

Bermudez, Natalia; Dejemeppe, Muriel; Tarullo, Giulia

Working Paper

Theory and Empirics of Short-Time Work: A Review

GLO Discussion Paper, No. 1348

Provided in Cooperation with:

Global Labor Organization (GLO)

Suggested Citation: Bermudez, Natalia; Dejemeppe, Muriel; Tarullo, Giulia (2023) : Theory and Empirics of Short-Time Work: A Review, GLO Discussion Paper, No. 1348, Global Labor Organization (GLO), Essen

This Version is available at:

<https://hdl.handle.net/10419/279649>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

Theory and Empirics of Short-Time Work: A Review

November 7th, 2023

Natalia Bermudez[‡], Muriel Dejemeppe[†] and Giulia Tarullo^{‡ §}

Abstract

Following massive take-up rates during the COVID-19 period, short-time work (STW) policies have attracted renewed interest. In this paper, we take stock of this policy instrument and provide a critical review of STW systems in Europe. We focus on the objectives of STW programs and their primary characteristics, as well as the inefficiencies associated with these policies, such as excessive use and slower worker reallocation. Additionally, we take a stroll through the main contributions of STW impact evaluations. Finally, we identify relevant directions for the refinement of the main design features of the scheme, key lessons, and avenues for future research.

Keywords: Short-time work; labor hoarding; employment; firm survival; unemployment insurance.

JEL Codes: E24, J22, J23, J63, J65.

[†] IRES/LIDAM/UCLouvain, Belgium. GLO, Essen, Germany. *Corresponding author:* muriel.dejemeppe@uclouvain.be

[‡] Department of Economics, Ghent University, Belgium. IRES/LIDAM/UCLouvain, Belgium.

[§] Funding information: We acknowledge funding from the Belgian Federal Administration Science Policy within the program “BRAIN-be 2.0 (2020-2025)” (contract No. B2/202/P3) and from the Research Foundation – Flanders (FWO) (FWO project number: G010421N). Giulia Tarullo also acknowledges funding from UCLouvain-FSR. We are especially thankful to Bart Cockx for very useful discussions and substantial support on the draft, as well as to Bruno Van der Linden for providing valuable and detailed comments.

1. Introduction

Short-time work (STW) is a government program that subsidizes temporary reductions in employee working hours in response to temporary shocks.¹ Unlike traditional unemployment insurance systems, STW is aimed at maintaining the employment relationship between employers and workers, thus avoiding excessive layoffs. By preventing the destruction of the job relationship, also called the job match, STW not only protects eligible firms and workers from the risk of layoff and its negative side effects but also brings social benefits to the aggregate economy.

After gaining notoriety during the Great Recession, STW received renewed attention during the global COVID-19 crisis, a period that revealed the highest uptake of STW programs in the history of many European countries. In April 2020, Germany, Italy, France, and Belgium had approximately 15%, 30%, 35%, and 30% of their salaried employment enrolled in STW schemes, respectively (Hijzen and Salvatori, 2022). The COVID-19 pandemic exposed firms and individuals to large unexpected drops in product and labor demand, induced by mandated activity reduction. The risk of high unemployment rates resulting from lockdown measures across countries, along with the risk of firms losing valuable human capital and being forced into bankruptcy with viable jobs, triggered the need for governments to invest massively in STW schemes.

Among its social benefits, STW enables employers to cope with temporary drops in demand or production by allowing the reduction of employee working hours, protecting them against the high costs of job separation (e.g., severance payment, loss of specific human capital, future hiring and training costs) and the risk of bankruptcy. Moreover, it allows workers to be compensated for the loss of income caused by reductions in activity and protects them against the scarring effects of unemployment, which are likely to result in negative welfare consequences. Furthermore, STW reduces the pool of unemployed workers, thus alleviating the fiscal burden on unemployment insurance systems (UI), which can be particularly large during recessions. In addition, STW programs play a crucial role in stabilizing aggregate demand by preventing excessive layoffs and firm bankruptcies (Dengler and Gehrke, 2021). Lastly, STW has the potential to mitigate income inequalities (Christl, De Poli, Hufkens, Peichl, and Ricci, 2022). This effect is particularly pronounced during aggregate economic shocks, where lower-income workers are likely to be the most negatively affected.

Although STW has an important value to society, it entails social costs that are the result of country-specific design features, as well as the distortive behavior of firms using these programs.

¹ These programs are also known as short-time *compensation* schemes, to emphasize that the scheme consists of a (partial) compensation to workers' earnings in the event of a temporary reduction in working hours. In some European countries, such as Belgium, France, and The Netherlands, STW schemes are also known as "temporary unemployment" or "partial unemployment". These programs should not be confused with temporary layoffs, which are common in the United States and Canada and allow the employer to temporarily suspend the employment relationship. In principle, temporary layoff policies enable dismissed workers to be rehired by their original employers (Fieldstein, 1976). Temporary layoffs are distinct from STW schemes since the latter maintains the employment relationship unchanged. In addition, STW programs are distinct from furlough schemes, such as the one used in the United Kingdom, which allow for a total suspension of activity without damaging the employment relationship. While STW schemes may in some cases allow for a complete suspension of activity, they differ from furloughs in their ability to accommodate partial reductions in activity while maintaining the employment relationship.

For example, STW can protect job matches that would remain viable even in the absence of the program. In this case, the use of STW results in deadweight losses. Moreover, these programs can protect jobs that are unviable in the long run (regardless of any shock), harming the efficient reallocation of workers toward more productive firms (and sectors). This results in displacement effects in the medium-to-long run. Likewise, firms can engage in distortive behaviors that affect the social cost of STW policies. These behaviors include, for instance, the manipulation of firm information to qualify for an STW program, excessive working-time reductions even if the firm does not encounter financial distress, or not implementing any reductions in working hours, despite being enrolled in a program.

The high level of uncertainty surrounding the COVID-19 crisis has raised some concern in the public policy debate regarding the duration of several generous STW schemes in Europe. This concern stems from the considerable government expenditure entailed by these programs and their alleged contribution toward labor shortages in certain sectors. Consequently, the policies' underlying principles have become the subject of vigorous debate, particularly in relation to the required policy adjustments needed to navigate the recovery phase.

In this paper, we take stock of this policy instrument and provide a critical review of STW in Europe, focusing on countries such as Belgium, France, Germany, and Italy that share rather similar characteristics in terms of labor market institutions. More specifically, these countries are characterized by rigid wages and hours of work, as well as stringent employment protection regulations.² They also have long-standing STW schemes that also operate during normal times and the eligibility conditions of which are often relaxed in the face of unexpectedly large aggregate shocks.

The structure of the paper is as follows. Section 2 pinpoints the main objectives and general characteristics of STW programs, with a special focus on the insurance value of such policies. We summarize the main design features of different STW programs in Europe to understand commonalities across countries. This is crucial to understand the mechanisms by which STW acts as an insurance device for firms and workers during recessions. In Section 3, we then summarize the main lessons learnt from recent robust impact evaluations of the effects of STW on firm and worker outcomes during the Great Recession. We focus on differences in dynamic effects as well as heterogeneous effects, both derived from differences in economic shocks and the types of firms treated by the programs. Section 4 analyzes recent theoretical and empirical contributions to provide an overview of the conditions that determine the efficiency of an STW policy (e.g., preserving the maximum number of jobs at a given cost). This will allow us to provide a critical summary of design refinements necessary to improve STW effectiveness in Section 5. Section 6 concludes with a summary of the main lessons of the review for policy guidance.

² According to OECD Employment Protection statistics, these countries are above the OECD average in terms of the strictness of the employment protection index for individual and collective dismissals in regular contracts (OECD, 2021).

2. Insurance value of STW programs

In this section, we outline the goals of STW systems, which are to enable labor hoarding and limit the destruction of job relationships during temporary economic shocks.³ As maintaining job relationships is valuable to firms, workers, and the economy as a whole, we summarize the reasons behind the social desirability of STW programs. We then define the primary characteristics of STW programs, that is, the extent of government financial support and the transitory and expedient nature of program implementation. Because these policies entail social costs as well, these characteristics guarantee that benefits are attained at the lowest possible social costs and increase the *net* social value of STW.

The take-up of STW policies is allowed for contingencies other than aggregate economic crises, such as weather shocks and seasonal fluctuations in sales or profits related to the economic activity of particular industries. In this article, the focus is on policy uptake during temporary economic downturns, when uptake is higher and the social value of the effects of STW on employment and firm survival are more salient.

2.1. Worker, firm, and social value of STW

By preventing the destruction of the job relationship, or job match, STW protects eligible firms and workers from the risk of layoff and its negative side effects. In addition to this, the provision of STW provides benefits to the aggregate economy as well. Below, we in turn discuss the value of STW insurance to firms and workers and to society as a whole.

When exposed to a temporary economic shock, firms face a trade-off between optimizing labor force requirements in the long run – retaining more workers than technically needed in the downturn – and avoiding a cash-flow shortage in the short run due to ongoing labor expenses for the retained workforce. Short-term financial frictions such as limited cash flow and the exacerbation of financial market imperfections during economic shocks impact the capacity to engage in labor hoarding during a temporary crisis and lead to job destruction (Giroud and Mueller, 2017). The likelihood of firm solvency and survival during a slump is also lowered. STW enables labor hoarding, therefore insuring firms against the costs of job separation: the loss of firm-specific and sponsored human capital and future hiring and training costs, among other frictions in the recruitment process. For all these reasons, subsidizing labor hoarding is particularly valuable for firms that – even if profitable and solvent before the economic shock – experience low liquidity levels during the downturn (Giupponi and Landais, 2023). These are the main targets of STW programs.

On the other hand, the value of STW insurance for workers can be decomposed into a *monetary* component and a component of *insurance* against the effects of unemployment. First, on top of the normal wage for hours worked, workers receive government subsidies – sometimes

³ STW's origins lie in work-sharing initiatives, both industry-led and government-led, that arose in Europe and North America during the Great Depression. In the late 1940s, a few European countries (e.g., Belgium, France, Germany, and Italy) had already implemented STW programs to absorb temporary shocks.

supplemented by the firm – for hours not worked.⁴ Thus, by preserving the job match, STW insures workers against the loss of firm-specific human capital, deteriorated earnings (Schmidler, Von Wachter, and Blender, 2013), and declining employment prospects following the unemployment spell.⁵ Earnings losses from unemployment can be decomposed into 1) the mechanical fall in earnings upon entering unemployment and 2) the loss in earnings because of unemployment scars. The latter effect materializes because a prolonged unemployment spell reduces a worker's employment probability, and therefore earnings, and because, conditional on finding a job, the worker risks moving from a high- to low-paying firm. The insurance value of STW to workers stems from preventing these losses. Since unemployment scars have a long-lasting negative impact on a worker's trajectory during a recession (relative to non-recessionary times), this raises even further the insurance value from STW for workers.

