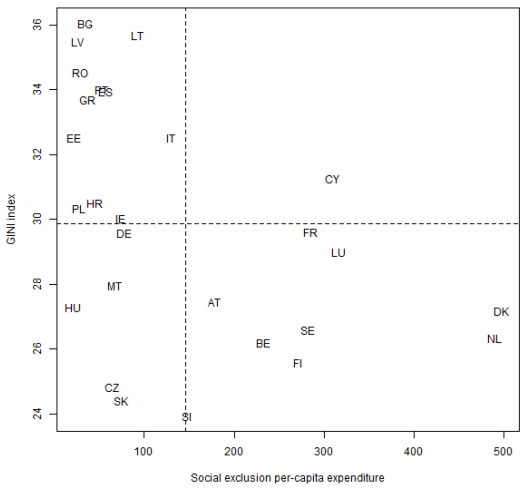
Source: Eurostat

Figure 3.10: Social benefits expenditure for 'social exclusion' function and at-risk-of-poverty or social exclusion rate



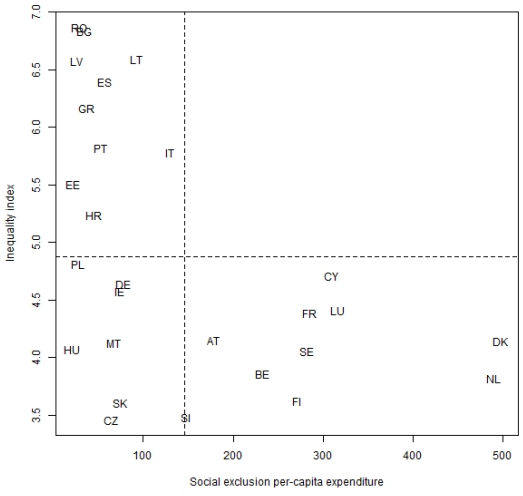
Source: Eurostat.

Figure 3.9: Social benefits expenditure for 'social exclusion' function and the Gini Index



Source: Eurostat .

Figure 3.8: Social benefits expenditure for 'social exclusion' function and the Inequality of income distribution



Source: Eurostat.

3.3. Minimum Wage regulations: Input, Outcome and Expected Results

Differently from STW and anti-poverty schemes, for which public spending data are available, the analysis of MW needs to be based on different input measures; this will also have further consequences on the estimation of budgetary waste, that will be discussed in Section 4. Taking into account the goal of MW regulation, we consider the level of the minimum wage relative to the mean wage (i.e., the Kaitz index) as the main input. The Kaitz index is a proxy of how MW bites on the wage distribution.

As for outcomes, MW affects labour market on many grounds. First, minimum wage affects the wage distribution. Hence, we expect the level of the minimum wage to affect the share of low-wage earners. More in general, minimum wage policies can also affect the at-risk-of-poverty rate, but we expect the effect to be weaker since only a share of minimum wage earners lives in poor households (see, among others, Brown, 1999, and Kawaguchi and Mori, 2009); specifically, we focus on the in-work at-risk-of-poverty rate. Finally, minimum wage policies can affect inequality, reflected in the Gini Index.

Following this discussion, the outcome measures considered are three: the share of low-wage earners, the in-work at-risk-of-poverty rate, and the Gini index. The additional exogenous inputs are the "*mean of the employment rate*" and the "*mean of low-educated employees as a percentage of the total population*". These are included as additional inputs since they are proxies of other factors that can affect the left tale of the wage distribution and of the income distribution.[45]

Figure 3.12 represents "*mean Kaitz index*" – the input – on the horizontal axis and "*mean share of low-wage earners*" – the outcome – on the vertical axis. The horizontal dashed line represents the average outcome value across selected countries, while the vertical dashed line represents the average input value. It is possible to observe that the countries with higher values of the Kaitz index have, on average, a lower share of individuals with low wage. Reducing the number of low-wage earners is a desirable outcome. A visual analysis of Figure 3.12 hence suggests that Spain, the Czech Republic, Belgium and France represent the best possible combinations of input and outcomes.

Figure 3.13 represents "*mean Kaitz index*" – the input – on the horizontal axis and "*mean in-work at-risk-of-poverty rate*" – the outcome – on the vertical axis. The horizontal dashed line represents the average outcome value across selected countries, while the vertical one represents the average input value. It is possible to observe that the countries with higher values of the Kaitz index have, on average, a lower in-work at-risk-of-poverty rate. Reducing the poverty rate is a desirable outcome. In this case, the Czech Republic presents the best input/outcome combination.

The intuition for Figure 3.14 is similar. On the horizontal axis we report "*mean Kaitz index*", as in the previous scatterplots. In the vertical axis we report the "*Gini Index*". Intuitively, the goal of the MW policy is to decrease inequality: a value of "*Gini Index*" as low as possible is therefore the preferred outcome. According to Figure 3.14, the Czech Republic, Slovakia and Slovenia present the lowest value of the Gini Index conditional on the Kaitz index, hence the best combinations of input/outcome.

Our empirical strategy is summarized in Table 3.4.

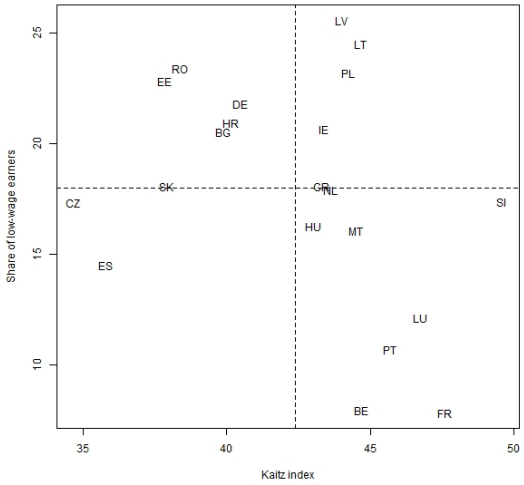
[45] As recalled in the data section, low-educated workers are the ones with one less than primary, primary or lower secondary education.

Table 3.4 Minimum wage: summary of methodological approach

Input	Additional Input(s)	Outcome	Expected result
Mean of the Kaitz index (2010, 2014, 2018)	Mean employment rate (2010, 2014, 2018), Mean value of low-educated employees as percentage of the population (2010, 2014, 2018)	Mean share of low-wage earners (2010, 2014, 2018)	An higher minimum wage decreases the share of workers earning a low wage
Mean of the Kaitz index (2009-2019)	Mean employment rate (2009-2019), Mean value of low-educated employees as percentage of the population (2009-2019)	Mean value of in-work at-risk-of-poverty rate (2009-2019)	An higher minimum wage decreases the share of workers whose labour income is not sufficient to lie above the poverty line
Mean of the Kaitz index (2009-2019)	Mean employment rate (mean, 2009-2019), Mean value of low-educated employees as percentage of the population (2009-2019)	Mean value of Gini Index (2009-2019)	An higher minimum wage decreases inequality

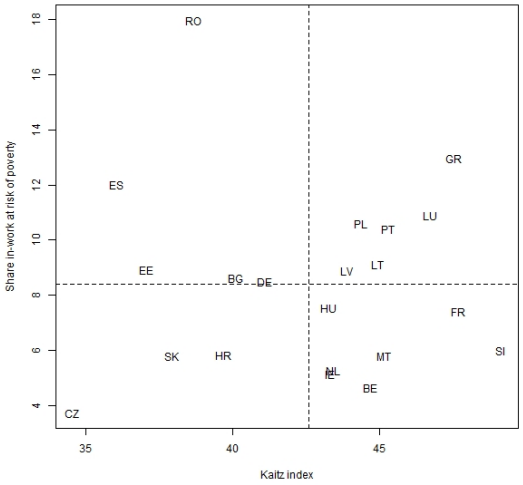
As Kaitz index we consider the ratio of minimum wage relative to the mean wage. Better outcomes require 1) a low share of low-wage earners, 2) a low value of in-work at-risk-of-poverty rate, 3) a low value of the Gini Index. DEA methodology requires an outcome to be maximized. Hence, for (1), (2) and (3) we consider the complement to 100% of the considered measure.

Figure 3.13: Kaitz index and share of low-wage earners



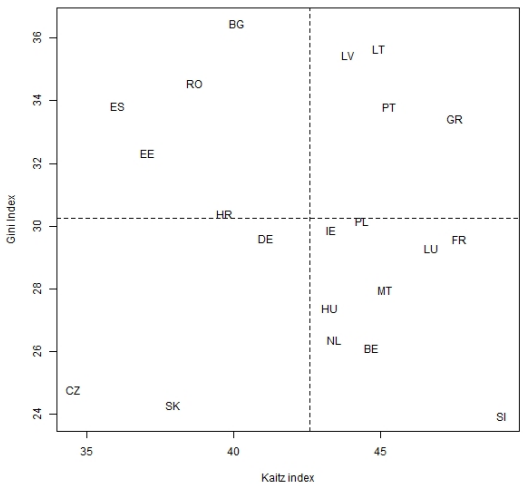
Source: Eurostat.

Figure 3.12: Kaitz index and in-work at-risk-of-poverty rate



Source: Eurostat.

Figure 3.14: Kaitz index and Gini Index



Source: Eurostat.

4. Results and Policy Implications

4.1. Results

This section presents our main results. We focus on three main issues for STW schemes, AP schemes, and MW regulations. First, we comment on DEA scores. Secondly, we provide an estimate of implied waste and waste rate. Finally, we discuss how the EU may reduce or eliminate waste through harmonization and coordination of policies, for instance allowing for the introduction of new schemes and for efficiency gains, decreasing the administrative costs, internalizing cross-border spillovers and pooling risks.

4.1.1. Short-Time Work schemes

In Section 3.1, we have provided a visual interpretation of the relationship between input and outcome measures. Scatterplots of raw data allow to roughly grasp the relation between inputs and outcomes, and to figure out the shape of the EU "gross" frontier via the identification of the best combinations of input and outcomes. The conclusions drawn from this visual interpretation of the raw data are largely confirmed by the "gross" DEA analysis, which results are reported in detail in the Appendix (Table A.2.1).

Here we discuss the results of the "net" DEA analysis. The "net" score is actually derived from the "gross" score by considering the Simar and Wilson (2007) two-stage estimator, that controls for observable differences across countries, i.e., the "additional inputs" in Table 3.2. As discussed in Section 3, DEA scores (gross or net) have a theoretical range going from 0 to 1: effective ("benchmark") countries have a score equal to 1; ineffective countries have a score that is lower than 1 and decreasing in their degree of ineffectiveness. This means that, for example, a country with a DEA score of 0.8 and one with a DEA score of 0.6 are both defined as "ineffective", but the latter is more ineffective than the former. This statement is clearly valid for the specific input-outcome relationship we are considering, but we will discuss the correlation of scores obtained from different DEA model specifications to test the robustness of our conclusions.

Country DEA "net" scores obtained through different specifications of the DEA model (presented in the previous Section 3) are reported in Table 4.1. Each column represents the results of a DEA model using a different outcome (reported in the header of the table).[46] Several interesting insights emerge from the analysis.

Let us start our discussion considering short-run outcomes. First, and notably, the use of the employment rate or of the unemployment rate as outcome measure produce very similar results. The correlation of the DEA scores obtained using the "*standard deviation of the employment rate*" (Panel A, first column) or using the "*standard deviation of the unemployment rate*" (Panel B, first column) is equal to 82%. The intuition is that the countries with STW schemes that have been effective in keeping the "standard deviation of the employment rate" low, have also been effective in keeping the "standard deviation of the unemployment rate" low. Second, DEA results are largely in line with the visual analysis of the scatterplots presented in Section 3.1 (Figure 3.2 and Figure 3.3). In particular, both in the analysis with the "standard deviation of employment rate" as outcome and in the analysis with the "standard deviation of the unemployment rate" as outcome, the benchmark is represented by Belgium. The other countries are below the EU frontier, even if some of these countries are estimated to be relatively close to the frontier: examples are Austria (score of 0.829 for the employment rate and 0.870 for the unemployment rate), Finland (score of

[46] For each specific outcome, the complete model specification is presented in Table 3.2.

0.841 for the unemployment rate), France (score of 0.856 for the employment rate), Luxembourg (score of 0.834 for the unemployment rate) and Portugal (score of 0.840 for the employment rate).

Table 4.1 STW Schemes: effectiveness scores calculated through DEA analysis

Panel A: Employment rate

GEO	Standard deviation	Change	Mean
AT	0.829	0.412	1
BE	1	0.558	0.846
FI	0.591	0.456	0.968
FR	0.856	0.312	0.908
DE	0.25	0.897	0.992
IT	0.461	0.354	0.77
LU	0.475	0.5	0.883
PT	0.84	1	0.907
ES	0.151	0.806	0.84

Panel B: Unemployment rate

GEO	Standard deviation	Change	Mean
AT	0.87	0.268	0.998
BE	1	0.535	0.977
FI	0.841	0.259	0.995
FR	0.747	0.299	0.981
DE	0.396	0.731	1
IT	0.277	0.087	0.932
LU	0.834	0.255	0.983
PT	0.719	0.679	0.973
ES	0.123	1	0.883

Consider now the medium- and long-run outcomes of the STW. In the second column of Table 4.1, we consider as outcome the "*change in the employment rate*" (Panel A) and the "*change in the unemployment rate*" (Panel B). First, looking at the correlation between scores, we observe that the correlation of the DEA scores obtained using the "*change in the employment rate*" (Panel A, second column) or using the "*change in the unemployment rate*" (Panel B, second column) is equal to 84%.