The value that STW brings to society is twofold. First, by reducing layoffs STW dampens the number of workers claiming unemployment benefits and assistance, and as a consequence, the fiscal costs of unemployment insurance (UI). As discussed above, these costs rise during economic shocks because unemployed individuals face a lower probability of finding a job. UI fiscal savings from STW take-up therefore go up during crises. Second, by lowering the risk of job loss for workers and mitigating the loss in income, STW indirectly stabilizes aggregate demand during recessions. Faced with the risk of unemployment and borrowing constraints, workers might self-insure against the economic shock by reducing consumption and increasing precautionary savings. Lower consumption demand, however, diminishes production and prompts even more layoffs, resulting in a contractionary deflationary spiral. STW dampens the amplification channel of precautionary savings. Dengler and Gehrke (2021) underline that workers internalize that they might be placed on STW instead of being dismissed, which provides them with a (relatively) higher and lessens the precautionary saving motive. The importance of STW as an automatic stabilizer is further based on its ability to alleviate the effects of economic shocks on income inequality (Christl et al., 2022). An economic crisis is a regressive phenomenon since lower-income households are often the most affected. The decline in disposable earnings is mitigated by STW, which alleviates the expected effects of an economic crisis on inequality by liquidity-constrained households, which are more prevalent in the lower part of the income distribution. This can also be seen as an additional mechanism through which STW stabilizes consumption and aggregate demand.

2.2. Key characteristics of STW programs

STW programs are based on three primary principles, each targeted at lowering the program's societal costs in order to maximize the net benefits from the provision of STW insurance. STW program designs are thus built around features that serve to uphold these principles. In this section, we first assess these principles. We then provide examples of design features of STW schemes in Belgium, France, Germany, and Italy, and COVID-19 policy changes that were implemented in

⁴ The worker receives STW allowances, which are computed as a rate of the wage for the hours not worked. The rate of the wage that determines the STW allowance is referred to as the *replacement rate*.

⁵ Beyond the consequences on future earnings and employment, there are other scars from unemployment, including negative health outcomes and undesirable psychological effects such as the loss of collective purpose, structure, goals, and physical security (Drydakis, 2021).

response due to the particular nature of this economic shock. A review of STW social costs that result from program inefficiencies follows in Section 4.

2.2.1. Government subsidization

Governments subsidize STW by paying out an allowance to workers for the hours not worked. Nonetheless, firms still pay some costs for STW. This occurs if firms contribute, along with the government, to financing the worker's STW allowance. In addition, unions often negotiate with firms to complement the allowance paid by the state. Below, we examine the rationale behind firms bearing a portion of the STW costs.

While governments contribute to lowering the financial burden of labor hoarding for short-term liquidity-constrained firms, firms are nevertheless accountable for a portion of STW subsidies, in order to prevent them from relying excessively on subsidized hour reductions (Burdett and Wright, 1989).⁶ In Section 4, we discuss how one of the societal costs associated with STW insurance explicitly derives from the potential to support excessive reductions in working hours. Therefore, partial government subsidization seeks to directly address this issue.⁷

Table A.1. in the Appendix presents the design features of STW systems in Belgium, France, Germany, and Italy. Design features regarding firm costs for hours not worked (see Table A.1, design feature: *cost sharing*) confirm that governments contribute only partially to the costs of STW, the remaining part being covered by firms. Thus, in all of these countries firms using the STW system pay a share of STW subsidies, as well as social security contributions for the hours not worked by their employees.⁸ Additionally, in Belgium and Italy firms top up STW subsidies either voluntarily or in accordance with a collective labor agreement (CLA). In these two countries, firm contributions are also experience-rated: the share of costs paid by firms increases according to the intensity or duration of STW uptake by a firm.⁹

However, firms in the selected countries bore little-to-no costs of STW during the COVID-19 period. This policy change was in line with the objective of further lowering the financial burden for the selection of firms insured by the program. The methods of lowering the STW costs borne by firms were slightly different across countries. Firm contributions were completely eradicated in Belgium, France, and Italy. In Germany, government-reimbursed social security contributions paid by firms for the hours not worked, typically at 50%, were increased to 100%. Moreover, firms in Belgium and Italy were exempted from experience-rated contributions during this period.

⁶ Firms typically bear lower STW costs during unanticipated aggregate shocks because the degree of limited access and imperfections in the financial markets is higher, emphasizing the need for government financial support.

⁷ Cahuc and Nevoux (2018) point out that the costs of STW usage by enterprises should be lower than the costs of the UI system, which are essentially the costs connected with firing regulations. In fact, businesses may prefer to fire employees if this is less expensive than insuring them through STW.

⁸ In addition, social security contributions by firms in Belgium also add up to a global funding for STW financing, regardless of whether the firm effectively benefits from STW.

⁹ The experience-rating systems differ across the two countries. In Belgium, experience rating taxes businesses based on the intensity of STW support for the individual worker. In Italy, the share of costs paid by the firm is based on the duration of STW use by the firm.

2.2.2. *Temporary: setting (and lengthening) program duration*

There are three main reasons to limit the duration of STW use. First, STW subsidizes labor hoarding, which is itself a temporary phenomenon. The firm temporarily keeps its workers during the downturn because it expects no long-term alteration of their productivity in the existing job and anticipates the future profitability of the job match when business conditions improve (Cahuc, Carcillo, and Zylberberg, 2014). Second, by limiting the duration of STW support, insured workers have fewer incentives to quit their jobs. This is because the STW allowance only partially covers income loss, such that the prolonged use of STW could induce liquidity constraints. Workers then prefer to sever the employment relationship and search for another job in less affected firms or sectors. Finally, restricting program duration also reduces the potential negative impact on reallocation from prolonged STW use, which is among the societal costs of the program discussed in Section 4.

Nonetheless, economic theory justifies modulating the duration of STW insurance for firms if the economic shock lasts longer than expected (Balleer, Gehrke, Hochmuth, & Merkl, 2020) as was the case for the COVID-19 crisis. The rationale is that to retain their workforce, firms must expect to be insured by STW for the full period in which economic activity drops, instead of a predetermined maximum period set regardless of the duration of the economic slump.

In Table A.1., we show working-time arrangements related to the duration of STW programs. These are a set of rules that establish the maximum duration a firm can make use of STW, as well as the minimum reduction in working time per worker necessary to take up the program. The maximum duration is often modulated based on the intensity of program uptake. In practice, in all four selected countries firms are not allowed to use STW beyond a maximum duration. In Belgium and France, this maximum decreases with the extent of activity reduction – it is shorter if workers stop all activity and longer if they still work part-time. In Germany, the maximum decreases with the share of the workforce of the firm enrolled in STW. Furthermore, experience-rated employer contributions can also discourage prolonged take-up.

During the COVID-19 crisis, all the examined countries extended this maximum duration to assure firms about the provision of STW throughout the pandemic. Belgium and France even adopted new regimes in which the duration was provisionally defined by a calendar date that was extended depending on morbidity indicators (e.g., Belgium's *Force Majeure Corona* and France's *Activité Partielle de Longue Durée* (APLD)). As discussed above, Belgium and Italy, the only countries with experience rating (ER) in STW, temporarily suspended this component of cost-sharing between firms and governments during the COVID-19 crisis.

2.2.3. *Expediency to alleviate financial hardship for firms and workers*

STW is as an expedient policy tool that promptly provides support to firms and workers during an economic shock. The streamlined process of application, approval, and payment, as well as avoiding delays in carrying out these operations, ensures the timely reduction of labor costs for firms and payment of allowances to workers. Alternative tools dealing with liquidity crunches by

firms (temporary loans, for example) are often not a good option because they involve longer administrative procedures and delivery times (Boeri and Cahuc, 2023).

Expediency is essential to guarantee that STW effectively prevents job losses. From the firm standpoint, firms suffering from a liquidity crunch may not be able to save jobs if they do not receive immediate support. From the worker perspective, delays in the payment of STW benefits reduce the capacity of STW to ease a household's financial distress. Therefore, lack of expediency increases the likelihood that workers voluntarily quit the program and search for other employment opportunities, a mechanism discussed above.

We characterize the expediency of STW programs in the four countries by analyzing the perceived administrative burden by firms, proxied by the strictness of rules for the approval of STW applications. All of these countries had strict eligibility rules for firms before the pandemic, in addition to the standard requirement that the economic shock experienced is of a cyclical – and not structural – nature. For all of them, proof of the reduction in output and/or revenues is required, along with the explicit agreement between companies and social partners. For instance, STW access in Italy is restricted to companies with specific industry codes and a particular size; in Germany, access is only granted to firms with 30% of workers suffering at least a ten percent reduction in income; in Belgium, stricter rules regulate the enrollment of white-collar workers relative to the rules for blue-collar workers.

However, all countries lifted or weakened STW eligibility rules to ensure timely support during the bulk of the pandemic. In Italy, firms of any industry and size could access STW; in Germany, 10% of the workforce was enough for a firm to qualify for access to the program; the *Force Majeure Corona* scheme in Belgium relaxed application rules for all workers. In addition, applications could be made retroactively for previous months. This administrative simplification, previously unavailable, was introduced because lockdown measures were deployed with little-to-no notice. However, while offering firms maximum flexibility in hours reduction, this extension in design generated worries that firms could employ STW without implementing any actual reduction in hours. In fact, as will be emphasized in Section 5, controls through the social security administration are hardly in place for STW use declared only ex-post (Boeri and Cahuc, 2023).

2.3. Rationale for STW inclusion in the social insurance system

There are several arguments why, in the absence of STW, dismissals can be inefficiently high during an economic shock (Cahuc and Carcillo, 2011). Firms might react to an unanticipated shock in sales and profits by changing their output price or production costs. If the emphasis is on lowering labor costs, firms either cut the wage bill or trim labor inputs at the extensive or intensive margin, more specifically employment and hours per employee. Nevertheless, since the hypothetical size of the pay cut needed to avoid a layoff is often high, risks harming morale, and incentivizes quits, most firms do not view pay cuts as a viable alternative to layoffs.¹⁰ Furthermore,

¹⁰ Using innovative survey data, Bertheau et al. (2022) show that most firms in Denmark did not implement pay cuts instead of layoffs during COVID-19, for fear of harming worker morale. This topic was further investigated by Davis and Krolkowski (2023) in the US. Also relying on rich survey data, these authors document that pay cuts would be accepted by workers if they prevent layoffs and that it is a lack of employer-worker communication regarding pay cuts that limits pay-cut initiatives.

the current structure of UI programs gives firms little incentive to internalize the social costs of their layoffs and induces excessive job separations. In fact, unemployment benefits are funded through payroll taxes and specific layoff taxes, namely severance payments. These taxes are insufficiently low or do not set up the right incentives. On the one hand, payroll taxes raise labor costs and provide enterprises with incentives to lay off workers during downturns (Blanchard and Tirole, 2008). On the other hand, severance payments do not fully cover the social costs of layoffs.

On the contrary, ER is a policy instrument that modulates the size of social insurance premia paid by firms to their adoption of the social insurance policy, in this case, UI. ER provides firms with incentives to reduce excessive layoffs (Blanchard and Tirole, 2008; Cahuc and Malherbet, 2004; Feldstein, 1976). Firms are expected to take into account – *internalize* – the costs of the dismissals imposed on society, such as the rise in government expenditure on unemployment benefits and transfers, the lowering in taxes and social security contributions, and the scarring effects of unemployment on laid-off employees (Boeri and Cahuc, 2023). Full ER can eliminate excessive layoffs. This happens when firms pay contributions that are equal to the costs that these layoffs induce on society. However, full ER is not optimal during an economic crisis because firms might face financial constraints, such as limited access to financial markets, and may go bankrupt if they have to cover the costs of their layoffs. For these reasons, the UI system is affected by excessive layoffs and the margin of flexibility entailed by STW is warranted.

The regulations and the institutional setting of the labor market also impact firm choices regarding the type of adjustment. Specifically, rigid labor market institutions (LMIs), in the form of a high coverage of collective agreements and lack of external flexibility (ease of dismissals), are prime explanatory causes of the extensive STW use in European social insurance programs (Biancardi, Lucifora, and Origo, 2022; Lydon, Mathä, and Millard, 2019). For this reason, in Appendix A.1 we discuss which LMIs make the adoption of STW more likely from a theoretical perspective.¹¹

3. Effects of STW on firm and worker outcomes

In this section, we present a critical review of the main findings from recent causal impact evaluations on the effects of STW use on firm and worker outcomes. From the firm perspective, it is important to understand how these policies are effective in terms of labor hoarding, particularly for firms with liquidity constraints, and thus beneficial to firm survival. Moreover, because STW protects firms' accumulated human capital, it may indirectly impact future investment decisions, both in terms of human and physical capital. All of these decisions may have short- and long-term impacts on firm profitability and productivity. From the workers' perspective, STW intends to insure workers i) against the income loss induced by the reduction in working hours and ii) the negative scarring effects of unemployment. It is therefore also crucial to evaluate the impact of STW policies on worker outcomes, such as hours worked, earnings, and the probability of sustained employment perspectives after STW take-up.

¹¹ These LMIs might have led to a lower take-up during the COVID-19 crisis, when STW use was essentially influenced by the severity of the health and economic situation (OECD, 2021).

3.1. Effects of STW on the economic behavior of firms

In this section, we discuss the main findings of STW on firm outcomes, with a special focus on European countries. These outcomes encompass employment decisions and firm survival probability, as well as economic indicators such as firm productivity and profitability. The findings are contingent upon the program design, such as its targeting features, and the nature of shocks experienced by firms. Specifically, we examine short- (during STW treatment) and long-run (post-treatment) effects to identify notable differences. Furthermore, we summarize heterogeneous effects according to firm characteristics such as liquidity and productivity levels before take-up.

Notably, a majority of studies have demonstrated that by reducing working hours per worker, STW schemes have a substantial positive impact on job preservation in the short run. This means that in the absence of STW programs, layoffs would have occurred. The positive effect of STW on employment seems to be sustained in the medium-to-long run, but only for a subset of firms. STW programs save jobs only for firms facing significant yet temporary shocks, whereas STW use in firms affected by smaller or persistent shocks may lead to deadweight losses (i.e., protecting jobs that would have survived the downturn without any STW subsidies) and displacement effects (i.e., protecting jobs that are not viable in the absence of STW), as discussed in Section 4.

3.1.1. Employment decisions

The empirical evidence on the effects of STW take-up on labor demand decisions falls into two categories. On the one hand, macro-econometric evaluations have generally identified positive effects on employment. While these are limited in their ability to identify causal effects, they allow examining aggregate patterns of employment and unemployment across countries (Boeri and Bruecker, 2011; Cahuc and Carcillo, 2011; Hijzen and Venn, 2011; Hijzen and Martin, 2013; Brey and Hertweck, 2020) and within countries (Gehrke and Hochmuth, 2021). In some instances, they also consider the indirect stabilizing effects of aggregate demand that STW programs generate (Gehrke and Dengler, 2022).¹² Micro-econometric evaluations, on the other hand, aim to identify causal effects by using firm-level data and focusing on within-country variation in a fixed institutional setting. However, much is still unknown about the effectiveness of STW on employment (Cahuc, 2019), and the results of microeconomic evaluations are mixed and heavily dependent on the method used to identify causal effects (Balleer et al., 2016; Bellmann and Gerner, 2011; Calavrezo, Duhautois, and Walkowiak, 2010; Tilly and Niedermayer, 2017; Tracey and Polachek, 2020).

It is well documented that firms that use STW differ in observable and unobservable characteristics from non-users, and this is one important challenge of micro-econometric evaluations. Hence, to determine the causal effects of STW, it is essential to construct an appropriate counterfactual that accounts for these differences. Furthermore, a number of studies that have used instrumental variables to control for the endogeneity of STW take-up are highly dependent on the validity of the exclusion restriction, which can be a source of contention.

In this section, we discuss robust empirical evidence on average and dynamic employment effects. In particular, we focus on how these effects can vary based on different dimensions, including

¹² For further details, see Section 2.1.

country-specific design, the types of economic shocks experienced by firms, and firm characteristics (e.g., liquidity and pre-shock productivity levels). The underlying mechanisms behind the short- and long-run STW employment effects are as follows. Firms respond to temporary productivity shocks by adjusting labor demand at the intensive margin through STW. Employers decide how many workers to put in STW and how many hours to furlough for each worker. In the short run, we expect STW to decrease the volume of work per employee but increase headcount employment compared to the scenario without the program, where these employees would be laid off. The net effect, captured by the total volume of work per firm, is expected to be greater than zero if the reduction in hours per employee translates into job savings (Cahuc et al., 2021). Dynamic effects on headcount employment for these firms are expected to remain positive in the medium-to-long run, but the effect on the volume of work per employee is expected to decrease as firms use the scheme temporarily. Therefore, the positive net effect on the total volume of work per firm is expected to increase in the medium-to-long run (Cahuc et al., 2021). Together, these mechanisms align with the objectives of STW programs.

However, for firms that in the counterfactual scenario i) would not have laid off workers or ii) would have laid off workers in the long run even in the absence of STW, we expect a reduction in working time with no positive effect on headcount employment. The former results in deadweight losses in the short run, while the latter leads to displacement effects in the medium-to-long run because STW preserves job matches that are not viable without a subsidy, hindering labor mobility and skill development.

A recent set of micro-econometric evaluations has reached robust conclusions (see Table A.2 in the Appendix for a summary of these studies). As STW consists of a working-time reduction scheme, it is not surprising that in the short run, STW reduces employment per worker at the intensive margin (e.g., hours per worker) (Cahuc, Kramarz, and Nevoux, 2021; Giupponi and Landais, 2023). However, the average effect of STW at the extensive margin (e.g., number of jobs) is less clear in the short run because STW subsidies may be paid for jobs that employers would have retained anyway. Cahuc et al. (2021), who evaluate the STW scheme in France during the Great Recession using single establishments with more than four employees and an instrumental variable (IV) approach, document a drop in hours per worker (−28%) but no employment gains in either the short run (i.e., in 2009) or the medium run (i.e., in 2011) for the average firm. However, they find positive short- and medium-run headcount employment gains (42% and 69%, respectively) for firms that suffer large shocks in demand, suggesting that average effects are masked by significant heterogeneity in the types of firms screened by the program. For this group of firms, they even show a net positive effect on total hours worked by firms that increases in magnitude in the medium run (34% in the short run versus 67% in the medium run).

On the other hand, Giupponi and Landais (2023) find short-run employment effects for the average firm with between 15 and 25 full-time equivalents (FTEs) during the 2005–2014 period in the Italian STW program. By using an IV approach that exploits the quasi-exogenous variation in eligibility rules across firms, they provide evidence that, on average, firms reduced the number of hours worked per employee by 40% during the 2009–2014 period, which aligns with the use of STW during these years. This reduction in working time per worker came with an increase of around the same magnitude (45%) in headcount employment relative to non-treated firms during

the 2009–2014 period. Interestingly, the results suggest that the effects occur in the year of treatment but dissipate rapidly in subsequent years. Therefore, there is no evidence of long-run effects of the program. In Italy, the STW program targets a broad range of firms, including those undergoing bankruptcy procedures, restructuring, reorganization, or severe demand shocks, which makes the program more prone to displacement effects. Moreover, the shock during the Great Recession was more persistent in Italy than in other European countries. In Italy, STW only offered short-run insurance to workers in firms exposed to the shock and had no effect in the medium run because a large group of treated firms could not maintain employment during the prolonged crisis.

Kopp and Siegenthaler (2021) investigate the impact of STW on employment growth during the Great Recession in Switzerland using an event study difference-in-difference (DID) analysis. They compare changes in the outcomes of successful and unsuccessful applicants and investigate average and dynamic effects around the event of application to the program. They find that, on average, STW not only increased FTE employment in the short run, but also in the long run (4.5 years after application to the program), by 9%–17%. Furthermore, they evaluate the effect on the net share of dismissed workers. This effect is estimated to be negative and larger during the first two quarters of the scheme's use. It diminishes in magnitude over time but remains statistically significant even after twelve quarters following application. In Switzerland, the monitoring and selection procedures of firms treated by the program are more rigorous and denial rates are high compared to other STW programs in Europe. In fact, the program targets firms with temporary rather than structural problems, as well as those suffering cyclical rather than seasonal shocks. Moreover, the recession in Switzerland, contrary to Italy, was deep but brief, which placed firms in a more favorable position to recover after STW use.

These studies not only demonstrate that STW effects can be heterogeneous over time but also show that effects vary according to the magnitude of aggregate (and idiosyncratic) shocks experienced by firms.

Another source of heterogeneity effects that the literature highlights relates to firm characteristics such as liquidity and productivity levels. Usually, firms with lower liquidity levels cut more jobs in response to large temporary negative shocks (Giroud and Mueller, 2017), but they do not necessarily have unviable jobs in the long run. STW enables this group of firms to overcome liquidity constraints during a shock. As soon as normal activity is resumed, their workers return to pre-crisis levels of activity and their improved financial health allows them to grow. In fact, it is for this group of firms that the largest positive short-run employment effects per hour from STW are found (Giupponi and Landais, 2023). Furthermore, the evidence points to large positive employment effects in the short run, but only for firms that have high productivity levels prior to the crisis. Firms with low pre-crisis productivity tend to reduce hours of work more intensively, with no effect on headcount employment (Giupponi and Landais, 2023).