Second, also in this case, DEA results largely confirm the visual interpretation of Figure 3.4 and Figure 3.5. As for the "*change in the employment rate*", the "benchmark" country is Portugal, which has a score equal to 1, the maximum theoretical value of DEA scores. As for the "*change in the unemployment rate*", the "benchmark" is Spain. In the case of the *employment rate*, two countries are very close to the frontier: Germany (0.897) and Spain (0.806); in the case of the *unemployment rate*, countries very close to the frontier are Germany (0.731) and Portugal (0.679). The cross-correlation with short-run DEA scores is negative. This means that, on average, the MS that are among the least ineffective in reducing the volatility of the employment (unemployment) rate are

among the most ineffective in increasing (decreasing) the employment (unemployment) rate after the recession, and the other way round. More in detail, the correlation of "*standard deviation of employment rate*" scores and "*change in the employment rate"* is -31%; the correlation of "*standard deviation of unemployment rate*" scores and "*change in the unemployment rate"* is -43%.

Two other long-run outcomes, that proxy the second-order structural effect of STW schemes, are the "*mean of the employment rate*" and the "*mean of the unemployment rate*". The DEA scores are reported in the third column of Table 4.1: Panel A for the *employment rate*, Panel B for the *unemployment rate*. The correlation of the DEA scores obtained using the "*mean of the employment rate*" or using the "*mean of the unemployment rate*" is equal to 72%. The "benchmarks" are Austria for the former, and Germany for the latter, confirming the results of the visual analysis. Notably, the degree of ineffectiveness appears to be low in this setting: no country has a DEA score lower than 0.77, for the former, and 0.883, for the latter. For the scatterplots, we refer the reader to Figure 3.6 and Figure 3.7 in Section 3, respectively. The cross-correlation with short-run DEA scores is weakly positive if we focus on the employment rate, but stronger if we focus on the unemployment rate. More in detail, the correlation of "*standard deviation of employment rate*" scores and "*mean of the employment rate"* is 11%; the correlation of "*standard deviation of unemployment rate*" scores and "*mean of the unemployment rate"* is 75%.

It might be interesting to look at the scores of the two countries that spend the most between 2008 and 2017, that is Belgium and Italy. Belgium spent, on average, €130 per capita per year, while Italy spent €212 – see Figure 2.1 in Section 2. Moreover, they are also the two countries with the highest expenditure per capita during the two recessions – €148 and €216, respectively. While Belgium is the benchmark in reducing the volatility of employment and unemployment, and only slightly ineffective in keeping a high (low) level of the employment (unemployment) rate, Italy is characterized by low scores both in the short-run and in the long-run. Our explanation for these results, supported by previous literature (e.g. Boeri & Bruecker, 2011), is that the generous Italian STW schemes have probably "postponed unavoidable job and worker reallocations" (Boeri & Bruecker, 2011) rather that allowing firms to cushion temporary downturns. Hence, STW schemes in Italy were likely too generous – both in terms of eligibility conditions and of replacement rate – and turn out to be a disincentive for workers to try to reallocate to more productive jobs.

For robustness purposes, we have repeated the analysis for the short-run effect considering three sub-periods, one until 2011, one until 2013 and one from 2012 to 2017. As highlighted in the data section, we have no data on STW schemes expenditure from 2018 onwards, hence our results are related to the pre-Covid period and do not take into consideration the peak in expenditure for STW recorded during the ongoing pandemic, even though in this section we will discuss also the role of SURE for common procurement. The results of these robustness tests do not qualitatively affect our main analysis: correlation of the scores obtained in the sub-periods with the ones obtained using all the observations are largely positive for both the "*standard deviation of employment rate*" and the "*standard deviation of the unemployment rate*", and range between 71% and 99%. The details are reported in Appendix A.2.

Waste rate

Following the procedure outlined in the example discussed in Section 3, we use the DEA scores in Table 4.1 to estimate public spending (input) waste and the related waste rate. Among the several exercises performed and presented in Table 4.1, we primarily focus on the effectiveness of STW schemes in reducing the volatility of labour market outcome measures in the short run. Hence, we take into consideration the degree of ineffectiveness implied by the exercise that uses the "*standard deviation of the employment rate*" as outcome, and by the one that uses the "*standard deviation of the unemployment rate*" as outcome; related DEA scores are the ones reported in the first column of Table 4.1, in Panel A and Panel B respectively. The calculations for the waste are

instead presented in Table 4.2. Waste estimates for medium and long-run effects – namely, the effect on the *change* and on the *level* of *employment* and *unemployment rates* – are available in the Appendix.

On average, expenditure for STW schemes over the 2008-2017 period amounted, in absolute terms, to about €7.6 billions per year. The waste rate suggested by our exercise is quite relevant: between €4.1 (54%) and €4.8 billions (62.7%). In order to obtain these figures, we multiply the level of expenditure of the country times its distance from the EU frontier, measured as 1 minus the country DEA score. This allows to obtain the estimated level of waste per country, and finally the estimated cumulated waste for the nine selected countries, both in absolute terms (waste) and as a share of expenditure (waste rate) – reported in the bottom line of Table 4.2. By definition, the countries with a DEA score equal to 1 (i.e., the benchmark) are assumed to have no waste. The high relevance of these waste rates suggest that there is room for an EU harmonization/coordination that will improve effectiveness and add value for EU citizens, thanks to the provision of new "public goods", efficiency gains, savings related to administrative costs, integration of cross-border externalities and spillovers and risk pooling.

The waste estimates for medium and long-run effects, available in the Appendix, provide a similar picture, even though the long-run estimates imply a lower waste rate (in the range of 5-16%). Of course, the different exercises provide different waste levels for the individual countries: for example, when the considered outcome is the "*mean employment rate*" the estimated waste for Austria is zero, while when the considered outcome is the "*mean unemployment rate*" the estimated waste for Germany is zero. Our exercises are not meant to provide a ranking of countries, but to allow of estimate the order of magnitude of the benefits of an EU coordination/harmonization.

Table 4.2 STW Schemes: calculation of the waste rate (short-run)

Unit	Input level	St.dev. of empl.rate		St.dev. of unempl.rate	
		Ineff.	Waste	Ineff.	Waste
AT	55.4	17.1%	9.5	13.0%	7.2
BE	647.4	0.0%	0.0	0.0%	0.0
FI	14.2	40.9%	5.8	15.9%	2.3
FR	171.6	14.4%	24.7	25.3%	43.4
DE	1550.2	75.0%	1162.6	60.4%	936.3
IT	4778.8	53.9%	2575.8	72.3%	3455.1
LU	30.8	52.5%	16.2	16.6%	5.1
PT	6.7	16.0%	1.1	28.1%	1.9
ES	392.7	84.9%	333.4	87.7%	344.4
TOTAL (EU)	7647.8		4129.1 (54.0%)		4795.7 (62.7%)

As input level, we consider average expenditure in million euros for STW schemes over the period 2008-2017. The degree of inefficiency is the complement to one of the DEA score, and waste corresponds to the product of input level times the degree of ineffectiveness. Waste for EU is calculated both as a level and as a share of total input employed (waste rate)

Sources of waste and potential EU added value

As discussed in the introduction, estimated waste can be originated from several sources. Each source of waste corresponds to a channel through which the EU may, potentially, generate added value by reducing waste. In this section, we will discuss in detail the role of savings related to

administrative costs, the role of risk pooling, and the role of integration of cross-border externalities and spillovers.

Concerning the savings connected to administrative costs, a clear and recent example is related to the common procurement of resources under SURE. SURE is a programme to borrow money at the EU level during the COVID-19 Pandemic to finance STW schemes defined by each single Member State. As reported in the second *Report on the European instrument for Temporary Support to mitigate Unemployment Risks in an Emergency* of September 2021, this massive intervention on supporting jobs has allowed the unemployment rate in beneficiary MS to increase by only 0.2 percentage points in 2020, compared with an increase of 2.6 percentage points in 2009, despite a much larger decrease in GDP (real GDP fall of 6.8%, with respect to the 4.1% figure of 2009). In absolute values, this suggest that 1.5 million jobs have been saved thanks to the measures financed through SURE.

Furthermore, as reported in the abovementioned Report of September 2021, the 19 beneficiary MS will save €8.18 billions in interest rates, according to the most recent estimates reported in Table 4.3. The reason is that the so-called Social Bonds, issued by the Commission on behalf of the EU, have been placed at extremely favourable terms, including negative yields on the bonds with maturities of 15 years or less. Such conditions are much more favourable than the ones that could have been obtained by issuing sovereign bonds. Considering existing spreads at the time of emission of those Social Bonds, several countries have saved more than 10% of the amount to be disbursed.

The SURE experience teaches that some degree of coordination at EU level can deliver a reduction of administrative costs in the forms of interest savings. This kind of savings can be replicated also for alternative policies.

Table 4.3 SURE: Interest Rate Savings by Member State

Country	Amount disbursed	Interest savings (EUR bn)	Interest Savings (% amount disbursed)
Belgium	8.2	0.14	1.7
Cyprus	0.6	0.06	9.5
Greece	5.3	0.51	9.8
Spain	21.3	1.59	7.4
Croatia	1.0	0.16	15.3
Hungary	0.5	0.09	18.0
Italy	27.4	3.76	13.7
Lithuania	1.0	0.00	0.5
Latvia	0.3	0.00	1.5
Malta	0.4	0.04	8.4
Poland	8.2	0.42	5.0
Portugal	5.4	0.38	7.1
Romania	3.0	0.85	28.4
Slovenia	1.1	0.05	4.3
Slovakia	0.6	0.01	1.3
Bulgaria	0.5	0.03	6.7
Ireland	2.5	0.05	2.1
Czechia	2.0	0.04	1.9
Estonia	0.2	0.00	0.0
TOTAL	**89.6**	**8.18**	**9.1**

Source: Table 4 of the Report on the European instrument for Temporary Support to mitigate Unemployment Risks in an Emergency (SURE) of September 2021

Table 4.4 Correlation of country growth rate with EU-27 growth rate

GEO	GDP	Disposable income	Consumption
Austria	84.2%	58.2%	71.4%
Belgium	83.0%	66.4%	78.3%
Bulgaria	88.1%	64.8%	75.0%
Croatia	84.1%	70.7%	86.3%
Cyprus	66.2%	38.5%	86.6%
Czechia	87.7%	24.5%	74.4%
Denmark	88.2%	52.7%	94.4%
Estonia	86.6%	74.4%	76.6%
Finland	95.7%	72.5%	89.3%
France	92.7%	76.4%	84.9%
Germany	88.9%	81.0%	82.2%
Greece	32.6%	8.5%	24.5%
Hungary	75.0%	65.6%	87.1%
Ireland	41.7%	67.9%	77.8%
Italy	88.3%	82.7%	89.6%
Latvia	89.4%	72.7%	78.2%
Lithuania	88.9%	72.6%	85.1%
Luxembourg	89.2%	21.5%	60.8%
Malta	79.9%		68.6%
Netherlands	91.7%	59.4%	89.6%
Poland	68.5%	31.6%	66.2%
Portugal	68.7%	38.6%	70.2%
Romania	61.1%	67.0%	81.0%
Slovakia	72.8%	44.2%	43.8%
Slovenia	93.3%	89.0%	91.6%
Spain	83.3%	53.8%	79.0%
Sweden	92.1%	52.5%	75.6%

Source: Eurostat. "Disposable income" is the adjusted gross disposable income of households. "Consumption" is the final consumption expenditure of households.

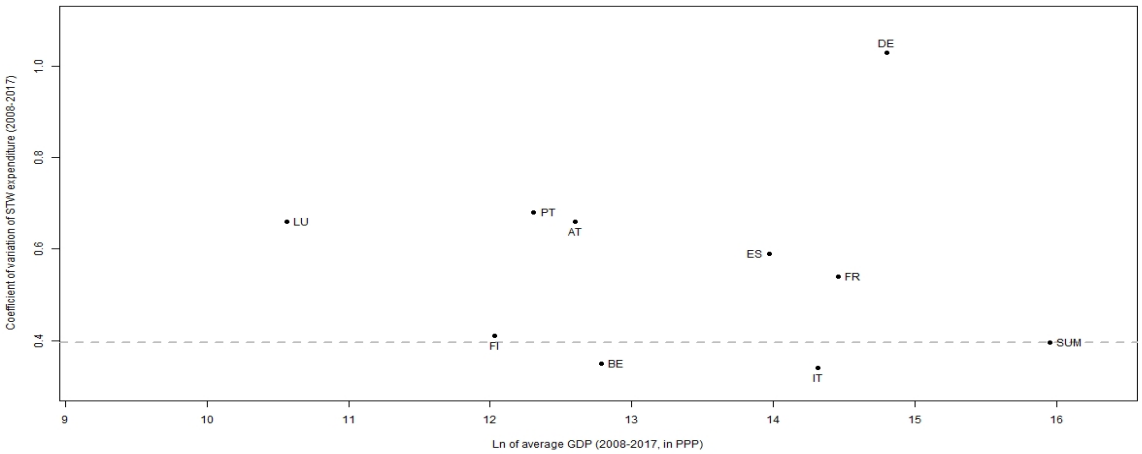
This consideration leads to a second relevant role for EU: the possibility to borrow resources at favourable conditions have led a majority of beneficiary MS "to adopt a new short-time work scheme or to modify an existing scheme" (see the Report of September 2021). Hence, thanks to SURE, most Members States have spent more resources and achieved a preferable outcome (see Graph 11 in the Report of September 2021) than they would have done otherwise. This evidence adds a further channel for the added value that could be generated at the EU level, which complements the one highlighted by our main analysis. In this sense, there are two different channels through which some degree of centralization could yield a preferable outcome: the first is that – as in the case of SURE – MS employ more resources, and the second is that those resources are employed more effectively.

Concerning the role of risk pooling, it would be desirable to pool risks at the supranational level mainly for two reasons. First, there is cross-sectional dispersion of the business cycles of the different MS. The growth rate of GDP of the individual MS is positively correlated with the growth rate of EU-27 GDP, but correlation is far from 100%, especially for smaller countries. This is reported in Table 4.4, with details at country level. Similarly, correlation is positive but lower than 100% also the growth rate of disposable income (Table 4.4, second column) and for the growth rate of consumption (Table 4.4, third column). This imperfect correlation makes it possible to create a formal (or informal) network of cross-insurance among MS: MS with "excess growth" can temporarily support social policies expenditure of those MS that are temporarily lagging behind. Of course, such a transfer cannot be supposed to be permanent.