Overall, STW has been demonstrated to be effective in preserving jobs (albeit at the cost of reducing hours per worker) in the short run, but only for firms suffering significant demand shocks or liquidity constraints and for those that had high productivity levels before the shock. Consequently, the net effect, resulting from the reduction in hours per worker and the positive effects on employment, translates into a positive effect on hours worked per firm. Whether these

positive effects on employment and hours per firm are sustained over time depends on various factors.

First, by safeguarding non-viable jobs in the long run (for example, jobs that would have been lost even in the absence of the program), STW may instead postpone dismissals, resulting in the absence of desirable long-term effects on headcount employment (Giupponi and Landais, 2023). Moreover, by protecting viable job matches in firms experiencing small demand shocks that jobs would have survived in any case, STW can lead to deadweight losses not only in the short but also in the long run because it reduces hours of work without any effect on headcount employment. In this regard, features of program design related to firm screening are crucial for determining the presence of job matches that are viable without subsidy, which could influence the desired outcomes of the program. Lastly, the persistence of aggregated (and idiosyncratic) shocks is also an important driver of medium- to long-run effects, given that STW is more effective when safeguarding against temporary shocks.

3.1.2. Other firm outcomes

STW impact evaluations have also examined other firm outcomes. In this section, we focus on the impact of STW programs on firm survival and other firm-level outcomes such as investment decisions, productivity, profitability, and liquidity levels. First, as noted in Section 2, in a setting of imperfect financial markets STW offers insurance against the risk of bankruptcy driven by the inability to hoard labor and subsidize workers' wages when a temporary decline in activity tightens financial constraints (Giroud and Mueller, 2017). Consequently, it is crucial to examine whether STW, by offering a labor-hoarding subsidy, has implications in terms of firm survival and, if so, identify the types of firms that benefit the most from this outcome. Giupponi and Landais (2023) provide some lessons in this regard. They find a positive effect on firm survival one year after treatment, but only for firms with low liquidity facing a temporary shock. Furthermore, for less productive firms prior to the recession, STW appears to prevent the efficient reallocation of jobs toward more productive firms (discussed in Section 4) without a significant effect on firm survival. Kopp and Siegenthaler (2021) also find that firms that take up STW are 5.5 to 9 percentage points more likely to be operational 4.5 years after their application to the program. This result is found for the average firm treated by the Swiss STW scheme, which screens firms with cyclical temporary shocks based on financial information.

Overall, STW appears to be beneficial to firm survival when tackling the liquidity constraint channel, as demonstrated by Giupponi and Landais (2023). However, further analysis is needed to address the role of different sources of heterogeneity (e.g., according to the types of firms treated and shocks experienced by these firms) on the effects of STW on firm survival.

In theory, STW can also enhance firm productivity and profitability. By preserving employment, STW safeguards against the risk of incurring future transaction costs associated with firing (e.g., hiring and training costs) and the loss of firm- and industry-specific human capital. This has direct implications not only for productivity but also for future investment decisions and can translate into higher profits when demand recovers. By supplementing firm liquidity in the short run, STW can facilitate investment in physical and human capital during recovery periods. Giupponi and Landais (2023) show that the positive short-run effects on employment are associated with a

declining productivity per employee (proxied by value added per worker), which is a mechanical effect of the reduction in working hours in the short run, but find no effect on productivity per hour worked. However, they do not find significant effects on investment decisions on physical capital, at least in the short run, while the effect on liquidity is positive (although it lacks precision).

Nevertheless, further research should be aimed at understanding the dynamics of these effects. Biancardi et al. (2022) investigate the role of STW on firm performance, taking into account the role of unionization and collective bargaining. Consistent with previous findings, they find that STW schemes not only reduce working hours per employee in the short run but also lower labor costs and per capita labor productivity, with no significant effect on hourly productivity. Additionally, they find that this results in an overall negative (although small) effect on firm profits. However, all of these results are found to be temporary and fade after STW uptake.

Interestingly, they find that these results also vary according to the level of unionization in firms where workers are employed. For instance, the labor cost per employee is less sensitive to the use of STW in firms with a high level of unionization, without any cost in terms of firm profits. This is because unions usually negotiate with employers to minimize the impact of STW on wages and promote STW as a work-sharing device (protecting both the employment and wages of their members). Notably, this behavior in highly unionized firms does not come at the cost of lower firm profitability. In fact, profit reductions in the short run are larger in low-unionized firms that use STW than in highly unionized ones.

3.2. Effects of STW on worker outcomes

Even though the main objective of STW is to sustain the employer-employee relationship during temporary economic shocks, rather than protect firm performance indicators, impact evaluations have primarily focused on the analysis of firm outcomes. There is less empirical evidence on the effect of STW schemes on workers' employment and income trajectories. The underlying theoretical argument is that by subsidizing labor hoarding, STW protects workers from being laid off and suffering the long-run scarring effects of unemployment and losses in income. In this section, we describe the existing evidence on the effects of STW programs on 1) earnings, 2) hours of work, and 3) the probability of being (re)employed, conditional on take-up of the program. These outcomes are critical for determining the efficacy of STW programs and whether or not their objectives are being met. In the following section, we discuss differences in workers outcomes effects in the short and long run, as well as heterogeneous effects across firm type.

The evaluation of the dynamic effects of STW on individual labor market outcomes relies on the comparison of STW-insured employees to different counterfactual groups, that is, the various scenarios that a worker would have experienced in the absence of STW. Recent evidence on the effects of STW (Giupponi and Landais, 2023) has mainly focused on two counterfactuals: 1) the group of unemployed individuals and 2) employees eligible for STW (in similar firms) but not insured by this policy.

Some studies suggest that the adoption of STW has a positive impact on the earnings and labor market prospects of employees, although they acknowledge that the effects may differ in the short and long term. Tilly and Niedermayer (2016) provide descriptive evidence suggesting that participation in STW programs decreases workers' earnings temporarily and sharply in the short

run, but to a lesser extent than that experienced by unemployed individuals. Moreover, they do not find negative long-term effects on the earnings of workers in STW compared to unemployed individuals. This is because of the ability of STW to maintain the employment relationship, even in the long run in certain cases, and the higher overall replacement rates for STW programs compared to UI systems. However, whether the positive effects on employment prospects and earnings are sustained over time is a question that requires further research.

It has been noted that the dynamics of these effects are determined by the persistence of the shock encountered by firms participating in the program, as well as firm financial characteristics (Giupponi and Landais, 2023). If firms encounter a more persistent shock, STW becomes less effective in preserving employment. In addition, if STW protects non-viable jobs in the long run and the shock is long-lasting, STW will not mitigate layoffs in the long run and will only allow postponing them. Moreover, the persistence of the shock may influence worker decisions to participate in the scheme. For instance, if the scheme fails to provide sufficient insurance value, workers might decide to drop out and seek an alternative job, leading to a direct impact on their earnings.

Giupponi and Landais (2023) find that workers in STW schemes have the same short-run probability of employment one year after STW use as similar workers employed in non-eligible firms, but this effect decreases in subsequent years. Interestingly, three years after treatment the probability of employment comes closer to that of similar workers in non-eligible firms who were laid off instead. Likewise, earnings per employee not only drop in the short run (because of the reduction in hours worked) but also in the medium run, and come closer to the earnings of similar workers who experience a layoff event in non-eligible firms. This result demonstrates that STW is more effective at providing insurance against temporary shocks and less effective at providing insurance against more persistent shocks (as was the case in Italy). In the case of more persistent shocks, firms eventually lay off workers, leading to a decline in earnings in the medium run.

On the other hand, the dynamic effects on workers may vary according to the type of firm in which they are employed. Giupponi and Landais (2023) show that the medium-run earnings of workers in STW in high-productivity firms are significantly higher than those of laid-off workers in the same high-productivity firms. Conversely, for treated workers in low-productivity firms, STW provides insurance in the short run but is not better than being laid off in the years after treatment. This is due to the fact that low-productivity firms are typically characterized by a larger proportion of non-viable jobs in the long run, for which STW does not have beneficial effects on employment. Instead, it serves as a temporary fix without positive medium- to long-run dynamic effects.

Overall, there is currently little evidence on how STW use differentially affects the careers of workers in the long run and how these effects differ according to the type of firm, the shocks experienced by firms, and labor markets. Understanding heterogeneous effects across workers is essential to designing effective STW schemes and implementing optimal policy responses.

4. Efficient STW insurance

An efficient STW program involves finding a balance between insurance provision to workers (and therefore firms) and minimizing distortion in labor demand choices. From a social welfare

standpoint, a program is efficient when the social costs (at most) balance the social gains.¹³ In this section, we discuss the conditions under which STW can become an inefficient policy instrument (e.g., failing to preserve the maximum number of jobs for any given cost) and identify a number of crucial characteristics in this respect.

We focus on two types of inefficiencies associated with STW: the generation of fiscal externality costs and dampening reallocation in the labor market. On the one hand, the fiscal externality cost of STW mainly emerges from two sources: 1) adverse selection of job matches in the program, and 2) moral hazard problems that are a result of the distorted behavior of firms taking up the program. Both stem from the existence of asymmetric information between firms and the public authorities that finance the program. Adverse selection arises when STW protects job matches that are viable in the long run even in the absence of the program. Likewise, STW also becomes inefficient when it protects unviable job matches in the long run, even after economic conditions recover, locking workers into low-productivity jobs and impeding productivity-enhancing reallocation (Hijzen and Venn, 2011). Moral hazard issues arise when there are distortive firm behaviors pre- and post-program use. Ex-ante, distortive firm behaviors include the manipulation of a firm's economic status and needs to become eligible for the program. Ex-post, or during STW program use, moral hazard issues emerge when i) there is an excessive reduction of hours even if firms do not suffer financial distress or ii) firms do not reduce hours while receiving STW benefits. Both adverse selection and moral hazard issues from STW are responsible for generating deadweight losses and displacement effects that we discuss further in this section.

On the other hand, the reallocation inefficiencies of STW are primarily linked to the protection of low-productivity job matches and permanent contracts. More specifically, two types of reallocation events in the labor market may occur during recessions: i) firm/sector reallocation and ii) reallocation across different types of labor contracts. Evidence suggests that both fiscal externality costs and reallocation inefficiencies were relatively small during the Great Recession; however, whether these results could be extrapolated to the COVID-19 period is still an underexplored question.

4.1. Fiscal externality costs of STW

The use of STW causes a fiscal externality when employers neglect that reducing the working hours of employees imposes a burden on the fiscal budget. However, there are also positive savings derived from STW through the reduction of the fiscal externality of UI. In this section, we first start by discussing the fiscal externality of UI to understand the fiscal externality cost of STW. Following this discussion, we describe two sources of STW externalities, namely adverse selection and moral-hazard-related issues. We then analyze the role of STW in reducing the UI fiscal externality. Overall, we report empirical findings that show that the net social cost of STW provision is positive but relatively low compared to regular UI systems, at least during the Great Recession.

To understand the fiscal externality cost from STW, we first need to understand the fiscal externality of UI systems. There are two types of values in a job match: i) the private value, which

¹³ This leads to a minimizing of the net social cost.

is determined as a function of the production process in the firm and is split between the worker (through wages) and the firm (through profits), and ii) the social value, which is the value of the job to the collectivity (Cahuc et al., 2014). The destruction of a job has consequences that extend beyond the firm and worker's private value, directly affecting the social value of a job through the creation of a fiscal externality. A fiscal externality is the cost of the behavior of insured agents borne by other agents and which is not financially incurred by the former. For instance, under inefficient UI systems, when a firm decides to destroy a job match it does not take into account the costs of benefit payments to that worker if these are financed by contributions from other workers and firms in the economy. Furthermore, the firm does not consider that the laid-off worker will no longer contribute to the funding of the UI system and will pay fewer taxes. This creates a gap between the social and private value of a job that is equal to what a person costs society (the fiscal externality) when the employment relationship is destroyed. Under an efficient unemployment insurance system, individuals internalize the social costs of their decisions by eliminating the gap between the social and private values of a job match.

The first source of fiscal externality of STW programs is adverse selection. In theory, STW is only allowed for firms facing temporary setbacks and the public authority may condition take-up on information that demonstrates this. However, it is difficult to distinguish between a temporary and a structural setback based on financial information. This therefore leaves room for the firm to manipulate this information in its favor (Giupponi and Landais, 2023). Consequently, both firms that have jobs that would be viable without financial support and firms that have unviable jobs because they face structural declines in demand cannot be prevented from STW take-up. By protecting the group of firms with jobs that would be viable even in the absence of the program, STW can result in deadweight losses, whereas by protecting jobs that are unviable in the long run even in the absence of the temporary shock, STW programs can lead to displacement effects. In particular, the latter occurs when by keeping unviable job matches alive STW crowds out more efficient matches in the labor market. This unintended use of STW drives up the social costs of such a scheme. In Belgium and Italy, for example, the use of STW has remained persistently high even during normal times and recovery periods, which suggests that STW is frequently used to absorb not only temporary cyclical fluctuations in demand but also structural adjustments in firms (European Commission, 2020) and seasonal shocks. Moreover, regular users may have greater incentives to take up STW programs during times of aggregated economic shocks, even if no jobs are at risk of termination, because they have more experience with them compared to non-users (Cahuc et al., 2021; Cooper, Meyer, and Schott, 2017).

Moral hazard is a second source of fiscal externality of STW schemes. This is the result of firm distortive behaviors in the use of STW, which can occur in various ways. First, firms can decide to (ex-ante) manipulate information to qualify for the program, as discussed previously. This is a moral hazard behavior that can result in displacement effects by selecting unviable matches that are likely to be terminated in the long run. Second by subsidizing working-time reductions, STW provides incentives to employers to excessively reduce the number of working hours, even if they are not in a situation of financial distress (ex-post). In particular, regular users of STW (for instance, those that experience seasonal fluctuations), have strong incentives to benefit excessively from cross-subsidies that reduce aggregate productivity in the economy (Boeri and Cahuc, 2023). These behaviors occur because (in most cases) firms do not need to cover any costs of using STW,

except for reducing hours of work, which firms are willing to do excessively to obtain STW benefits (Burdett and Wright, 1989; Cahuc, 2019; Van Audenrode, 1994). Moreover, in practice employers can even use STW as a wage subsidy without effectively reducing hours of work (Boeri and Cahuc, 2023). All these behaviors result in deadweight losses that increase the fiscal cost of an STW program.

Nevertheless, there are also positive fiscal savings of STW associated with the reduction of the UI fiscal externality. A more generous STW system that provides incentives to hoard labor has a mechanical effect of reducing the fiscal cost of the UI system, as there are fewer unemployed that end up claiming unemployment benefits (Giupponi et al., 2022). Whether this positive externality can undo the negative one depends on the extent to which STW use can be confined to viable jobs that are at risk of destruction as a consequence of a transitory economic shock. This is more likely when the economy is hit by a short-lived recession and in sectors that are not undergoing important structural changes that would put the long-run viability of jobs under strain. In other periods, the information asymmetry between public authorities and firms complicates the targeting of STW to at-risk jobs such that the net fiscal costs of these programs may outweigh the social benefits.

Some recent studies have quantified the net fiscal costs of STW programs during the Great Recession. Giupponi and Landais (2023) report a fiscal cost of 1.38 euros for the use of STW in Italy. This means that an efficient system requires society to pay 1.38 euros for every marginal euro spent by the government on STW. Even though the program had a cost due to behavioral responses, this was relatively low when compared, for instance, to UI (where the cost is estimated to be 1.5 to 2.5 euros per marginal euro spent). Conversely, Kopp and Siegenthaler (2021) find that the fiscal benefits were large enough to compensate for the total costs of STW policies during the Great Recession in Switzerland. As seen in Section 2, design features related to firm screening, as well as the temporariness of the shock, are determinants of how high these fiscal costs can be during recessions.

In summary, the use of STW creates a fiscal externality when employers neglect that reducing the working hours of employees imposes a burden on the fiscal budget. However, this negative externality may turn positive to the extent that employers also neglect the social benefits of having fewer unemployed workers. Empirical evidence suggests that the fiscal externality costs of STW policies during recessions are relatively modest compared to UI. Nevertheless, these costs are expected to be higher than in normal times, when take-up rates are lower and schemes are less generous on average. Overall, there is limited evidence regarding the quantification of the fiscal cost of STW programs. This is needed not only during recessionary periods, when the benefits of avoiding layoffs could be higher (due to the long-lasting scars that recession-induced unemployment can leave), but also outside of recessions when, in some cases, behavioral costs remain substantial, depending on the targeting and eligibility features of the scheme.

4.2. Reallocation inefficiencies

Efficient reallocation in the labor market is the process by which workers and firms are matched in such a way that aggregate output is maximized in the economy (Cahuc et al., 2014). In practice, this requires easy reallocation of labor from contracting sectors to expanding sectors (Cahuc, 2019). In other words, the process of reallocation in the labor market is efficient when there is a

sufficient number of workers searching for new jobs and, at the same time, firms are actively posting vacancies to hire new workers (Giupponi et al., 2022). Labor market institutions and insurance policies are critical in determining the magnitude of the reallocation process, particularly in times of crisis and recovery. We analyze how STW policies translate into reallocation inefficiencies and describe some empirical evidence on this mechanism.

4.2.1. Inefficient firm/sector reallocation

STW policies can interfere with the efficient reallocation of workers in the labor market. For instance, during a crisis workers tend to move away from badly and persistently affected firms and sectors toward more productive jobs, enhancing aggregate productivity in the economy (Boeri and Bruecker, 2011; Cooper et al., 2017; Hijzen and Venn, 2011). When used by firms over prolonged periods of time, STW programs tend to keep low-productivity firms alive and excessively support low-productivity job matches (causing displacement effects). This harms the reallocation of labor toward more productive firms/sectors in the economy. Yet, the extent to which STW harms labor market reallocation is highly dependent on the nature (e.g., duration and magnitude) of the economic shock to which firms are subjected (Cahuc et al., 2021; Cooper et al., 2017) and the program design in terms of job-match selection into the program (Cahuc et al., 2021; Giupponi and Landais, 2023). In the presence of persistent shocks, STW may substitute for new vacancies in the medium-to-long run, subsidizing inefficient matches and preventing workers from allocating to more productive jobs. Furthermore, the more STW use is concentrated on low-quality matches the more negative the effect of STW on reallocation, particularly during recovery periods.

In order to understand how STW policies interfere with the efficient firm/sector reallocation process during a crisis, we need to first understand how STW affects job flows in the labor market. Most recessions are marked by job rationing, which occurs when many unemployed workers search for a limited number of vacancies. In this scenario, STW protects firm employment by enabling firms to retain workers who would otherwise be laid off. This directly slows down the reallocation process, especially if STW is extensively used by low-productivity firms that will eventually go bankrupt anyway. Furthermore, it also affects the reallocation process indirectly because by retaining workers, it increases the cost of hiring for all firms, given that fewer workers are released into the unemployment pool, thereby making it costly for more productive firms and new entrants to fill vacancies (Cooper et al., 2017; Giupponi and Landais, 2023). This effect increases the tightness of the labor market (e.g., the number of vacancies per unemployed individual). However, in a recession, when labor markets are weak and hiring is scarce, this last indirect effect seems less important.

Giupponi and Landais (2023) empirically investigate the reallocation effect of the Italian STW program during the Great Recession. They exploit the spatial variation across more than 600 local labor markets (LLMs) and estimate how an increase in the fraction of workers treated in STW within an LLM affected employment in non-treated firms during the recession years (2010–2013). They find that, on average, employment was reduced by 0.94% in non-treated firms for every percentage-point increase in the fraction of treated firms within an LLM. They also calibrate a matching model of the Italian labor market to investigate the implications of this slowdown of reallocation on aggregate productivity. They observe that STW keeps workers in low-productivity

firms and decreases employment in high-productivity ones. This lowered the total factor productivity of the Italian economy during the Great Recession by about 2% compared to the counterfactual scenario in the absence of the program.

Whether STW had a significant impact on dampening reallocation during the COVID-19 period remains a relatively unexplored question. The COVID-19 crisis, as opposed to most market-led recessions, was not a typical crisis. First, levels of tightness prior to COVID-19 were already relatively high (Ando et al., 2022). Second, the COVID-19 shock affected sectors heterogeneously. Some sectors were positively impacted and experienced high demand (e.g., ICT sectors, manufacturing, and the health sector), whereas other sectors (e.g., recreation and hospitality) were negatively affected by the economic slowdown induced by lockdown measures. Moreover, the affected sectors were different from those affected in previous recessions, such as the manufacturing and construction sectors during the Great Recession. This heterogeneity amplified the need for reallocation not only within sectors but also across sectors (Barrero et al., 2021). Third, the COVID-19 crisis accelerated structural changes that were already ongoing in the labor market (e.g., the increasing incidence of alternative work arrangements such as temporary work, part-time work, self-employment, and the kinds of jobs that have emerged from the online gig economy) (Boeri and Cahuc, 2023). For instance, the introduction of remote working has allowed people in certain occupations to maintain their working hours while changing the location of their work. In fact, many firms have adopted these remote work modalities as a permanent measure, even after the lockdown periods.