Second, usually the larger an economic area, the more its economic activities are diversified, implying that if one sector is hit by an idiosyncratic negative shock, the relative impact on the economic cycle is limited. This intuition applies to STW, too, as represented in Figure 4.1 that relates GDP to volatility of expenditure for STW schemes. The horizontal axis reports the natural log of GDP of selected MS, and of a fictitious economic area that includes them all ("SUM"). The vertical axis reports the average coefficient of variation (i.e., the ratio between the standard deviation and the mean) of expenditure for STW schemes. The grey dashed line represents the coefficient of variation of expenditure for STW schemes of "SUM": almost all MS have a coefficient of variation higher than the one of "SUM", and hence a more volatile expenditure.

The role of integration of cross-border externalities and spillovers is partially related to the role of risk pooling. Actually, a support for the MS that are growing less than the EU may indirectly provide some benefits also for the MS that are providing that support. For example, the support that is temporarily provided to one Member State may increase the disposable income and the consumption of those Member State households, that may increase their demand for imported goods and generate positive spillovers on the rest of the European Union – including the countries with "excess growth" that are providing the temporary support. Hence, the cost born by some MS to support social spending in other MS may be at least partially offset by beneficial spillovers. Some empirical studies focus on the existence of similar effects, and provide mixed evidence in support of the hypothesis. For example, In't Veld (2016) focuses on the role of an increase in public investment, finding that an increase in public investment in selected countries (Germany and the Netherlands) would increase GDP both in the country that is making the investment (order of magnitude of 2% increase in GDP for every 1% increase in investment) and in the EU (order of

Figure 4.1: Scatter plot of the natural logarithm of GDP (in Purchasing Power Standard) and coefficient of variation of STW expenditure (2008-2017).



Source: Author calculations on Eurostat data. Dashed line : level of « SUM »

magnitude of 0.5% increase in GDP for every 1% increase in investment in the Netherlands or in Germany).

Finally, ad additional issue concerns the scale of policy. The differences observed in per-capita spending clearly reflect heterogeneity of preferences at the MS level. The approach employed in our main analysis allows for variable returns to scale; hence, we are able to identify an optimal efficient "scale" of the policy and to compute "scale ineffectiveness" according to the procedure described in details in the technical appendix A.1.1. Estimates of the constant returns to scale DEA models allowing to compute "scale ineffectiveness" are provided in Appendix A.2.1, together with the estimates of the waste rate (Table A.2.7 and Table A.2.8). Waste due to "scale ineffectiveness" is estimated to be equal to €2.5 and €3.2 billions in the two short-run exercises, representing a relevant – even though not the prevalent – share of the total waste estimated.

4.1.2. Anti-Poverty schemes

The visual analysis of Figures 3.8 to 3.11 allows to grasp the relation between inputs and outcomes and the shape of the EU "gross" frontier. The conclusions drawn from this analysis are largely confirmed by the "gross" DEA analysis, which results are reported in detail in the Appendix (Table A.2.9). In this section, we report the "net" DEA scores, which differ from the "gross" score since the "net" score is actually derived from the "gross" score by considering the Simar and Wilson (2007) two-stage estimator, that controls for observable differences across countries (labelled as additional inputs in Table 3.3).

Country DEA scores obtained through different specifications of the DEA model are reported in Table 4.5.[47] Each column represents the results of a DEA model using a different outcome (reported in the header of the table); the corresponding input and periods considered for each specific outcome are reported in the previous Table 3.3.

The specifications that employ inequality measures as outcome ("*Gini index*" or "*Inequality in income distribution*", first and the second column of Table 4.5) produce robust results: the correlation of the effectiveness scores is 98%. More in general, the DEA scores are in line with the visual analysis of the scatterplots: the "benchmark" is provided by Slovenia in both cases. Despite being correlated, the estimated *level* of ineffectiveness is different across the two models: in the exercise that consider "*Inequality in income distribution*" as outcome, MS appear to be more ineffective. For example, using the outcome "*Inequality in income distribution*" only six of the twenty-seven MS have an effectiveness score greater than 0.9 (Belgium, Czech Republic, Finland, Netherlands, Slovakia and, of course, the "benchmark" Slovenia); while in the case of outcome "*Gini index*", nineteen of the twenty-seven MS have scores above 0.9 and none has an effectiveness score lower than 0.85. As we will discuss in the next section, this higher "average" ineffectiveness result in a higher estimated waste rate in the "*Inequality in income distribution*" exercise than in the "*Gini index*" one.

The last two columns of Table 4.5 refer to the DEA model specifications that employ poverty indicators, the "*at-risk-of-poverty or social exclusion rate*" and the "*difference in the at-risk-of-poverty rate, before and after transfers*". In the exercise "*at-risk-of-poverty or social exclusion rate*", the DEA scores are in line with the visual analysis: Netherlands is the benchmark country; Czech Republic (0.987) and Finland (0.989) are close to the EU frontier. The average effectiveness is pretty high: twelve countries are above the 0.9 score, and none is below the 0.7 score.

[47] See Table 3.3 for a summary of our methodological approach.

Table 4.5 Anti-Poverty Schemes: effectiveness scores calculated through the DEA analysis

GEO	Gini index	Inequality in income distribution	At-risk-of-poverty or social exclusion rate	Diff. in the at-risk-of-poverty rate, before and after transfers (net)
AT	0.957	0.843	0.962	0.592
BE	0.977	0.913	0.939	0.611
BG	0.855	0.535	0.7	0.362
HR	0.928	0.679	0.858	0.541
CY	0.913	0.752	0.879	0.479
CZ	0.994	0.964	0.987	0.397
DK	0.97	0.86	0.981	0.809
EE	0.888	0.635	0.92	0.483
FI	0.987	0.977	0.989	0.766
FR	0.934	0.806	0.971	0.576
DE	0.928	0.735	0.935	0.407
GR	0.887	0.591	0.827	0.246
HU	0.944	0.815	0.91	0.839
IE	0.922	0.742	0.853	1
IT	0.888	0.6	0.847	0.262
LV	0.859	0.555	0.819	0.408
LT	0.847	0.52	0.813	0.411
LU	0.943	0.804	0.968	0.667
MT	0.952	0.813	0.903	0.391
NL	0.982	0.932	1	0.54
PL	0.931	0.766	0.938	0.444
PT	0.879	0.597	0.891	0.379
RO	0.875	0.537	0.75	0.339
SK	0.996	0.941	0.943	0.311
SI	1	1	0.959	0.549
ES	0.879	0.536	0.86	0.435
SE	0.974	0.872	0.973	0.743

The specification using the "*difference in the at-risk-of-poverty rate, before and after transfers*" as outcome (last column of Table 4.5) needs a somewhat different discussion. First, the visual analysis is confirmed, with DEA identifying Ireland as the benchmark shaping the EU frontier. Unsurprisingly, taking Ireland as the benchmark puts all remaining MS far behind in terms of effectiveness: only Denmark (0.809) and Hungary (0.839) would have a degree of ineffectiveness lower than 20%. However, Ireland looks like an "outlier" and DEA estimates are particularly sensitive to the presence of extreme data. Hence, to avoid waste estimates that are "inflated" by the outlier, we re-run the DEA analysis on a sub-sample of countries which excludes Ireland. Comparing the results of this exercise with the ones obtained by using the "*at-risk-of-poverty or social exclusion rate*" as outcome, the correlation between the effectiveness scores is positive (42%) but weaker than the correlation between the two "inequality indicators" exercise.

More in general, countries that have been effective in employing AP schemes to reduce inequality have been so also in reducing the share of the population at risk of poverty. The correlation of country scores obtained in the "*Gini Index*" exercise with the ones obtained in the "*at-risk-of-poverty or social exclusion rate*" exercise ("*difference in the at-risk of-poverty-rate before and after social transfers*" exercise) is equal to 83% (43%). The results comparing the "*inequality in income distribution*" with the poverty measures are similar: the correlations are 84% and 46%, respectively. The intuition behind these correlations is that well-designed (i.e., effective) anti-poverty policies are able both to decrease inequality, and to reduce the share of the population who is at risk of poverty.

We also run additional robustness exercises, considering two sub-periods, one until 2011 and one from 2012 onwards. Our conclusions are qualitatively unaffected: for every outcome variable considered, the correlation of the DEA scores obtained over the period 2009-2018 with the ones obtained in the sub-periods is largely positive and ranges between 73% and 97%. Details on these robustness checks are reported in Appendix A.2.2.

Waste rate

Following the procedure outlined in the example discussed in Section 3, we use the DEA scores shown in Table 4.5 to estimate input waste and the related waste rate. Such estimates are collected in Table 4.6 for each of the outcomes. On average, expenditure for AP schemes over the 2009-2018 period amounted, in absolute terms, to about €62.8 billions per year. The waste rate suggested by our exercise is quite relevant: it ranges between €3.3 (5.2%), estimated using *"At-risk-of-poverty or social exclusion rate"* as outcome, and €18.7 billions (29.8%), estimated using the "*difference in the at-risk of-poverty-rate before and after social transfers*" as outcome[48]. In order to obtain these figures, we multiply the level of public spending for each country times its distance from the EU estimated frontier; this distance is measured as 1 minus the country DEA score. This allows to obtain the estimated level of waste per country. Finally, the estimated cumulated waste for the EU, both in absolute terms (waste) and as a share of expenditure (waste rate) are reported in the bottom line of Table 4.6. By definition, the countries with a DEA score equal to 1 (i.e., the benchmark) are not wasting public monies (hence, the level of waste is zero). This is the case of Slovenia for the first two exercises, of the Netherlands for the third and of Denmark for the last one.

[48] For this outcome, we computed the waste rate using the DEA specification which excludes Ireland. This explains why results are not reported for this country in the last columns of Table 4.6. The original estimates including these two countries was of a budgetary waste of €28.9 billions, corresponding to about 46% of the budget.

Table 4.6 Anti-Poverty Schemes: calculation of the waste rate

Unit	Input level	Gini		Inequality in income distribution		At-risk-of-poverty or social exclusion rate		At-risk-of-poverty rate before and after transfers	
		Ineff.	Waste	Ineff.	Waste	Ineff.	Waste	Ineff.	Waste
AT	1685.3	4.3%	72.5	15.7%	264.6	3.8%	64.0	17.4%	293.2
BE	2883.7	2.3%	66.3	8.7%	250.9	6.1%	175.9	18.3%	527.7
BG	110.8	14.5%	16.1	46.5%	51.5	30.0%	33.3	61.8%	68.5
HR	122.7	7.2%	8.8	32.1%	39.4	14.2%	17.4	36.6%	44.9
CY	240.0	8.7%	20.9	24.8%	59.5	12.1%	29.0	38.2%	91.7
CZ	426.9	0.6%	2.6	3.6%	15.4	1.3%	5.5	44.7%	190.8
DK	3921.5	3.0%	117.6	14.0%	549.0	1.9%	74.5	1.0%	39.2
EE	20.0	11.2%	2.2	36.5%	7.3	8.0%	1.6	56.2%	11.2
FI	1801.3	1.3%	23.4	2.3%	41.4	1.1%	19.8	0.0%	0.0
FR	20440.9	6.6%	1349.1	19.4%	3965.5	2.9%	592.8	25.2%	5151.1
DE	5221.0	7.2%	375.9	26.5%	1383.6	6.5%	339.4	38.4%	2004.9
GR	334.6	11.3%	37.8	40.9%	136.9	17.3%	57.9	73.4%	245.6
HU	118.2	5.6%	6.6	18.5%	21.9	9.0%	10.6	27.0%	31.9
IE	434.8	7.8%	33.9	25.8%	112.2	14.7%	63.9		
IT	7410.7	11.2%	830.0	40.0%	2964.3	15.3%	1133.8	62.2%	4609.5
LV	33.8	14.1%	4.8	44.5%	15.1	18.1%	6.1	60.9%	20.6
LT	160.5	15.3%	24.6	48.0%	77.0	18.7%	30.0	38.7%	62.1
LU	243.1	5.7%	13.9	19.6%	47.6	3.2%	7.8	14.0%	34.0
MT	23.3	4.8%	1.1	18.7%	4.4	9.7%	2.3	44.1%	10.3
NL	9267.6	1.8%	166.8	6.8%	630.2	0.0%	0.0	33.8%	3132.4
PL	556.9	6.9%	38.4	23.4%	130.3	6.2%	34.5	56.3%	313.5
PT	463.0	12.1%	56.0	40.3%	186.6	10.9%	50.5	52.1%	241.2
RO	277.7	12.5%	34.7	46.3%	128.6	25.0%	69.4	66.0%	183.3
SK	260.5	0.4%	1.0	5.9%	15.4	5.7%	14.8	53.1%	138.3
SI	252.2	0.0%	0.0	0.0%	0.0	4.1%	10.3	21.8%	55.0
ES	2509.0	12.1%	303.6	46.4%	1164.2	14.0%	351.3	43.2%	1083.9
SE	3602.1	2.6%	93.7	12.8%	461.1	2.7%	97.3	3.3%	118.9
TOTAL (EU)	62822.3		3702.4 (5.9%)		12723.7 (20.3%)		3293.9 (5.2%)		18703.9 (29.8%)

As input level, we consider average expenditure in million euros for Anti-Poverty Schemes over the period 2009-2018. The degree of ineffectiveness is the complement to one of the DEA score, and waste corresponds to the product of input level times the degree of ineffectiveness. Waste for EU is calculated both as a level and as a share of total input employed (*waste rate*)

EU value added

The large waste rates suggest that there is room for an EU harmonization/coordination aimed at improving the effectiveness of spending, thanks to new AP schemes, to efficiency gains including savings related to administrative costs, integration of cross-border externalities and spillovers, as well as risk pooling. In what follows, we provide a discussion for some of these different perspectives.