Overall, STW has been demonstrated to have been an effective policy for preserving employment at a low cost in terms of reallocation during the Great Recession; however, whether it has had more significant implications for reallocation during the COVID-19 crisis in Europe is an empirical question that has not yet been sufficiently investigated.

4.2.2. *Inefficient reallocation of workers across different types of labor contracts*

STW policies can also hamper the efficient reallocation of workers across types of labor contracts. Given that STW primarily benefits permanent contracts (or insiders), workers with temporary contracts (e.g., essentially, young workers) may have a more difficult time finding permanent jobs and unemployed individuals may face additional difficulties entering the labor force (Cahuc and Carcillo, 2011; Cahuc et al., 2021). In other words, STW policies may contribute to an increase in the labor market segmentation between workers in irregular jobs (e.g., temporary contracts) and new recruitments and those on permanent contracts (Hijzen and Venn, 2011).

Accordingly, Giupponi and Landais (2023) show evidence of STW protecting mostly insiders during the Great Recession in Italy, harming the reallocation of employment between open-ended and fixed-term contracts, but the magnitude of this effect is small. In contrast, Kopp and Siegenthaler (2021) do not find strong evidence that the employment effects (reduction in dismissals) were accompanied by a decline in the use of temporary contracts (or outsiders). More recently, Lafuente and Ruland (2022) investigated the impact of STW on labor market flows during the COVID-19 period in Spain, France, Italy, and the Netherlands. They document descriptive evidence of a large fall in the stock of temporary contracts during the COVID-19 crisis, which is explained by (i) a fall in transitions from non-employment to temporary employment and

(ii) an increase in job-destruction flows from temporary employment to non-employment. Moreover, they find large declines in flows from temporary to permanent employment, especially in the Netherlands and Spain. This suggests that STW, a scheme extensively used in these countries during COVID-19, appears to have mostly protected permanent contracts, thereby exacerbating labor market inequalities (Boeri and Cahuc, 2023).

5. What elements of the current design features can be improved?

Monitoring and co-financing requirements may limit opportunities for manipulation by firms and reduce the fiscal externalities of STW. These design features can also limit possible negative effects on reallocation. They thus represent viable instruments to reduce the societal costs generated by STW. In this section, we first highlight the mechanisms through which these two instruments act on existing inefficiencies and then advance practical recommendations for their implementation. We also discuss the potential drawbacks involved in their use.

It is important to consider that in response to COVID-19, new rules to scale up existing STW systems were implemented (OECD, 2020). The new rules mostly consisted of cutting down on administrative procedures to make STW available for firms quickly. This facilitation of the application process may actually have induced more inefficient use of the scheme. Even though similar policy changes were implemented during the Great Recession and empirical evidence shows that there was, for example, no manipulation in hours not worked during the previous crisis, it remains an open question whether the evidence for this shock can be extrapolated to the COVID-19 crisis.

On the other hand, distortions in the behavior of firms might be lower in the context of temporary and cyclical economic downturns. In fact, in these contexts more jobs are at risk of destruction and there is a greater need to reduce working hours due to the unexpected decline in a firm's economic activity (Hijzen and Venn, 2011), or for the COVID-19 crisis, because economic activity virtually came to a standstill (OECD, 2021). Therefore, company manipulation can be less problematic during such economic shocks. The risk of harming reallocation can also be temporarily lower, specifically because vacancies fall and the prospects of rapidly transitioning to more productive jobs are weakened.

5.1. Monitoring

Monitoring is a primary tool to limit manipulation from the firm side. It reduces the extent of asymmetric information that is privately held by STW-insured businesses but not by governments financing the policy. It requires collecting information about the actual operation of firms that (plan to) take up STW and, based on this information, restricting access to those firms for which the returns to using the scheme are most beneficial for society. Implemented (*ex-ante*) before the take-up of STW, monitoring reduces the likelihood that ineligible firms make use of the scheme; for example, it prevents firms that are not exposed to economic and financial distress or that experience structural rather than transitory difficulties from applying for STW. Monitoring can thus enhance the efficiency of the scheme because it avoids subsidizing (i) profitable matches that would be viable even without STW support (deadweight losses) and (ii) matches that, even if insured by STW, would dissolve anyway (displacement effect). Implemented (*ex-post*) after access

to STW is granted, monitoring prevents excessive reductions in hours worked for the workers insured by the program, which, as highlighted in Section 4, is also a form of moral hazard.

Monitoring essentially targets firm behavior and not the behavior of employees. The reason for this is that the employer is more prone to opportunistic behavior when making decisions regarding both the uptake and the extent of the reduction in working time.¹⁴ Likewise, even though unions are not indifferent to the choice of adopting STW and often interact with firms regarding the use of these programs (Appendix A.1), there are fewer concerns about distortions in their behavior. In fact, a union's aim is to maximize the welfare of members, an objective largely accomplished when the job relationship is preserved. Furthermore, the job match results in no direct surplus for unions. We advance a similar explanation for the targeting of co-financing requirements to employers, which is discussed in Section 5.2.

How can monitoring be implemented in practice? The first solution might consist of tightening the eligibility requirements for enterprises. For example, firms are often only eligible if they can prove a significant decline in output demand or revenues. Table A.1. documents that such eligibility requirements – Evidence of temporary economic need (e.g., minimum reduction in output, production activity, or revenues) – are imposed in the four selected countries of analysis.

Ex-post, the monitoring of a company's financial situation and the banning of dividend payments (or other profit-sharing instruments) may reveal companies that took up the program despite not truly being in financial distress (OECD, 2020). None of the STW systems analyzed in Table A.1. include this clause, yet other STW programs such as the *Expediente de Regulación Temporal de Empleo* (ERTE) in Spain, do. If abuse of this sort is detected, the company is asked to reimburse all the STW benefits it was paid.

The monitoring of hours effectively worked by employees, as well as examining whether the value added per worker decreases while the firm is using STW, may limit abuse by firms that keep operating without hours reductions even though they claiming STW (Giupponi and Landais, 2023).¹⁵ At present, none of the countries analyzed have enacted monitoring of hours or value added, but an increasing number are conducting STW claim audits and building integrated administrative systems to link STW claims to tax or social security data.

Monitoring is a challenging chore for governments because it is costly and prone to error. For example, STW adoption was so extensive during COVID-19 that the implementation of such large-scale monitoring would not have been conceivable. In the context of the COVID-19 crisis, monitoring has also been challenging given changes in the organization of work caused by the pandemic. Indeed, to cope with health restrictions remote working has expanded, limiting the observability of hours worked, but also the relevance of statutory working hours. This raises

¹⁴ To rationalize this finding, it is noted that firms are more responsive to changes in the firm- and not the worker-side of the match surplus (Giupponi et al., 2022). This mechanism is particularly salient in the presence of rigidities in bargaining outcomes, which limit the possibility of sharing the match surplus by revising hours and wages.

¹⁵ In this context, asymmetric information regards not only the public authority and the firm but also the employee, who colludes with the employer to gain STW subsidies. Requiring the worker's consent for the actual hours reduction might help (Balleer et al., 2020). Worker consent will be given only if layoff is the sole outside option for the worker.

concerns that STW is actually employed by firms that also make extensive use of remote working (Boeri and Cahuc, 2023).

5.2. Co-financing requirements

To complement monitoring, co-financing requirements for firms based on STW take-up can limit STW fiscal costs. While this reduces the attractiveness of STW for firms, it also strengthens incentives to utilize support only for job matches expected to survive after the crisis and to resume pre-crisis work schedules as soon as possible. Hence, co-financing requirements may enhance the efficiency of a program (Balleer et al., 2020; OECD, 2020; OECD, 2021). In addition, since prolonged STW use is also discouraged, they may reduce the risk of harming reallocation.

With co-financing requirements, labor hoarding through STW is only beneficial for workers whose replacement costs for the firm (e.g., the cost of firing, hiring, and training) are greater than the expected costs of STW throughout the period of policy adoption (OECD, 2021). This scenario is thus more likely the higher the replacement cost of workers and the lower the cost of labor hoarding (e.g., as can be the case assuming a short hoarding period and a low co-financing rate). Nonetheless, co-payments of this sort bear the risk of reinforcing labor market duality and segmentation. Incentives are in fact set to support workers with high replacement costs (on open-ended contracts and with significant severance-pay entitlements or with relevant firm-specific skills) and to neglect support for workers with low replacement costs (fixed-term contracts often with little on-the-job human capital) (OECD, 2021).

As discussed in Section 2, financial incentives in STW can be introduced in various ways, such as by making firms directly pay a share of the STW allowance. Another way is through an ER system in which firms pay contributions to social insurance that are modulated according to the intensity of past STW use, as in Belgium for example (Cahuc and Carcillo, 2011). However, it is still unclear whether the level of co-payment by firms in existing STW systems is sufficiently high relative to the benefits of adopting the program for firms. Firm costs are often low until the firm reaches an extensive level of policy usage, either in terms of STW hours assigned to each employee (e.g., Belgium) or in terms of the duration of uptake by the firm (e.g., Italy). While the objective of such co-financing systems is to avoid supporting job matches or firms that are unviable in the long term, low co-financing during the first months of STW insurance may nevertheless support job matches that are not viable in the first place. Setting copayments at a shorter duration of policy use might avoid subsidizing job matches that are permanently unviable.

We mentioned above that during a recession the excessive use of STW may not be widespread. This is because in such periods it is more likely that structurally healthy firms are facing temporary liquidity constraints. Consequently, it is desirable to lower the financial incentives of STW during economic downturns. This is particularly true when we consider the specific type of firm that enrolled in STW during COVID-19: essentially, small businesses that face barriers in accessing financial markets. This is precisely what happened in countries such as France and Belgium. However, it can be difficult for governments to resume cost sharing when business activity rebounds. In France, the government demanded that businesses gradually cover a share of the costs associated with the hours not worked as economic activity rose again (OECD, 2020). In contrast,

the Belgian government kept operating the special regime (without ER) installed at the start of the lockdown until the end of June 2022, a long time after the economic consequences of the COVID-19 crisis disappeared.

6. Concluding remarks

The purpose of this review was to examine the insurance value of STW programs from both a theoretical and empirical standpoint. To this aim, we first appraised how the objectives and the key characteristics of STW systems enhance the social desirability of these programs. We then evaluated how the empirical findings from STW impact evaluations corroborate these views, analyzed the inefficiencies triggering social costs to STW policies, and advanced proposals to modify design features for more efficient STW support.

By enabling firms to cut down the working hours of their employees instead of laying them off, government-funded STW insurance schemes are socially desirable in social insurance programs. From the firm perspective, they reduce the risk of bankruptcy when financial frictions bind, they allow retaining firm-specific human capital, and they avoid the costly process of separation, re-hiring, and training when business conditions improve. From the worker perspective, they provide compensation for income loss while on reduced working time and prevent the scarring of unemployment, which have been shown to be particularly persistent during recessions. Finally, by lowering the risk of layoff and the precautionary-saving motives for insured workers, STW policies also stabilize consumption and aggregate demand. It is therefore no surprise that STW systems have been the primary policy response during the COVID-19 crisis, with European social insurance programs witnessing an unprecedented surge in up-take.