Consider first the reduction of administrative costs: one example, widely discussed in the previous subsection on STW schemes, is interest savings via a common procurement of funds at the EU level. In Table 4.7, we provide a back-of-the-envelope calculation of savings that would be attainable through a scheme (similar to SURE) to finance spending for AP schemes, in which funding procurement is centralized at the EU level. Expenditure is *"expenditure for 'social exclusion' function"*, in PPP, concerning the last available year (2019). We assume that "*interest savings (% expenditure)"* are the same estimated for SURE and reported in Table 4.4 as a percentage of the amount disbursed (last column of Table 4.4).[49] "*Interest savings (EUR mn, PPP)*" are hence estimated as the product of *"expenditure"* times "*interest savings (% expenditure)"*. We obtain about €3.9 billion savings, that theoretically are spread across several years – until all the funds collected through EU-level bonds are reimbursed – but if a similar scheme were permanently in place, at the bottom line those savings would be achieved per year.

Table 4.7 AP schemes: (Potential) Interest Rate Savings by Member State

Country	Expenditure (EUR mn, PPP)	Interest savings (EUR mn, PPP)	Interest Savings (% expenditure)
Austria	1666.2	21.7	1.3
Belgium	3019.0	51.3	1.7
Bulgaria	274.9	18.4	6.7
Croatia	260.6	39.9	15.3
Cyprus	225.1	21.4	9.5
Czechia	552.0	10.5	1.9
Denmark	3042.2	12.2	0.4
Estonia	22.9	0.0	0
Finland	1655.0	19.9	1.2
France	26759.3	428.1	1.6
Germany	6377.4	0.0	0
Greece	936.6	91.8	9.8
Hungary	298.4	53.7	18
Ireland	260.1	5.5	2.1
Italy	17812.6	2440.3	13.7
Latvia	41.9	0.6	1.5

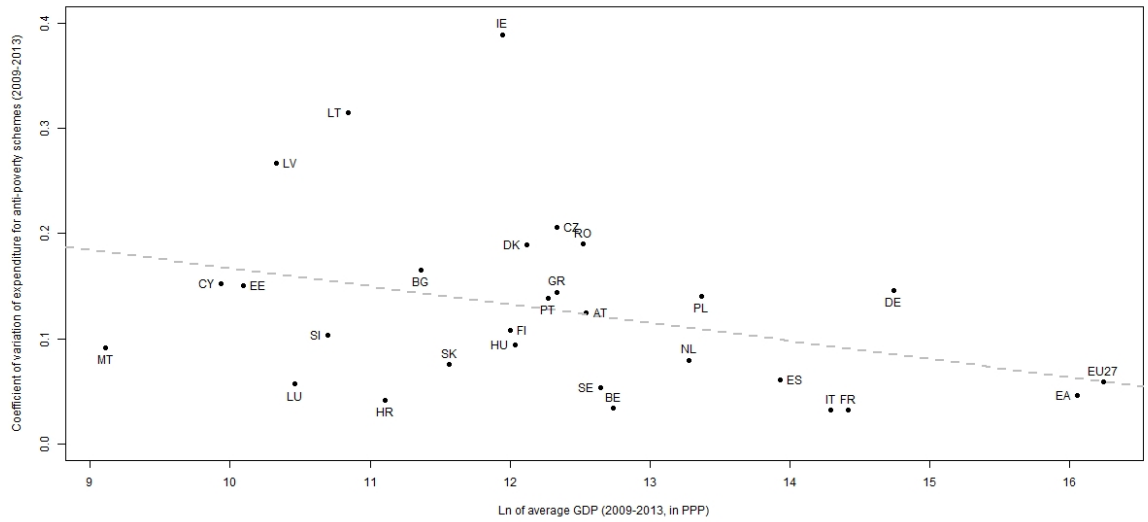
[49] For the Member States that did not apply for SURE funds, we provide tentative interest savings as a percentage of expenditure by comparing EMU convergence criterion bond yields of those countries with the ones of the MS that did apply for SURE funds.

Country	Expenditure (EUR mn, PPP)	Interest savings (EUR mn, PPP)	Interest Savings (% expenditure)
Lithuania	205.0	1.0	0.5
Luxembourg	226.4	1.4	0.6
Malta	30.9	2.6	8.4
Netherlands	9467.2	66.3	0.7
Poland	3140.4	157.0	5
Portugal	521.3	37.0	7.1
Romania	371.8	105.6	28.4
Slovakia	284.0	3.7	1.3
Slovenia	449.0	19.3	4.3
Spain	3094.8	229.0	7.4
Sweden	2619.8	36.7	1.4
TOTAL	**83614.7**	**3874.8**	**4.6**

A second possible role for EU is about risk pooling. We have already shown the imperfect correlation of MS business cycles across the EU in Table 4.4 in the previous subsection, while discussing how EU coordination can improve STW schemes. In addition, it is important to mention expenditure volatility in MS: larger economic areas have more stable expenditure patterns. This intuition is confirmed by data on expenditure for AP schemes in the period 2008-2013 (corresponding to the financial and the sovereign debt crisis period) reported in Figure 4.2. The horizontal axis reports the (natural log of) GDP for each MS, of the Euro Area (EA) and of the European Union (EU27). The vertical axis reports the average coefficient of variation (i.e., the ratio between the standard deviation and the mean) of expenditure for anti-poverty policies. The grey dashed line represents the regression line of the average coefficient of variation of expenditure for anti-poverty policies as a function of the logarithmic transformation of GDP. The slope of the regression line is clearly negative, meaning that a higher GDP is related to a smaller coefficient of variation and, hence, to a more stable expenditure. It is noteworthy to highlight that the Euro Area (EA) and the European Union (EU27) have a coefficient of variation that is smaller than most MS, which suggests that it might be reasonable to pool risk at the supranational level, and that risk pooling is an additional source of savings with respect to AP policies.

Finally, an additional source of potential savings is represented by the "scale" of the policy at the national level. The differences observed in per-capita spending clearly reflect heterogeneity of

Figure 4.2: Scatter plot of the natural logarithm of GDP (in Purchasing Power Standard) and coefficient of variation of AP schemes expenditure (2008-2013).



Source: Author calculations on Eurostat data

preferences at the MS level. The approach employed in our main analysis allows for variable returns to scale; hence, we are able to identify an optimal efficient "scale" of the policy and to compute "scale ineffectiveness" according to the procedure described in details in the technical appendix A.1.1. Estimates of the constant returns to scale DEA models allowing to compute "scale ineffectiveness" are provided in Appendix A.2.2, together with the estimates of the waste rate (Table A.2.13 and Table A.2.14). Waste due to "scale ineffectiveness" ranges between €25 and €51 billions in the different exercises, hence it is likely to represent the largest share of the total waste estimated.

4.1.3. Minimum Wage regulations

We finally discuss results for MW regulation. Also in this case, the conclusions drawn from the visual analysis of raw data are confirmed by the "gross" DEA analysis, which results are reported in detail in the Appendix (Table A.2.15). In this section, we consider the "net" DEA scores derived from the "gross" score by considering the Simar and Wilson (2007) two-stage estimator, that controls for observable differences across countries (i.e., the additional inputs identified in Table 3.4).

Country DEA scores obtained through different specifications of the DEA model (described in Table 3.4) are reported in Table 4.8. We recall that the analysis is limited to those MS that have a statutory minimum wage in place. Each column represents the results of a DEA model using a different outcome (reported in the header of the table).

The first column concerns the results obtained using the "*share of low-wage earners*" as outcome. The results of the visual analysis are largely confirmed: the benchmark is represented by France, and several other countries are extremely close to the EU frontier (for example, Belgium, score of 0.996, Portugal, score of 0.969, or Spain, score of 0.966). More in general, the level of ineffectiveness is limited, with no MS reporting a score below 0.8.

The second column concerns the results for the exercise considering "*in-work at-risk-of-poverty rate*" as outcome. The intuition is similar to the one of the previous exercise: in this case, in line with the visual analysis, the benchmark is Belgium, but most MS are close to the frontier: 14 MS report a DEA score above 0.95, and all MS are above 0.85.

The third column concerns the results of the model using the "*Gini index*" as outcome. Also in this case, the conclusions of the visual analysis are largely confirmed. The benchmark is Slovenia; Belgium (0.973) Netherlands (0.969) and Slovakia (0.983) are quite close to the frontier. More in general, even in this exercise most MS are not that far from the frontier: 12 have a DEA score above 0.9, all above 0.8.

Differences in the benchmark across the different exercises clearly reflect the idea that the choice of the outcome variable to evaluate the country performance is crucial. As discussed in the previous Section 3.3, MW policies affects the wage distribution more than the income distribution. Hence, it is not surprising that the effectiveness scores obtained through the first analysis ("*share of low-wage earners*") are positively but only weakly correlated with the ones obtained from the second ("*in-work at-risk-of-poverty rate*") and the third specification ("*Gini index*"). The correlations are 16% and 35%, respectively.[50] Conversely, the correlation between the scores obtained through the two measures of income inequality – the "*in-work at-risk-of-poverty rate*" and the "*Gini index*" – is sensibly higher, reaching 67%.

We also tested the robustness of our estimates by considering two sub-periods, one until 2011 and one from 2012 onwards. The results are qualitatively unaffected: for every outcome variable considered, the correlation of the DEA scores obtained over the period 2009-2019 with the ones obtained in the sub-periods is largely positive and ranges between 85% and almost 100%. Details on these robustness checks are reported in Appendix A.2.3.

Table 4.8 Minimum Wage regulations: effectiveness scores calculated through the DEA analysis

	Share of low-wage earners	In-work at-risk-of-poverty rate	Gini Index
BE	0.996	1	0.973
BG	0.894	0.956	0.831

[50] The correlations between the "gross" scores are similar: 21% and 41%, respectively.

HR	0.888	0.985	0.91
CZ	0.929	0.99	0.94
EE	0.875	0.948	0.876
FR	1	0.971	0.927
DE	0.876	0.958	0.923
GR	0.9	0.913	0.876
HU	0.921	0.969	0.955
IE	0.871	0.995	0.923
LV	0.812	0.955	0.849
LT	0.817	0.953	0.847
LU	0.954	0.935	0.931
MT	0.911	0.988	0.948
NL	0.899	0.993	0.969
PL	0.835	0.938	0.919
PT	0.969	0.94	0.872
RO	0.868	0.857	0.852
SK	0.929	0.983	0.983
SI	0.897	0.986	1
ES	0.966	0.912	0.847

Waste rate and EU value added

There is no formal budget drawn from public finances for minimum wage policies. Hence, it is not possible to estimate a budgetary waste as simply as in Section 4.1.1 (STW) and Section 4.1.2 (Anti-poverty schemes). An alternative approach could be to consider low wage employment as a market imperfection which can arise from labour market frictions or from the existence of monopsony power. In theory, frictions or monopsony power may allow employers to set wages (ineffectively) below the marginal revenue product. The larger the monopsony power, the larger would be the share of workers earning a low wage. The threshold conventionally used by most international institutions (such as Eurofund, Eurostat and ILO) to measure low paid employment, is 50% of the national average wage (or alternatively two-thirds of the median wage). Thus, to reduce the share of working poor, regulators may set a minimum wage level to raise wages above the threshold, or alternatively subsidise the wages of low-wage earners by lump-sum transfer. In such case, it would be possible to evaluate the distributional effects of MW, as the amount of resources that would be necessary to transfer to those workers to bring them out of low pay poverty. In other words, in our exercise, we measure how many low-wage workers would be able to exit the low-wage status when an "effective" minimum-wage policy is applied. This approach allows a back-of-the-envelope calculation by which we can derive a monetary equivalent of the distributional effects of a MW policy in terms of a social transfer scheme for the low-paid. Clearly, in this exercise each Member State is meant to maintain its MW regulation, while the EU coordination could deliver a better implementation of the MW policy – such as reduction of frictions or the extent of monopsony power.

Waste estimates of MW regulations along these lines are reported in Table 4.9. In order to obtain these figures, we multiply the number of low-wage earners of the country times its distance from the EU frontier, measured as 1 minus the country DEA score. Given that we are focusing on low-

wage earners, the ineffectiveness measure we consider is the score obtained by considering as outcome the "*share of low-wage earners*" (see the first column of Table 4.8). This allows to obtain the estimated level of waste per country, in terms of workers that are below the low-wage threshold due to ineffectiveness of MW policy, both in absolute terms (waste) and as a share of the total number of low-wage workers (waste rate) – reported in the bottom line of the third column of Table 4.9.

Over the period considered, the number of employees in the EU has been, on average, about 160 million individuals. Of those, about 23 millions workers are classified as low-wage earners. Considering the degree of ineffectiveness estimated, about 2.3 million workers would be brought above the "low-wage line" by an effective EU-coordinated minimum wage policy.

We finally multiply the "waste" expressed in thousands of low-wage earners (third column) times the wage-subsidy necessary to bring minimum-wage earners above the low-wage threshold. The amount of the transfer is estimated to be equal to the difference between the statutory minimum wage level and the low-paid threshold in each country. This exercise returns a figure close to 6 billion euros – see the bottom line of the last column of Table 4.9 – of equivalent transfer/subsidies that would be necessary to reduce low-pay poverty in each MS by adopting a common standard for the EU MW regulation (i.e., 50% of the national average wage or two-thirds of the median wage). This figure represents a potential saving for national budgets.

Table 4.9 Minimum Wage regulations: calculation of the waste rate

	Outcome level (thousands of low-wage earners)	Ineffectiveness	Waste (thousands of low-wage earners)	Low earnings threshold minus statutory minimum wage (Euros per month)	Waste (Eur mln per year)
BE	308	0.4%	1	176.0	2.6
BG	531	10.6%	56	47.0	31.8
HR	278	11.2%	31	102.4	38.2
CZ	764	7.1%	54	160.7	104.6
EE	126	12.5%	16	121.5	22.9
FR	1,933	0.0%	0	72.1	0.0
DE	8,390	12.4%	1,040	353.3	4,410.1
GR	560	10.0%	56	115.0	77.4
HU	642	7.9%	51	55.6	33.8
IE	346	12.9%	45	230.0	123.2
LV	198	18.8%	37	45.6	20.4
LT	287	18.3%	52	36.7	23.1
LU	46	4.6%	2	131.0	3.3
MT	28	8.9%	2	87.6	2.6
NL	1,341	10.1%	135	218.3	354.7
PL	2,892	16.5%	477	52.5	300.4
PT	426	3.1%	13	56.4	8.9
RO	1,441	13.2%	190	75.3	171.9
SK	350	7.1%	25	121.3	36.2
SI	136	10.3%	14	6.2	1.0
ES	2,362	3.4%	80	310.7	299.4
TOTAL	23,385		2,380 (10.2%)		6,066.7

As outcome level, we consider average number of low-wage earners (expressed in thousands) over the period 2009-2019. The degree of ineffectiveness is the complement to one of the DEA score, and waste corresponds to the product of outcome level times the degree of ineffectiveness. Waste for EU is calculated both as a level and as a share of total outcome level (waste rate).

5. Limitations of the analysis

The computation of DEA scores and the derivation of waste described in the previous sections has some clear limitations, that are worth discussing. Some limitations refer to the methodology. First, being an extension of Saulnier (2020), all our results are based on DEA: as already mentioned and as discussed more in details in Appendix A.1, DEA is a linear programming technique that does not assume any functional form for the production frontier and does not impose any specific distributional form for the ineffectiveness scores. This is important in a framework where we are extending the production function model to public policies in which public spending is thought to pursue specific goals. However, as a drawback, it produces results that are particularly sensitive to variable selection and data error. Hence, the choice of the outcome variable is crucial, for a given level of spending, to determine both the benchmarks and the size of waste.

Somewhat connected to this, it is important to recognize that DEA performs a simple benchmarking exercise and compares the effectiveness of the different Decision Making Units (the MS, in all our exercises). However, it cannot inform about the effectiveness of the policy in each country; it remains a descriptive comparison exercise which is unable to account for institutional differences across MS. Differently from the papers surveyed in the literature review, we are not evaluating the policies and we are not drawing any conclusion about whether STW, AP and MW schemes are effective in reaching the respective goals, or not, or whether it would be preferable to devote resources to either one or the other policy. In addition, we are unable – with this methodology – to assess which system works better. The methodology simply allows the definition of benchmarks given the choice of inputs and outcomes of each policy, and the computation of waste under the assumption of a common EU frontier.

Some limitations concern data availability. In particular, as far as STW schemes are concerned, for reason convincingly explained in Mosley (2020) it was not possible to obtain data for all MS that have such a policy in place. We concentrate on a subset of nine countries for which we have a long time series available, and the external validity of our results depends on the representativeness of those nine countries. At the very same time, having excluded some MS from the analysis for lack of data implies that there could be some effective policies that we are not considering. This implies that the budgetary waste we have presented in Section 4.1.1 is a lower bound for the actual value of budgetary waste in the EU. By definition, DEA is a benchmarking exercise allowing to identify best combinations of the input/outcome from *observed* units.

An additional point concerns the presence of outliers. We identified Ireland as an outlier heavily influencing DEA scores and waste estimation when considering as outcome *"At-risk-of-poverty rate before and after transfers"* in the analysis of AP schemes. When estimating the waste in that exercise, we have excluded Ireland. This exclusion may have led to an underestimate of the level of waste and of the waste rate.

Finally, concerning MW analysis, it is worth remarking that we had to exclude six countries that do not have a statutory minimum wage, since it would not have been possible to have a comparable figure for the Kaitz index. In addition, for this exercise there are no costs for the public budget, and the estimate of the waste rate had to consider this peculiarity of the policy.

6. Concluding remarks

In this study, we employ a benchmarking technique, Data Envelopment Analysis (DEA), to identify and compute waste in MS spending for three specific branches of social policy: short-time work schemes, anti-poverty schemes and minimum wage regulation.

Concerning the role of social policies, we take a more general perspective considering the role of short-time work schemes, anti-poverty policies and minimum wage for a period of more than ten years, to encompass an entire business cycle. Unfortunately, we do not have up-to-date data covering also the ongoing pandemic crisis.

The results presented in the present Report allow to conclude that there is a relevant budgetary waste in the three social policies considered. Such a waste, for the different policies, ranges from 5.1% to 69.0%. Cumulatively, the waste amounts to between €9.8 and €30.1 billion. This waste could be reduced through an EU-level coordination/harmonization, provided that the EU would be able to bring MS policies closer to the estimated EU frontier by allowing the provision of new public goods, efficiency gains, lower administrative costs, internalization of externalities and spill-overs and risk sharing. We stress that the benefits of such a coordination/harmonization would eventually accrue to the Member States that are currently lagging behind in terms of effectiveness, enhancing the *upward convergence* aimed by the European Commission (Mascherini et al. 2021).

Concerning short-time work schemes, we analysed whether national spending on these schemes effectively influenced the volatility of labour market measures (employment and unemployment rate) in the short-run. We find a relevant degree of heterogeneity in effectiveness, with budgetary waste with respect to total expenditure of considered Member States ranging between 5.1% and 69.0% (€0.4 to €5.3 billion). This implies that an EU-level coordination/harmonization may substantially increase the added value for EU citizens.

There are a few other interesting results concerning short-time work schemes. First, we find that Member States that are more effective in the short-run are, on average, also more effective in the long-run, reducing unemployment. Second, that too generous schemes (with respect to duration and/or replacement rates) turn out to be less effective with respect to schemes that more properly balance the temporary support with (implicit) incentives to relocate to more productive jobs. Third, we match the evidence of the DEA analysis with the one of SURE, that encouraged Member States to introduce new STW schemes or potentiate existing ones. A higher level of effectiveness, coupled with a greater availability of resources, may result in a preferable outcome and facilitate the *upward convergence*.

As far as anti-poverty schemes are concerned, we analysed whether national spending to fight poverty and social exclusion effectively influenced the inequality and poverty measures. In general terms, countries which anti-poverty policies have been effective in reducing inequality, have been so also in reducing share of the population at risk of poverty. We find a considerable budgetary waste rate, ranging between 5.2% and 29.8% according to the different inequality/poverty measures considered. According to our estimates, the waste amounts to between €3.3 and €18.7 billion in absolute terms. This absolute value puts the relevance of anti-poverty schemes on a level similar to the one of short-time work schemes, despite the latter has a much higher budgetary waste rate in relative terms.

Finally, for Minimum Wage regulation currently there are no public monies specifically spent. This makes impossible to estimate *budgetary waste* in strict sense. However, the literature points to the inefficiencies in labour market outcomes, in particular on the left tail of the wage distribution, caused by employers' monopsony power. Low wages could be an effect of their ability to pay workers less than their marginal productivity, that could be prevented by an adequate regulation.

It is possible to estimate how effectively the twenty-one Member States that do have a statutory minimum wage affect the share of low-wage earners among employees. We calculate that 10.2% of low-wage earners, corresponding to 2.3 million workers, are in this condition due to inefficiencies in the minimum wage regulation. Hence, in absence of interventions on minimum wage regulation, bringing this 2.3 million workers above the low-wage threshold would cost Member States about €6 billion, in terms for example of wage subsidies or of means-tested social transfers. Hence, a pretty much costless intervention on minimum wage regulation could provide a benefit that would currently cost about €6 billion of public monies.

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A.1. DEA methodology

This Appendix provides a wider and somewhat more technical discussion of the DEA methodology, as presented in Saulnier (2020).

A.1.1. The idea of benchmarking governments and the tools for benchmarking

Following the definition of budgetary waste introduced by Saulnier (2020) and recalled in the introduction, the key issue for our empirical analysis is to find a methodology to identify the benchmarks defining the EU 'production frontier'. This frontier for MS countries describes the largest possible amount of output/outcome that can be obtained given a fixed level of input (in general, public spending).

The original applications of the concept of "frontier" are related to applied production analysis, in particular the analysis of firms' efficiency operating in industries characterized by competitive markets for inputs and outputs. The frontier is meant to replicate the standard microeconomic production function Y=f(X), where Y is the output obtained by consuming the inputs X. In the seminal analysis of firms' efficiency, the main idea is to find 'benchmarks', meant to be those firms that: i) for a given level of input consumption, are able to obtain the largest possible output; or, ii) for a given level of output production, are able to consume the lowest possible amount of input. Benchmark firms are those lying on the production frontier, and serve as reference for all the remaining firms, which are characterized by different degrees of "inefficiency" depending on their distance from the frontier.

Starting from specific industries, this idea has found widespread applications, firstly in industries characterized by non-competitive markets (e.g., banking or insurance) and then in industries characterized by difficulties in identifying "outputs" (e.g., schools or hospitals, for which the output is usually measured in terms of number of students or number of patients, but the outcome is usually more important and more difficult to measure, the students' achievement or the patients' health). In many of these applications, the analysis started to involve also public producers: many schools and many hospitals are indeed public firms. Also in this case, finding benchmark schools and hospitals allowed researchers to have a reference through which the performance of all the other producers could be assessed. However, the original concept of "inefficiency" started to be regarded as a concept of "waste" of public monies. After all, public schools and public hospitals spend public funds to serve students and patients, and the whole community to improve education and health.

The idea of benchmarking public producers has also been extended to the analysis of the performance of governments, at different level: from entire countries to municipalities. In these applications, on which is grounded also the analysis of budgetary waste, the microeconomic concept of production function is stretched to compare different governments: the inputs consumed are generally measured by public spending; the outputs/outcomes are generally thought to reflect the best proxies for the goals aimed for by the specific policy under study.

From the analysis of firms to the analysis of entire countries, identifying the frontier requires to find an appropriate methodology for empirical applications. Several benchmarking techniques exist in the literature for this purpose. The two main methods that can be found in the economic literature are the Stochastic Frontier Analysis (SFA) and the Data Envelompent Analysis (DEA). The first one is an econometric technique that redefine the standard error term as the sum of white noise plus an asymmetric random variable measuring inefficiency, i.e., the distance from the production frontier. SFA is clearly a parametric methodology, since it requires the specification of the parameters describing the production frontier. Several specifications have been tested by

researchers, from the seminal Cobb-Douglas model to the most common (and more flexible) Translog model.

Following Saulnier (2020), we decided to focus on Data Envelompent Analysis (DEA), that is a non-parametric technique that requires only mild assumptions on the production set, but it is more affected by measurement errors in the data. Contrary to SFA, DEA is a linear programming technique. The basic DEA model solves a linear program to obtain either i) the maximum achievable outputs/outcomes given a fixed level of inputs, or ii) the minimum level of inputs given a fixed level of output/outcome that each Decision Making Unit (DMU)[51] should consume in order to be on the effective boundary (Daraio and Simar 2007). Once the effective frontier has been defined, output- or input-based technical (in)effectiveness for each unit is measured by considering the distance from the observed point to its corresponding production (or cost frontier); in the case of more than one input and more than one output, this distance is specified as a radial distance by allowing each DMU to rest on the specific input/output mix adopted (Daraio and Simar 2007). In the empirical applications presented here, we adopt an output-based approach[52], to emphasize the value added that can be obtained from a more effective use of resources.

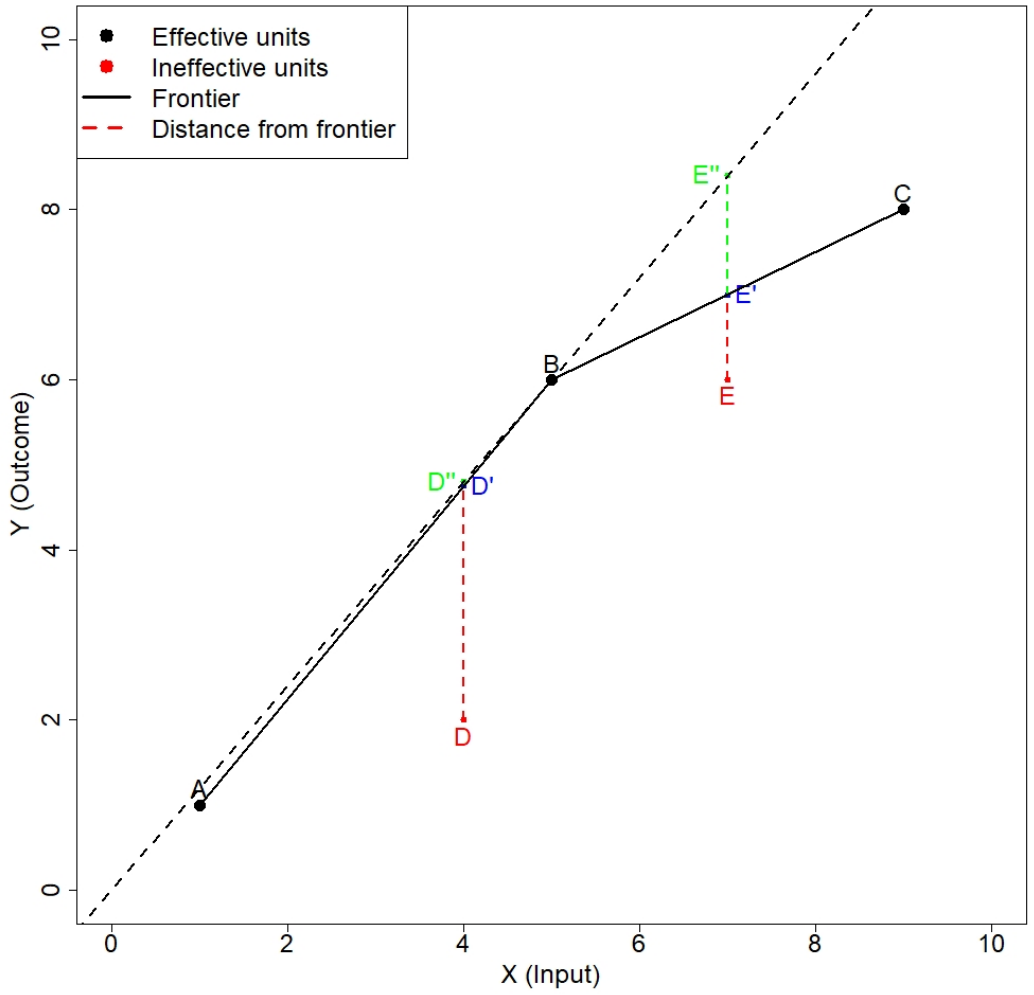
On a more technical ground, recalling the original idea of production function, DEA models may be adapted to different returns to scale specifications (e.g., Tsai and Molinero 2002; Daraio and Simar 2007; Hernandez Villafuerte et al. 2017). The original DEA model proposed by Charnes, Cooper and Rhodes (1978) was based on a constant returns to scale (CRS) assumption. Thereafter, Banker, Charnes and Cooper (1984) introduced the variable returns to scale (VRS) DEA model. Estimating and comparing the two models, it is possible to separate total effectiveness measure into pure *technical effectiveness* and *scale effectiveness*. Indeed, technical effectiveness (TE) computed through the CRS-DEA model corresponds to the pure technical effectiveness (PTE), while technical effectiveness computed through the VRS-DEA model is given by the pure technical effectiveness multiplied by the scale effectiveness (SE) component (Marselli and Vannini 2004; Ji and Lee 2010). In other words, using a simple formula:

$$TE = PTE \times SE$$

[51] DMU is the standard term used in the DEA literature to identify production units that take decisions on the level of input consumption and the organization of production, and – hence – are ultimately responsible for the outputs/outcomes obtained.