Fiscal costs and the risk of harming worker reallocation in the labor market represent negative aspects of STW insurance. Driven by asymmetric information between firms and policymakers, employers can adopt opportunistic behaviors, such as excessive policy use, and not consider the costs that these behaviors impose on the government's budget and society overall. Furthermore, the reallocation of workers across firms and sectors, which is particularly strong during economic crises, and reallocation across types of labor contracts can be negatively affected by STW. Recessions, which cause the destruction of low-productivity matches in declining firms and/or sectors and foster the reallocation of workers to jobs in growing firms and/or sectors, are also periods of intense STW take-up. But the take-up of STW, especially if for a prolonged period, can keep alive low-productivity matches and firms and limit this reallocation process. Additionally, because STW primarily targets and shelters workers in open-ended jobs, there is a risk that it could reduce new job-matching opportunities for the unemployed and individuals outside of the labor market on the one hand, and on the other hand, lessen the transition of workers from temporary to permanent jobs.

Existing policy evaluations of STW programs are primarily concerned with the effects on employment, the likelihood of firm survival, and the individual outcomes of insured workers. Despite the evidence indicating a large, short-term positive impact of these programs, particularly during the Great Recession, more research is necessary to address three gaps. First, there is a need to evaluate the long-term effects of STW policies and, consequently, their ability to successfully

protect job relationships instead of delaying layoffs. Even if the policy might not save jobs in the long run, we must be cautious in assessing its overall effectiveness. Saving jobs during crises can be highly socially valuable because layoffs in these times bring more detrimental consequences to workers than layoffs during recovery periods or normal times. For these reasons, the positive impact in the short term still makes STW desirable even without positive employment effects in the long term. Second, the appraisal of the overall social costs of STW generated from fiscal externalities and the unfavorable impact on reallocation are of great policy relevance. Finally, one needs to establish new lessons regarding STW consequences during COVID-19, accounting for differences in the nature of the shock relative to the Great Recession.

References

- Abraham, K. G., & Houseman, S. N. (2014). Short-Time Compensation as a Tool to Mitigate Job Loss? Evidence on the U.S. Experience During the Recent Recession. *Industrial Relations: A Journal of Economy and Society*, 53(4), 543–567.
- Acemoglu, D. (1995). Asymmetric Information, Bargaining, and Unemployment Fluctuations. *International Economic Review*, 36(4), 1003–1024.
- Ando, S., Balakrishnan, R., Gruss, B., Hallaert, J. J., Jirasavetakul, L. B. F., Kirabaeva, K., ... & Solovyeva, A. (2022). European Labor Markets and the COVID-19 Pandemic: Fallout and the Path Ahead. *International Monetary Fund. Departmental Papers*, 2022(004).
- Audenrode, V., & A, M. (1994). Short-Time Compensation: Job Security, and Employment Contracts: Evidence from Selected OECD Countries. *Journal of Political Economy*, 102(1), 76–102.
- Balleer, A., Gehrke, B., Lechthaler, W., & Merkl, C. (2016). Does short-time work save jobs? A business cycle analysis. *European Economic Review*, 84, 99–122.
- Balleer, A., Gehrke, B., Hochmuth, B., & Merkl, C. (2020). Guidelines for cost-effective use of SURE: Rule-based short-time work with workers' consent and aligned replacement rates. *Vox CEPR Policy Portal*.
- Barrero, J. M., Bloom, N., & Davis, S. J. (2021). Why Working from Home Will Stick. *National Bureau of Economic Research No. 2873*.
- Bellmann, L., & Gerner, H. D. (2011). Reversed roles? Wage and employment effects of the current crisis. In *Who loses in the downturn? Economic crisis, employment and income distribution* (pp. 181-206). Emerald Group Publishing Limited.
- Bertheau, A., Kudlyak, M., Larsen, B., & Bennedsen, M. (2022). *Why firms lay off workers instead of cutting wages: Evidence from matched survey-administrative data*. Hoover Institution Working Paper No. 434.
- Bertola, G., Boeri, T. & Cazes, S. (1999). Employment Protection and Labour Market Adjustment in OECD Countries: Evolving Institutions and Variable Enforcement. Geneva: Employment and Training Dep., Internat. Labour Off.
- Biancardi, D., Lucifora, C., & Origo, F. (2022). Short-time work and unionization. *Labour Economics*, 78, 102188.
- Blanchard, O. J., & Tirole, J. (2008). The Joint Design of Unemployment Insurance and Employment Protection: A First Pass. *Journal of the European Economic Association*, 6(1), 45–77.
- Boeri, T., & Bruecker, H. (2011). Short-time work benefits revisited: some lessons from the Great Recession. *Economic Policy*, 26(68), 697-765.

- Boeri, T., & Cahuc, P. (2023). Labor Market Insurance Policies in the Twenty-First Century. *Annual Review of Economics*, 15(1).
- Brey, B., & Hertweck, M. S. (2020). The extension of short-time work schemes during the Great Recession: a story of success? *Macroeconomic Dynamics*, 24(2), 360–402.
- Burdett, K., & Wright, R. (1989). Unemployment Insurance and Short-Time Compensation: The Effects on Layoffs, Hours per Worker, and Wages. *Journal of Political Economy*, 97(6), 1479–1496.
- Cahuc, P. (2019). Short-time work compensation schemes and employment. *IZA World of Labor*, 11(2).
- Cahuc, P., & Carcillo, S. (2011). Is Short-Time Work a Good Method to Keep Unemployment Down? *Nordic Economic Policy Review*, 1(1), 133–65.
- Cahuc, P., Carcillo, S., & Zylberberg, A. (2014). *Labor Economics*. (Second Edition. ed.). Cambridge (Mass.): MIT Press.
- Cahuc, P., Kramarz, F., & Nevoux, S. (2021). The Heterogeneous Impact of Short-Time Work: From Saved Jobs to Windfall Effects. *IZA Discussion Papers* No. 14381.
- Cahuc, P., & Malherbet, F. (2004). Unemployment compensation finance and labor market rigidity. *Journal of Public Economics*, 88(3-4), 481-501.
- Cahuc, P., & Nevoux, S. (2018). Inefficient Short-Time Work. *Banque de France Working Paper* No. 693:32.
- Calavrezo, O., Duhautois, R., & Walkowiak, E. (2010). Short-Time Compensation and Establishment Exit: An Empirical Analysis with French Data. *IZA Discussion Paper* No. 4989.
- Christl, M., De Poli, S., Hufkens, T., Peichl, A., & Ricci, M. (2022). The role of short-time work and discretionary policy measures in mitigating the effects of the COVID-19 crisis in Germany. *International Tax and Public Finance*, 1–30.
- Cooper, R., Meyer, M., & Schott, I. (2017). The Employment and Output Effects of Short-Time Work in Germany. *National Bureau of Economic Research* No. 23688.
- Davis, S. J., & Krolikowski, P. M. (2023). Sticky wages on the layoff margin. *National Bureau of Economic Research* No. 31528.
- Drydakakis, N. (2021). The Relationship between Recessions and Health. *IZA World of Labor*.
- Eichhorst, W., Marx, P., Rinne, U., Brunner, J. (2022). Job Retention Schemes during COVID-19: A Review of Policy Responses. *IZA Policy Papers* No. 187.
- European Commission, . (2020). *European Network of Public Employment Services: short time work schemes in the EU : April 2020 Study report*. LU: Publications Office of the European Union.

- Feldstein, M. (1976). Temporary Layoffs in the Theory of Unemployment. *Journal of Political Economy*, 84(5), 937–957.
- Gehrke, B., & Dengler, T. (2022). Short-Time Work and Precautionary Savings. *CESifo Working Paper* No. 9873:44.
- Gehrke, B., & Hochmuth, B. (2021). Counteracting Unemployment in Crises: Non-Linear Effects of Short-Time Work Policy. *The Scandinavian Journal of Economics*, 123(1), 144–183.
- Giroud, X., & Mueller, H. M. (2017). Firm Leverage, Consumer Demand, and Employment Losses During the Great Recession. *The Quarterly Journal of Economics*, 132(1), 271–316.
- Giupponi, G., & Landais, C. (2023). Subsidizing Labour Hoarding in Recessions: The Employment and Welfare Effects of Short-time Work. *The Review of Economic Studies*, 90(4), 1963–2005.
- Giupponi, G., Landais, C., & Lapeyre, A. (2022). Should We Insure Workers or Jobs during Recessions? *Journal of Economic Perspectives*, 36(2), 29–54.
- Hall, R. E., & Lazear E. P. (1984). The Excess Sensitivity of Layoffs and Quits to Demand. *Journal of Labor Economics*, 2(2), 233–257.
- Hijzen, A., & Martin, S. (2013). The Role of Short-Time Work Schemes during the Global Financial Crisis and Early Recovery: A Cross-Country Analysis. *IZA Discussion Papers* No. 7291.
- Hijzen, A., & Salvatori, A. (2022). The impact of the COVID-19 crisis across different socio-economic groups and the role of job retention schemes—The case of Switzerland. *OECD Social, Employment and Migration Working Papers*, Article 268.
- Hijzen, A., & Venn, D. (2011). *The Role of Short-Time Work Schemes during the 2008-09 Recession* (115). OECD.
- Jäger, S., Schoefer, B., & Zweimüller, J. (2023). Marginal jobs and job surplus: a test of the efficiency of separations. *The Review of Economic Studies*, 90(3), 1265-1303.
- Kopp, D., & Siegenthaler, M. (2021). Short-Time Work and Unemployment in and after the Great Recession. *Journal of the European Economic Association* 19(4), 2283–2321.
- Kugler, A., & Pica, G. (2008). Effects of Employment Protection on Worker and Job Flows: Evidence from the 1990 Italian Reform. *Labour Economics* 15(1), 78–95.
- Lafuente Martinez, C., & Ruland, A. (2022). Short-Time Work schemes and labour market flows in Europe during COVID. *European University Institute Working Paper*.
- Lucifora, C., & Origo, F. (2022). Rigid yet resilient: Firms’ margins of adjustment to demand shocks in regulated labour markets. In *Quaderni del Dipartimento di Scienze economiche* (Vol. 10). Università degli studi di Bergamo.