[52] The alternative is to have an input-based approach, according to which budgetary waste would be defined as the amount of public spending in excess of the optimal level to obtain a given level of output. Nevertheless, input and output oriented measures are clearly related, being exactly the same in the DEA-model with constant returns to scale (CRS).

Figure A.1.1 Example of an efficient frontier



To show how TE, PTE and SE are computed, consider again Figure 3.1 in the main text, which is based on a VRS setup. PTE for a generic unit *i* is represented by the ratio between the output of the unit (y_i) and the output achievable adopting that level of input (x_i) along the VRS effective frontier ($y^*(x_i)$). Let us take, as examples, an unit which is VRS-effective (C) and one which is VRS-ineffective (E). Formally, their pure technical efficiencies are:

$$PTE_C = \frac{y_C}{y^*(x_C)} = \frac{y_C}{y_C} = 1$$

and

$$PTE_E = \frac{y_E}{y^*(x_E)} = \frac{y_E}{y_{E'}} < 1 \; since \; y_{E'} > y_E$$

The scale effectiveness, instead, is related to the output scale with respect to the optimal scale of production in a CRS setup. Figure A.1 reports the CRS effective frontier (black dashed line): only B would be effective, while A and C (which are considered effective in a VRS setup) would be ineffective due to their suboptimal scale: A has a scale lower than the optimal one, while C has a scale higher than the optimal one.

Let us define as $\hat{y}(x_i)$ the output achievable adopting a given level of input (x_i) along the CRS-effective frontier $(y^*(x_i))$. The scale effectiveness of a unit is then equal to the ratio between the output achievable adopting that level of input (x_i) along the VRS effective frontier $(y^*(x_i))$ and $\hat{y}(x_i)$. SE, actually, is equal to the ratio between the technical effectiveness calculated under the assumption of CRS and the technical effectiveness calculated under the assumption of VRS. For example, for unit E, scale effectiveness is formally equal to:

$$SE_E = \frac{y^*(x_E)}{\hat{y}(x_E)} = \frac{y_{E'}}{y_{E''}} < 1 \; since \; y_{E''} > y_{E'}$$

Similarly, scale effectiveness has a value lower than one for units A, C and D. The only unit for which scale effectiveness is equal to one is B:

$$SE_B = \frac{y^*(x_B)}{\hat{y}(x_B)} = \frac{y_B}{y_B} = 1$$

Since B lies on the CRS effective frontier and, by definition, also on the VRS effective frontier.

A.1.2. The pros and cons of DEA and the two-stage estimator

There is a general consensus in the literature that there is no optimal methodology for benchmarking. Unsurprisingly, both the SFA and the DEA approach has pros and cons. Limiting the discussion to DEA, standard considerations suggest that while this technique is non-parametric, hence it does not require to parametrize the production set, it does not allow however a proper role for variables outside the control of the decision maker in each production unit. To be more specific, DEA does not assume any functional form for the production frontier and does not impose any specific distributional form for the ineffectiveness scores. However, it produces results that are particularly sensitive to variable selection and data error (e.g., Kalirajan and Shand 1999). Moreover, with DEA, it is more difficult to implement statistical hypothesis tests.

However, there are several different approaches that can be followed to overcome these limits. One possibility, used in many papers, relies on a semi-parametric two-stage procedure that combines effectiveness measurement by DEA with a regression analysis that uses DEA effectiveness scores as dependent variables. In these analyses, the second stage is typically a censored (Tobit) or truncated regression to account for the bounded nature of effectiveness scores (Badunenko and Tachmann, 2018). This is known by now as a naïve two-stage DEA model, since it ignores the data generating process of the DEA scores for a correct inference at the second stage, and it ignores the fact that DEA-scores are estimated from the same data used for the second-stage inference.

To solve these issues, Simar and Wilson (2007) developed a parametric bootstrap procedure for a correct inference in DEA models. The advantage of this two-stage estimator is that it considers that effectiveness scores are estimated from a common sample of data. Therefore, applying a bootstrap procedure, generates estimated standard errors and confidence intervals that account for the correlation between estimated effectiveness scores; DEA-scores are then unbiased.

Simar and Wilson (2007) created two algorithms for computing these bias-corrected effectiveness scores, the estimated parameters of the second-stage regression and their related variance. All our models use the "dea.env.robust" routine in R for the estimation of bias-corrected DEA with environmental variables. This routine is based on the second algorithm defined by Simar and Wilson (2007). Bootstrap replications in the first loop are set to 100, while in the second loop are set to 2000. Additional information can be found in the technical description of the package "rDEA" available at https://cran.r-project.org/web/packages/rDEA/rDEA.pdf.

Notice that environmental variables are defined as additional inputs in all of our models, while "gross" and "net" DEA scores identify estimates not accounting or accounting for the effect of environmental variables, respectively. In brief, "net" DEA scores are obtained in a regression-like framework as predicted values of "gross" scores obtained after controlling for environmental variables (our additional inputs).

A.2. Robustness checks

A.2.1. Short-Time Work Schemes

Table A.2.1 STW Schemes: gross effectiveness scores calculated through DEA analysis

Panel A: Employment rate

GEO	St.dev. (gross)	Change (gross)	Mean (gross)
AT	0.881	0.361	1
BE	1	0.449	0.847
FI	0.667	0.421	1
FR	1	0.282	0.908
DE	0.253	0.75	1
IT	0.458	0.284	0.77
LU	0.475	0.404	0.884
PT	1	1	1
ES	0.156	0.682	0.835

Panel B: Unemployment rate

	St.dev. (gross)	Change (gross)	Mean (gross)
AT	1	0.272	1
BE	0.983	0.496	0.972
FI	1	0.301	0.995
FR	0.854	0.321	0.979
DE	0.417	0.706	1
IT	0.271	0.081	0.926
LU	0.829	0.237	0.978
PT	1	1	1
ES	0.132	0.974	0.881

Table A.2.2 STW Schemes: calculation of the waste rate (long-run)

Unit	Input level	Change in empl. rate		Change in unempl. rate		Mean of empl. rate		Mean of unempl. rate	
		Ineff.	Waste	Ineff.	Waste	Ineff.	Waste	Ineff.	Waste
AT	55.4	58.8%	32.6	73.2%	40.5	0.0%	0.0	0.2%	0.1
BE	647.4	44.2%	286.2	46.5%	301.1	15.4%	99.7	2.3%	14.9
FI	14.2	54.4%	7.7	74.1%	10.5	3.2%	0.5	0.5%	0.1
FR	171.6	68.8%	118.0	70.1%	120.3	9.2%	15.8	1.9%	3.3
DE	1550.2	10.3%	159.7	26.9%	417.0	0.8%	12.4	0.0%	0.0
IT	4778.8	64.6%	3087.1	91.3%	4363.1	23.0%	1099.1	6.8%	325.0
LU	30.8	50.0%	15.4	74.5%	23.0	11.7%	3.6	1.7%	0.5
PT	6.7	0.0%	0.0	32.1%	2.1	9.3%	0.6	2.7%	0.2
ES	392.7	19.4%	76.2	0.0%	0.0	16.0%	62.8	11.7%	45.9
TOTAL (EU)	7647.8		3782.9 (49.5%)		5277.5 (69.0%)		1294.5 (16.9%)		389.9 (5.1%)

Table A.2.3 STW Schemes: effectiveness scores calculated through DEA (short-run), 2008-2011

GEO	St.dev. of empl.rate (gross)	St.dev. of empl.rate (net)	St.dev. of unempl.rate (gross)	St.dev. of unempl.rate (net)
AT	1	0.877	1	0.905
BE	1	1	0.541	0.549
FI	0.592	0.518	1	0.881
FR	1	0.816	0.888	0.804
DE	0.277	0.268	0.468	0.469
IT	0.388	0.392	0.412	0.429
LU	0.388	0.387	1	1
PT	1	0.913	1	0.93
ES	0.114	0.101	0.11	0.102

Table A.2.4: STW Schemes: effectiveness scores calculated through DEA (short-run), 2008-2013

GEO	St.dev. of empl.rate (gross)	St.dev. of empl.rate (net)	St.dev. of unempl.rate (gross)	St.dev. of unempl.rate (net)
AT	0.883	0.938	1	0.864
BE	1	1	0.842	0.847
FI	0.63	0.625	1	0.826
FR	1	0.953	0.691	0.596
DE	0.232	0.251	0.429	0.407
IT	0.265	0.269	0.236	0.24
LU	0.311	0.314	1	1
PT	1	0.934	1	0.824
ES	0.103	0.111	0.09	0.082

Table A.2.5 STW Schemes: effectiveness scores calculated through DEA (short-run), 2012-2017

GEO	St.dev. of empl.rate (gross)	St.dev. of empl.rate (net)	St.dev. of unempl.rate (gross)	St.dev. of unempl.rate (net)
AT	1	0.783	1	0.898
BE	0.75	0.771	0.638	0.77
FI	0.938	0.732	0.709	0.62
FR	1	0.771	1	0.864
DE	0.499	0.443	0.587	0.592
IT	0.415	0.441	0.521	0.641
LU	1	1	0.649	0.757
PT	1	0.875	1	1
ES	0.164	0.149	0.108	0.111

Table A.2.6: STW Schemes: calculation of "gross" DEA scores under constant-returns-to-scale (CRS), variable-returns-to-scale (VRS) and scale effectiveness (SE)

GEO	St.dev. of empl.rate (gross)			Change in empl.rate (gross)			Mean of empl.rate (gross)		
	CRS	VRS	SE	CRS	VRS	SE	CRS	VRS	SE
AT	0.412	0.881	0.468	0.062	0.361	0.172	0.180	1.000	0.180
BE	0.046	1.000	0.046	0.007	0.449	0.016	0.014	0.847	0.017
FI	0.639	0.667	0.958	0.245	0.421	0.582	0.601	1.000	0.601
FR	1.000	1.000	1.000	0.136	0.282	0.482	0.453	0.908	0.499
DE	0.039	0.253	0.154	0.038	0.750	0.051	0.056	1.000	0.056
IT	0.013	0.458	0.028	0.003	0.284	0.011	0.009	0.770	0.012
LU	0.026	0.475	0.055	0.007	0.404	0.017	0.016	0.884	0.018
PT	0.575	1.000	0.575	1.000	1.000	1.000	1.000	1.000	1.000
ES	0.039	0.156	0.250	0.051	0.682	0.075	0.068	0.835	0.081
	St.dev. of unempl.rate (gross)			Change in unempl.rate (gross)			Mean of unempl.rate (gross)		
	CRS	VRS	SE	CRS	VRS	SE	CRS	VRS	SE
AT	0.534	1.000	0.534	0.046	0.272	0.169	0.175	1.000	0.175
BE	0.050	0.983	0.051	0.007	0.496	0.014	0.015	0.972	0.015
FI	1.000	1.000	1.000	0.175	0.301	0.581	0.582	0.995	0.585
FR	0.737	0.854	0.863	0.155	0.321	0.483	0.474	0.979	0.484
DE	0.073	0.417	0.175	0.036	0.706	0.051	0.053	1.000	0.053
IT	0.008	0.271	0.030	0.001	0.081	0.012	0.010	0.926	0.011
LU	0.050	0.829	0.060	0.004	0.237	0.017	0.017	0.978	0.017
PT	0.738	1.000	0.738	1.000	1.000	1.000	1.000	1.000	1.000
ES	0.038	0.132	0.288	0.073	0.974	0.075	0.069	0.881	0.078

Table A.2.7: STW Schemes: calculation of the waste rate (short-run) under CRS, including share due to scale effectiveness (SE).

Unit	Input level	Outcome: St.dev. of empl.rate			Outcome: St.dev. of unempl.rate		
		TE		*Of which: SE*	TE		*Of which: SE*
		Ineff.	Waste	Waste	Ineff.	Waste	Waste
AT	55.4	58.8%	32.6	26.0	46.6%	25.8	25.8
BE	647.4	95.4%	617.6	617.6	95.0%	615.1	604.1
FI	14.2	36.1%	5.1	0.4	0.0%	0.0	0.0
FR	171.6	0.0%	0.0	0.0	26.3%	45.1	20.1
DE	1550.2	96.1%	1489.7	331.7	92.7%	1437.0	533.3
IT	4778.8	98.7%	4716.7	2126.6	99.2%	4740.6	1256.8
LU	30.8	97.4%	30.0	13.8	95.0%	29.3	24.0
PT	6.7	42.5%	2.8	2.8	26.2%	1.7	1.7
ES	392.7	96.1%	377.4	45.9	96.2%	377.8	36.9
TOTAL (EU)	7647.8		7272.0 (95.1%)	3165.0 (41.4%)		7272.4 (95.1%)	2502.7 (32.7%)

Table A.2.8: STW Schemes: calculation of the waste rate (long-run under CRS, including share due to scale effectiveness (SE).

Unit	Input level	Change in empl. rate			Change in unempl. rate			Mean of empl. rate			Mean of unempl. rate		
		TE Ineff.	TE Waste	*Of which: SE*	TE Ineff.	TE Waste	*Of which: SE*	TE Ineff.	TE Waste	*Of which: SE*	TE Ineff.	TE Waste	*Of which: SE*
AT	55.4	93.8%	52.0	16.6	95.4%	52.8	12.5	82.0%	45.4	45.4	82.5%	45.7	45.7
BE	647.4	99.3%	642.9	286.2	99.3%	642.9	316.6	98.6%	638.4	539.3	98.5%	637.7	619.6
FI	14.2	75.5%	10.7	2.5	82.5%	11.7	1.8	39.9%	5.6	5.6	41.8%	5.9	5.8
FR	171.6	86.4%	148.2	25.0	84.5%	145.0	28.5	54.7%	93.8	78.1	52.6%	90.2	86.6
DE	1550.2	96.2%	1491.3	1103.7	96.4%	1494.4	1038.6	94.4%	1463.4	1463.4	94.7%	1468.0	1468.0
IT	4778.8	99.7%	4764.5	1342.9	99.9%	4774.1	382.3	99.1%	4735.8	3636.7	99.0%	4731.1	4377.4
LU	30.8	99.3%	30.6	12.2	99.6%	30.7	7.2	98.4%	30.3	26.8	98.3%	30.3	29.6
PT	6.7	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0	0.0%	0.0	0.0
ES	392.7	94.9%	372.7	247.8	92.7%	364.1	353.8	93.2%	366.0	301.2	93.1%	365.6	318.9
TOTAL (EU)	7647.8		7512.9 (98.2%)	3036.9 (39.7%)		7515.6 (98.3%)	2141.3 (28.0%		7378.8 (96.5%)	6096.5 (79.7%)		7374.6 (96.4%)	6951.7 (90.9%)

A.2.2. Anti-Poverty Schemes

Table A.2.9 AP Schemes: gross effectiveness scores calculated through the DEA analysis

GEO	Gini (gross)	Inequality in income distribution (gross)	At-risk-of-poverty or social exclusion rate (gross)	At-risk-of-poverty rate before and after transfers (gross)
AT	0.954	0.834	0.947	0.547
BE	0.97	0.896	0.921	0.549
BG	0.871	0.564	0.713	0.38
HR	0.938	0.707	0.866	0.55
CY	0.904	0.735	0.86	0.422
CZ	1	1	1	0.396
DK	0.957	0.836	0.958	0.703
EE	0.928	0.737	1	0.557
FI	0.978	0.956	0.968	0.68
FR	0.925	0.788	0.95	0.509
DE	0.931	0.746	0.933	0.405
GR	0.901	0.62	0.84	0.256
HU	1	1	1	1
IE	0.926	0.755	0.853	1

GEO	Gini (gross)	Inequality in income distribution (gross)	At-risk-of-poverty or social exclusion rate (gross)	At-risk-of-poverty rate before and after transfers (gross)
IT	0.889	0.599	0.838	0.249
LV	0.884	0.608	0.861	0.451
LT	0.849	0.525	0.809	0.403
LU	0.933	0.785	0.947	0.587
MT	0.957	0.838	0.911	0.39
NL	0.969	0.906	0.977	0.469
PL	0.953	0.825	0.974	0.482
PT	0.885	0.618	0.896	0.38
RO	0.895	0.573	0.775	0.365
SK	1	0.958	0.944	0.311
SI	1	0.994	0.947	0.515
ES	0.884	0.554	0.865	0.434
SE	0.965	0.852	0.953	0.658

Table A.2.10 AP Schemes: effectiveness scores calculated through DEA, excluding Ireland

GEO	At-risk-of-poverty rate before and after transfers (net)
AT	0.826
BE	0.817
BG	0.382
HR	0.634
CY	0.618
CZ	0.553
DK	0.99
EE	0.438
FI	1
FR	0.748
DE	0.616
GR	0.266
HU	0.73
IE	
IT	0.378
LV	0.391
LT	0.613
LU	0.86
MT	0.559
NL	0.662
PL	0.437
PT	0.479
RO	0.34
SK	0.469
SI	0.782
ES	0.568
SE	0.967

Table A.2.11 AP Schemes: effectiveness scores calculated through DEA, 2009-11

GEO	Gini (gross)	Gini (net)	Inequality (gross)	Inequality (net)	At-risk-of-poverty or social exclusion rate (gross)	At-risk-of-poverty or social exclusion rate (net)	At-risk-of-poverty rate before and after transfers (gross)	At-risk-of-poverty rate before and after transfers (net)
AT	0.944	0.945	0.803	0.804	0.947	0.951	0.485	0.488
BE	0.961	0.967	0.866	0.884	0.929	0.936	0.513	0.542
BG	0.883	0.866	0.591	0.533	0.659	0.64	0.328	0.3
HR	0.914		0.641		0.848		0.565	
CY	0.919	0.927	0.764	0.783	0.887	0.894	0.341	0.366
CZ	0.994	0.996	1	0.979	1	0.989	0.478	0.475
DK	0.956	0.964	0.778	0.799	0.962	0.97	0.694	0.748
EE	0.915	0.884	0.705	0.61	1	0.955	0.472	0.418
FI	0.97	0.976	0.919	0.937	0.969	0.976	0.559	0.589
FR	0.912	0.918	0.752	0.769	0.948	0.955	0.466	0.496
DE	0.942	0.94	0.787	0.757	0.963	0.953	0.494	0.482
GR	1	0.945	1	0.813	1	0.892	1	0.842
HU	1	0.955	1	0.837	0.914	0.866	1	0.867
IE	0.918	0.919	0.747	0.748	0.843	0.846	1	1
IT	0.902	0.904	0.638	0.625	0.866	0.857	0.264	0.263
LV	0.852	0.839	0.518	0.474	0.773	0.754	0.401	0.37
LT	0.848	0.85	0.521	0.52	0.793	0.794	0.441	0.441
LU	0.939	0.946	0.817	0.837	0.969	0.977	0.563	0.602
MT	0.953	0.955	0.838	0.831	0.922	0.919	0.379	0.379
NL	0.964	0.973	0.89	0.915	0.991	1	0.42	0.454
PL	0.918	0.904	0.722	0.659	0.915	0.892	0.396	0.365
PT	0.868	0.87	0.604	0.595	0.879	0.874	0.381	0.38
RO	0.882	0.873	0.566	0.528	0.722	0.709	0.385	0.363
SK	0.981	0.983	0.922	0.916	0.933	0.931	0.319	0.318
SI	1	1	1	1	0.957	0.96	0.458	0.459
ES	0.883	0.884	0.572	0.56	0.868	0.859	0.431	0.429
SE	0.967	0.973	0.861	0.876	0.96	0.966	0.601	0.629

Table A.2.12 AP Schemes: effectiveness scores calculated through DEA, 2012-18

GEO	Gini (gross)	Gini (net)	Inequality (gross)	Inequality (net)	At-risk-of-poverty or social exclusion rate (gross)	At-risk-of-poverty or social exclusion rate (net)	At-risk-of-poverty rate before and after transfers (gross)	At-risk-of-poverty rate before and after transfers (net)
AT	0.956	0.961	0.834	0.862	0.947	0.97	0.579	0.63
BE	0.972	0.979	0.897	0.931	0.918	0.941	0.568	0.624
BG	0.861	0.855	0.551	0.543	0.737	0.737	0.383	0.363
HR	0.938	0.938	0.726	0.729	0.871	0.881	0.503	0.496
CY	0.895	0.903	0.712	0.745	0.848	0.872	0.464	0.518
CZ	0.99	0.982	1	0.986	1	1	0.364	0.369
DK	0.955	0.966	0.849	0.894	0.957	0.986	0.707	0.801
EE	1	0.942	1	0.836	1	0.927	1	0.816
FI	0.979	0.989	0.956	0.999	0.968	0.994	0.743	0.829
FR	0.929	0.938	0.792	0.829	0.951	0.978	0.531	0.593
DE	0.923	0.92	0.731	0.734	0.931	0.942	0.423	0.437
GR	0.891	0.89	0.593	0.595	0.797	0.806	0.239	0.234
HU	1	0.951	1	0.872	0.941	0.902	1	0.826
IE	0.931	0.929	0.781	0.786	0.881	0.894	1	1
IT	0.884	0.887	0.583	0.597	0.826	0.842	0.271	0.29
LV	0.9	0.875	0.655	0.607	0.899	0.876	0.485	0.42
LT	0.844	0.84	0.52	0.521	0.815	0.823	0.394	0.406
LU	0.929	0.938	0.76	0.796	0.938	0.965	0.6	0.672
MT	0.953	0.949	0.853	0.852	0.92	0.928	0.39	0.393
NL	0.968	0.979	0.9	0.946	0.971	1	0.495	0.56
PL	0.969	0.954	0.875	0.837	1	0.986	0.526	0.472
PT	0.891	0.891	0.641	0.643	0.912	0.923	0.364	0.359
RO	0.901	0.888	0.582	0.558	0.797	0.787	0.354	0.318
SK	1	0.992	0.968	0.954	0.948	0.948	0.321	0.326
SI	0.997	1	0.976	1	0.942	0.961	0.545	0.583
ES	0.877	0.875	0.551	0.554	0.862	0.874	0.402	0.403
SE	0.961	0.971	0.837	0.876	0.95	0.977	0.687	0.769

Table A.2.13: AP Schemes: calculation of "gross" DEA scores under constant-returns-to-scale (CRS), variable-returns-to-scale (VRS) and scale effectiveness (SE)

GEO	Gini (gross)			Inequality (gross)			At-risk-of-poverty or social exclusion rate (gross)			At-risk-of-poverty rate before and after transfers (gross)		
	CRS	VRS	SE	CRS	VRS	SE	CRS	VRS	SE	CRS	VRS	SE
AT	0.119	0.954	0.125	0.117	0.834	0.140	0.130	0.947	0.137	0.105	0.547	0.192
BE	0.093	0.970	0.096	0.096	0.896	0.107	0.097	0.921	0.105	0.081	0.549	0.148
BG	0.543	0.871	0.623	0.367	0.564	0.651	0.465	0.713	0.652	0.270	0.380	0.711
HR	0.449	0.938	0.479	0.365	0.707	0.516	0.444	0.866	0.513	0.329	0.550	0.598
CY	0.065	0.904	0.072	0.059	0.735	0.080	0.068	0.860	0.079	0.047	0.422	0.111
CZ	0.343	1.000	0.343	0.390	1.000	0.390	0.381	1.000	0.381	0.195	0.396	0.492
DK	0.043	0.957	0.045	0.042	0.836	0.050	0.047	0.958	0.049	0.048	0.703	0.068
EE	0.911	0.928	0.982	0.725	0.737	0.984	1.000	1.000	1.000	0.549	0.557	0.986
FI	0.080	0.978	0.082	0.088	0.956	0.092	0.087	0.968	0.090	0.086	0.680	0.126
FR	0.072	0.925	0.078	0.069	0.788	0.088	0.081	0.950	0.085	0.061	0.509	0.120
DE	0.262	0.931	0.281	0.237	0.746	0.318	0.289	0.933	0.310	0.176	0.405	0.435
GR	0.527	0.901	0.585	0.381	0.620	0.615	0.516	0.840	0.614	0.174	0.256	0.680
HU	1.000	1.000	1.000	1.000	1.000	1.000	0.947	1.000	0.947	1.000	1.000	1.000
IE	0.274	0.926	0.296	0.253	0.755	0.335	0.279	0.853	0.327	0.457	1.000	0.457
IT	0.152	0.889	0.171	0.115	0.599	0.192	0.157	0.838	0.187	0.065	0.249	0.261
LV	0.744	0.884	0.842	0.519	0.608	0.854	0.743	0.861	0.863	0.396	0.451	0.878
LT	0.203	0.849	0.239	0.142	0.525	0.270	0.213	0.809	0.263	0.148	0.403	0.367

GEO	Gini (gross)			Inequality (gross)			At-risk-of-poverty or social exclusion rate (gross)			At-risk-of-poverty rate before and after transfers (gross)		
	CRS	VRS	SE	CRS	VRS	SE	CRS	VRS	SE	CRS	VRS	SE
LU	0.066	0.933	0.071	0.062	0.785	0.079	0.073	0.947	0.077	0.063	0.587	0.107
MT	0.313	0.957	0.327	0.311	0.838	0.371	0.331	0.911	0.363	0.187	0.390	0.479
NL	0.044	0.969	0.045	0.046	0.906	0.051	0.049	0.977	0.050	0.033	0.469	0.070
PL	0.738	0.953	0.774	0.651	0.825	0.789	0.778	0.974	0.799	0.398	0.482	0.826
PT	0.362	0.885	0.409	0.279	0.618	0.451	0.399	0.896	0.445	0.206	0.380	0.542
RO	0.653	0.895	0.730	0.430	0.573	0.750	0.586	0.775	0.756	0.289	0.365	0.792
SK	0.299	1.000	0.299	0.324	0.958	0.338	0.312	0.944	0.331	0.143	0.311	0.460
SI	0.150	1.000	0.150	0.168	0.994	0.169	0.156	0.947	0.165	0.119	0.515	0.231
ES	0.339	0.884	0.383	0.237	0.554	0.428	0.364	0.865	0.421	0.227	0.434	0.523
SE	0.076	0.965	0.079	0.076	0.852	0.089	0.083	0.953	0.087	0.080	0.658	0.122

Table A.2.14: AP schemes: calculation of the waste rate under CRS, including share due to scale effectiveness (SE).

Unit	Input level	Gini			Inequality			At-risk-of-poverty or social exclusion rate			At-risk-of-poverty rate before and after transfers		
		TE Ineff.	TE Waste	*Of which: due to SE*	TE Ineff.	TE Waste	*Of which: due to SE*	TE Ineff.	TE Waste	*Of which: due to SE*	TE Ineff.	TE Waste	*Of which: due to SE*
AT	1685.3	88.1%	1484.8	1407.2	88.3%	1488.1	1208.4	87.0%	1466.2	1376.9	89.5%	1508.3	744.9
BE	2883.7	90.7%	2615.5	2529.0	90.4%	2606.8	2306.9	90.3%	2603.9	2376.1	91.9%	2650.1	1349.6
BG	110.8	45.7%	50.7	36.4	63.3%	70.2	21.8	53.5%	59.3	27.5	73.0%	80.9	12.2
HR	122.7	55.1%	67.6	60.0	63.5%	77.9	42.0	55.6%	68.2	51.8	67.1%	82.4	27.1
CY	240.0	93.5%	224.4	201.4	94.1%	225.9	162.2	93.2%	223.7	190.1	95.3%	228.7	90.0
CZ	426.9	65.7%	280.5	280.5	61.0%	260.4	260.4	61.9%	264.3	264.3	80.5%	343.7	85.8
DK	3921.5	95.7%	3752.9	3584.3	95.8%	3756.8	3113.7	95.3%	3737.2	3572.5	95.2%	3733.3	2568.6
EE	20.0	8.9%	1.8	0.3	27.5%	5.5	0.2	0.0%	0.0	0.0	45.1%	9.0	0.2
FI	1801.3	92.0%	1657.2	1617.6	91.2%	1642.8	1563.6	91.3%	1644.6	1587.0	91.4%	1646.4	1070.0
FR	20440.9	92.8%	18969.2	17436.1	93.1%	19030.5	14697.0	91.9%	18785.2	17763.2	93.9%	19194.0	9157.5
DE	5221.0	73.8%	3853.1	3492.8	76.3%	3983.6	2657.5	71.1%	3712.1	3362.3	82.4%	4302.1	1195.6
GR	334.6	47.3%	158.3	125.2	61.9%	207.1	80.0	48.4%	162.0	108.4	82.6%	276.4	27.4
HU	118.2	0.0%	0.0	0.0	0.0%	0.0	0.0	5.3%	6.3	6.3	0.0%	0.0	0.0
IE	434.8	72.6%	315.7	283.5	74.7%	324.8	218.3	72.1%	313.5	249.6	54.3%	236.1	236.1
IT	7410.7	84.8%	6284.3	5461.7	88.5%	6558.5	3586.8	84.3%	6247.2	5046.7	93.5%	6929.0	1363.6
LV	33.8	25.6%	8.7	4.7	48.1%	16.3	3.0	25.7%	8.7	4.0	60.4%	20.4	1.9
LT	160.5	79.7%	127.9	103.7	85.8%	137.7	61.5	78.7%	126.3	95.6	85.2%	136.7	40.9
LU	243.1	93.4%	227.0	210.8	93.8%	228.0	175.8	92.7%	225.3	212.5	93.7%	227.8	127.4
MT	23.3	68.7%	16.0	15.0	68.9%	16.0	12.3	66.9%	15.6	13.5	81.3%	18.9	4.7
NL	9267.6	95.6%	8859.8	8572.5	95.4%	8841.3	7970.1	95.1%	8813.5	8600.3	96.7%	8961.8	4040.7

Unit	Input level	Gini			Inequality			At-risk-of-poverty or social exclusion rate			At-risk-of-poverty rate before and after transfers		
		TE Ineff.	TE Waste	*Of which: due to SE*	TE Ineff.	TE Waste	*Of which: due to SE*	TE Ineff.	TE Waste	*Of which: due to SE*	TE Ineff.	TE Waste	*Of which: due to SE*
PL	556.9	26.2%	145.9	119.7	34.9%	194.3	96.9	22.2%	123.6	109.1	60.2%	335.2	46.8
PT	463.0	63.8%	295.4	242.2	72.1%	333.8	157.0	60.1%	278.3	230.1	79.4%	367.6	80.6
RO	277.7	34.7%	96.4	67.2	57.0%	158.3	39.7	41.4%	115.0	52.5	71.1%	197.5	21.1
SK	260.5	70.1%	182.6	182.6	67.6%	176.1	165.1	68.8%	179.2	164.6	85.7%	223.2	43.8
SI	252.2	85.0%	214.4	214.4	83.2%	209.9	208.4	84.4%	212.9	199.5	88.1%	222.2	99.9
ES	2509.0	66.1%	1658.5	1367.4	76.3%	1914.4	795.4	63.6%	1595.7	1257.0	77.3%	1939.5	519.4
SE	3602.1	92.4%	3328.4	3202.3	92.4%	3328.4	2795.2	91.7%	3303.1	3133.8	92.0%	3314.0	2082.0
TOTAL (EU)	62822.3		54876.7 (87.4%)	50818.4 (80.9%)		55793.5 (88.8%)	42399.1 (67.5%)		54291.0 (86.4%)	50055.3 (79.7%)		57185.3 (91.0%)	25037.6 (39.9%)

A.2.3. Minimum Wage regulations

Table A.2.15: MW regulations: effectiveness scores calculated through the DEA analysis

	Share of low-wage earners (gross)	In-work at-risk-of-poverty rate (gross)	Gini (gross)
BE	1	0.99	0.973
BG	0.898	0.949	0.838
HR	0.891	0.978	0.919
CZ	1	1	1
EE	0.887	0.946	0.895
FR	1	0.962	0.926
DE	0.879	0.951	0.928
GR	0.9	0.904	0.876
HU	0.922	0.961	0.957
IE	0.871	0.986	0.924
LV	0.813	0.946	0.85
LT	0.82	0.944	0.847
LU	0.954	0.926	0.93
MT	0.913	0.979	0.949
NL	0.9	0.984	0.97
PL	0.837	0.929	0.92
PT	0.97	0.931	0.871
RO	0.877	0.852	0.864
SK	0.941	0.978	1
SI	0.896	0.977	1
ES	1	0.914	0.877

Table A.2.16 Minimum Wage regulations: effectiveness scores calculated through the DEA, 2009-2011

	Share of low-wage earners (gross)	Share of low-wage earners (net)	In-work at-risk-of-poverty rate (gross)	In-work at-risk-of-poverty rate (net)	Gini (gross)	Gini (net)
BE	1	0.996	0.992	1	0.963	0.964
BG	0.909	0.892	0.957	0.961	0.878	0.875
HR	0.903	0.894	0.971	0.975	0.91	0.908
CZ	1	0.938	1	0.984	1	0.966
EE	0.891	0.873	0.96	0.96	0.911	0.903
FR	1	1	0.966	0.974	0.912	0.912
DE						
GR	0.97	0.971	0.901	0.909	0.873	0.873
HU	0.91	0.906	0.976	0.982	0.988	0.988
IE	0.862	0.863	0.981	0.989	0.922	0.924
LV	0.79	0.791	0.936	0.943	0.838	0.84
LT	0.797	0.799	0.926	0.933	0.852	0.853
LU	0.927	0.926	0.932	0.94	0.939	0.939
MT	0.878	0.878	0.978	0.986	0.944	0.944
NL	0.885	0.883	0.984	0.992	0.967	0.969
PL	0.836	0.837	0.922	0.929	0.905	0.907
PT	0.913	0.914	0.933	0.94	0.861	0.863
RO	1	0.952	0.85	0.841	0.882	0.863
SK	0.936	0.924	0.978	0.983	0.989	0.986
SI	0.882	0.882	0.982	0.99	1	1
ES	1	0.976	0.922	0.92	0.885	0.877

Table A.2.17 MW regulations: effectiveness scores calculated through the DEA, 2012-2019

	Share of low-wage earners (gross)	Share of low-wage earners (net)	In-work at-risk-of-poverty rate (gross)	In-work at-risk-of-poverty rate (net)	Gini (gross)	Gini (net)
BE						
BG	0.901	0.903	0.946	0.958	0.821	0.818
HR	0.893	0.894	0.98	0.991	0.917	0.912
CZ	1	0.944	1	0.994	1	0.937
EE	0.89	0.881	0.941	0.947	0.886	0.867
FR	0.992	0.993	0.96	0.973	0.927	0.931
DE	0.89	0.887	0.946	0.957	0.922	0.918
GR	0.867	0.87	0.905	0.918	0.872	0.876
HU	0.939	0.943	0.955	0.967	0.943	0.946
IE	0.882	0.886	0.987	1	0.92	0.921
LV	0.833	0.837	0.95	0.963	0.851	0.852
LT	0.841	0.844	0.951	0.964	0.843	0.846
LU	0.96	0.96	0.923	0.936	0.922	0.926
MT	0.942	0.947	0.979	0.992	0.944	0.947
NL	0.912	0.917	0.984	0.997	0.965	0.966
PL	0.848	0.851	0.932	0.944	0.922	0.925
PT	1	1	0.93	0.943	0.872	0.875
RO	0.877	0.878	0.853	0.863	0.855	0.849
SK	0.947	0.934	0.979	0.987	1	0.982
SI	0.897	0.898	0.975	0.988	0.996	1
ES	1	0.965	0.911	0.912	0.872	0.841

Table A.2.18: MW regulations: calculation of "gross" DEA scores under constant-returns-to-scale (CRS), variable-returns-to-scale (VRS) and scale effectiveness (SE)

	Share of low-wage earners (gross)			In-work at-risk-of-poverty rate (gross)			Gini (gross)		
	CRS	VRS	SE	CRS	VRS	SE	CRS	VRS	SE
BE	0.863	1.000	0.863	0.765	0.990	0.773	0.759	0.973	0.780
BG	0.834	0.898	0.929	0.817	0.949	0.861	0.727	0.838	0.868
HR	0.825	0.891	0.926	0.851	0.978	0.870	0.805	0.919	0.876
CZ	0.999	1.000	0.999	1.000	1.000	1.000	1.000	1.000	1.000
EE	0.854	0.887	0.963	0.882	0.946	0.932	0.838	0.895	0.936
FR	0.811	1.000	0.811	0.696	0.962	0.723	0.678	0.926	0.732
DE	0.809	0.879	0.920	0.799	0.951	0.840	0.786	0.928	0.847
GR	0.793	0.900	0.881	0.657	0.904	0.727	0.643	0.876	0.734
HU	0.815	0.922	0.884	0.767	0.961	0.798	0.771	0.957	0.806
IE	0.766	0.871	0.879	0.785	0.986	0.796	0.743	0.924	0.804
LV	0.708	0.813	0.871	0.745	0.946	0.788	0.675	0.850	0.794
LT	0.708	0.820	0.863	0.726	0.944	0.769	0.657	0.847	0.776
LU	0.788	0.954	0.826	0.684	0.926	0.739	0.694	0.930	0.746
MT	0.790	0.913	0.865	0.748	0.979	0.764	0.732	0.949	0.771
NL	0.788	0.900	0.876	0.782	0.984	0.795	0.778	0.970	0.802
PL	0.727	0.837	0.869	0.723	0.929	0.778	0.722	0.920	0.785
PT	0.819	0.970	0.844	0.709	0.931	0.762	0.671	0.871	0.770
RO	0.836	0.877	0.953	0.761	0.852	0.893	0.777	0.864	0.899
SK	0.905	0.941	0.962	0.891	0.978	0.911	0.916	1.000	0.916
SI	0.698	0.896	0.779	0.686	0.977	0.702	0.710	1.000	0.710
ES	1.000	1.000	1.000	0.876	0.914	0.958	0.843	0.877	0.961

Table A.2.19: MW regulations: calculation of the waste rate under CRS, including share due to scale effectiveness (SE).

	Outcome level (low-wage earners)	TE Ineff.	TE Waste (workers)	*Of which: due to SE*	Low earnings threshold minus statutory MW (Euros per month)	Waste (Euro)	*Of which: due to SE*
BE	308	13.7%	42	42	176.0	89.0	89.0
BG	531	16.6%	88	34	47.0	49.8	19.2
HR	278	17.5%	49	18	102.4	59.7	22.5
CZ	764	0.1%	1	1	160.7	1.5	1.5
EE	126	14.6%	18	4	121.5	26.8	6.1
FR	1,933	18.9%	365	365	72.1	316.0	316.0
DE	8,390	19.1%	1,602	587	353.3	6793.0	2489.6
GR	560	20.7%	116	60	115.0	160.1	82.8
HU	642	18.5%	119	69	55.6	79.2	45.8
IE	346	23.4%	81	36	230.0	223.4	100.3
LV	198	29.2%	58	21	45.6	31.7	11.4
LT	287	29.2%	84	32	36.7	36.8	14.1
LU	46	21.2%	10	8	131.0	15.2	11.9
MT	28	21.0%	6	3	87.6	6.1	3.6
NL	1,341	21.2%	284	150	218.3	744.6	393.4
PL	2,892	27.3%	790	318	52.5	497.0	200.2
PT	426	18.1%	77	64	56.4	52.2	43.5
RO	1,441	16.4%	236	59	75.3	213.5	53.4
SK	350	9.5%	33	13	121.3	48.5	18.4
SI	136	30.2%	41	27	6.2	3.1	2.0
ES	2,362	0.0%	0	0	310.7	0.0	0.0
TOTAL	23,385		4,101 (17.5%)	1,912 (8.2%)		9447.2	3924.5

Low-wage earners are expressed in thousand levels. Low earnings threshold minus statutory MW is in euros per month. Waste in monetary terms is in million euro per year. TE is technical effectiveness. SE is scale effectiveness.

This study analyses the potential European Union (EU) added value (or untapped cost of non-Europe) in certain areas of social and labour policy: short-time work schemes, anti-poverty and inequality-reduction measures, and minimum wage regulations. The three areas are closely interlinked, and the study shows the potential relevance of EU action in addressing the main existing challenges. The quantitative analysis uses the 'budgetary waste rate' approach to measure the potential efficiency gains in the selected areas. Finally, the study discusses the channels that could allow the EU to support these gains and improve social outcomes.

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