- Lydon, R., Mathä, T. Y., & Millard, S. (2019). Short-time work in the Great Recession: Firm-level evidence from 20 EU countries. *IZA Journal of Labor Policy*, 8(1), 2.
- Niedermayer, K., & Tilly, J. (2016). Employment and Welfare Effects of Short-Time Work in Germany. *VfS Annual Conference 2016 (Augsburg): Demographic Change*, 145842.
- OECD. (2020). OECD Employment Outlook 2020: Worker Security and the COVID-19 Crisis.
- OECD. (2021). OECD Employment Outlook 2021: Navigating the COVID-19 Crisis and Recovery.
- Osuna, V., & García-Pérez, J. I. (2015). On the effectiveness of short-time work schemes in dual labor markets. *De Economist*, 163(3), 323-351.
- Osuna, V., & García Pérez, J. I. (2022). Temporary layoffs, short-time work and COVID-19: the case of a dual labour market. *Applied Economic Analysis*, 30(90), 248-262.
- Schmieder, J. F., Wachter, T. von, & Bender, S. (2013). The Causal Effect of Unemployment Duration on Wages: Evidence from Unemployment Insurance Extensions. *NBER Working Papers* No. 19772.
- Schoefer, B. (2021). The financial channel of wage rigidity. *National Bureau of Economic Research* No. 29201.
- Tracey, M. R., & Polachek, S. W. (2020). Heterogeneous Layoff Effects of the US Short-Time Compensation Program. *LABOUR*, 34(4), 399–426.
- Villanueva, E. A. (2022). Employment and Wage Effects of Extending Collective Bargaining Agreements. *IZA World of Labor*.

Appendix

A.1. STW in the policy toolkit of continental Europe's labor markets

We focus on two labor market institutions (LMIs) that favor the implementation of STW schemes as a buffer to economic shocks: multi-period collective agreements and the regulation for (involuntary) dismissals. We first present the theoretical arguments that propose a link between these institutions and STW take-up and, if present, we provide empirical evidence supporting these correlations.¹

(1) Institutional constraints and frictions to bargaining on wages and hours

In most European countries, collective agreements regulate the working conditions of unionized and non-unionized workers (Villanueva, 2022). Their provisions include wages (floors), hours, and employment regulations bargained at the national or industry level. These collective agreements impede the adoption of firm–worker agreements regarding wages and hours (Boeri and Bruecker, 2011) and limit the transfer of the job-match surplus between these two parties (Acemoglu, 1995; Hall and Lazear, 1984; Jäger, Schoefer, and Zweimüller, 2022). As a result, the downward rigidity of wages and hours may lead to the destruction of matches whose surplus is still positive for workers (Giupponi and Landais, 2023).² By preserving job relationships with a positive surplus, STW offers flexibility to firms in this institutional environment.

Drawing on evidence from the Great Recession in Italy, Giupponi and Landais (2023) document important rigidities in bargaining between workers and firms that motivated high STW take-up rates during the Great Recession. Regarding wages, they observe that the distribution of hourly wage changes is strongly skewed, with little mass just below zero.³ Regarding hours, they also find evidence of strong rigidities, as at least 70% of workers do not see variation in weekly hours of work over time. Relying on a wider set of countries, Lydon et al. (2019) show that sectors with higher levels of wage rigidity also display higher take-up.

Biancardi et al. (2022) argue that the presence of unions in a firm affects the adoption of STW in two ways. First, unions aim to maximize the welfare of their members, which is determined by their employment and wages. As a result, they favor the use of working-time reduction via STW over wage cuts and layoffs when firms reduce costs in reaction to an economic shock. Second, unions are involved in the practical implementation of STW in the workplace. In particular, they advocate for firms to complement the STW allowance with a premium. During the COVID-19 shock, sectoral collective bargaining agreements also shaped the design of STW and enhanced its uptake. For example, in Germany provisions have been adopted to raise replacement rates for workers up to 90% and allow the adoption of STW for workers in the public sector (OECD, 2021). While this increases the value of STW insurance to workers, it

¹ Recent empirical evidence evaluates the effects of STW on employment, firm survival, and worker outcomes in contexts where labor markets feature collective bargaining agreements (Giupponi and Landais, 2022), firm-level unionization (Biancardi et al., 2022; Lucifora and Origo, 2022), and dual labor markets (García-Pérez and Osuna, 2015; García-Pérez and Osuna, 2022).

² Furthermore, wage rigidity amplifies fluctuations in the cash flow of firms and, due to financial constraints, their capacity to hire, invest in, and hoard labor (Schoefer, 2021).

³ However, the distribution is asymmetric, meaning that workers' wages respond to positive productivity shocks.

creates disincentives for firms to adopt STW as it makes its use more expensive.

(2) Asymmetric degree of strictness of employment protection laws (EPL)

European countries exhibit asymmetric strictness in the regulations for involuntary individual or collective dismissals between workers with open-ended contracts and workers with temporary contracts, such as workers on fixed-term contracts. For the first group, the firing costs – severance payments and extended notice periods – are much higher than for the second group. Over the last two decades, two-tier reforms of EPL have widened the asymmetry between these contract types, contributing to the creation of a dual regime.⁴

There are benefits and costs associated with STW in this setting. On the one hand, preserving job relationships that are temporarily unprofitable is warranted during temporary economic slumps and STW complements the lack of external flexibility from strict job protection regulations (Boeri and Cahuc, 2023).⁵ As demonstrated by Lydon et al. (2019), the relationship between EPL and STW uptake is strong and positive. On the other hand, even though STW reduces job losses, it has the disadvantage of not benefiting all workers equally and of creating barriers to entry in the labor market. Boeri and Cahuc (2023) underline that program uptake is concentrated in open-ended relationships, with less protection for temporary workers that are often used as an (additional) buffer during an economic downturn (Bertola, Boeri, and Cazes, 1999; Kugler and Pica, 2008). Workers with permanent contracts are more likely to use STW than temporary workers because laying off workers on permanent contracts is far more expensive, with the firing costs and opportunity costs of lost human capital investments being substantially higher than for workers on a temporary contract.

⁴ The goal of two-tier EPL reforms is to promote labor market flexibility by liberalizing the use of fixed-term contracts and leaving EPL for open-ended ones unaltered.

⁵ It is well-established that countries with less stringent EPL, like the US, operate adjustments through temporary layoffs rather than flexible working hours (Abraham and Houseman, 2014; Eichroost et al., 2022).

Table A.1. STW design features and COVID-19 modifications for four selected European countries

| Design features | Rules | Regulation changes during COVID-19 |
|--|---|--|
| <p>Entitlement conditions</p> <p>Set of rules for firms and workers to qualify for and gain access to STW</p> | <p><u>Firms:</u></p> <ul style="list-style-type: none"> ○ Evidence of <i>temporary</i> economic need (<i>Belgium, France, Germany, Italy</i>) ○ Evidence of <i>structural</i> economic need: company reorganization or restructuring (<i>France, Germany, Italy</i>) ○ Agreement between the firm, social partners, and workers (<i>Belgium, France, Germany, Italy</i>) ○ Firm size (<i>Italy</i>) <p><u>Workers:</u></p> <ul style="list-style-type: none"> ○ Full-time or part-time contract (<i>Belgium, France, Germany, Italy</i>) ○ Temporary contract, temporary agency workers, apprentices (<i>Belgium, France, Italy</i>) ○ Eligibility for regular UI (<i>Belgium, Germany</i>) ○ Tenure (<i>Italy</i>) | <p><u>Firms:</u></p> <ul style="list-style-type: none"> ○ Creation of a new COVID-19-specific regime <p><i>Belgium: Force Majeure Corona</i> <i>France: Activité Partielle de Longue Durée (APLD)</i> <i>Italy: Cassa Integrazione Guadagni (CIG) Covid</i></p> <ul style="list-style-type: none"> ○ Easing access - Invoke the health crisis as the forefront reason for the economic shock (<i>Italy</i>) - STW entitlement for companies of any size (<i>Italy</i>) ○ Simplification of administrative procedures (<i>Belgium, France, Germany, Italy</i>) <p><u>Workers:</u></p> <ul style="list-style-type: none"> ○ Extension of coverage to non-standard workers (<i>France, Germany</i>) |
| <p>Conditionality requirements</p> <p>Behavioral requirements for firms and workers while on STW benefits</p> | <p><u>Firms:</u></p> <ul style="list-style-type: none"> ○ No dismissals during or for a brief period following STW support (<i>France, Germany: dismissals are possible but lead to the firm's loss of STW benefit entitlement</i>) ○ Recovery plan (<i>Belgium</i>) <p><u>Workers:</u></p> <ul style="list-style-type: none"> ○ Job search during idle hours (<i>Belgium after six months of STW uptake</i>) ○ Training during idle hours (<i>Belgium, Italy; optional in France and Germany</i>) | <p><u>Firms and workers:</u></p> <ul style="list-style-type: none"> ○ Reinforcement of training <p><i>France: Firms provide training to workers, of which costs are then reimbursed by the government (up to 100% until October 2020; from 70% to 80% since then, with a cap of 6,000 euros).</i></p> |
| <p>Cost sharing</p> <p>Cost of participation for firms and generosity of STW allowances for workers</p> | <p><u>Firms:</u></p> <ul style="list-style-type: none"> ○ Payment for a portion of subsidies for reduced hours (<i>France, Germany, Italy</i>) ○ Social security contributions for hours not worked (<i>Belgium, France, Italy, Germany</i>) | <p><u>Firms:</u></p> <ul style="list-style-type: none"> ○ Zero (or low) costs <p><i>Belgium: The newly introduced Force Majeure Corona regime entailed no costs for firms;</i></p> |

| | | |
|--|--|---|
| | <ul style="list-style-type: none"> ○ Top-ups of worker allowances, in accordance with collective labor agreements (CLAs) or on a voluntary basis (<i>Belgium, Italy (CIGS)</i>) ○ Experience rating (<i>Belgium, Italy</i>) <p><u>Workers:</u> ^{6,7}</p> <ul style="list-style-type: none"> ○ Contribution rate as the difference between full insurance (100% of earnings) and their replacement rate (% of full earnings subsidized) <p><i>Belgium:</i> 65% of gross daily wage up to a cap; <i>France:</i> 60% of gross hourly wage with a lower limit at 6.84; <i>Germany:</i> 67% of net wage up to a cap; <i>Italy:</i> 80% replacement rate up to a cap.</p> | <p><i>Italy:</i> Firms bear no costs;</p> <p><i>France:</i> Costs are fully covered by the government in particularly affected sectors (i.e., tourism, hospitality, and culture). From June 2020, firm costs were resumed to 15% of the net wage-replacement rate for workers. From November 2020, the amount increased to 40%;</p> <p><i>France (ALDP):</i> Reimbursement by the government of firm's payments for subsidies up to 60%.</p> <p><u>Workers:</u></p> <ul style="list-style-type: none"> ○ Higher replacement rates <p><i>Belgium:</i> 70% of gross daily wage up to a cap;</p> <p><i>France:</i> 100% of the net pay for the minimum wage; 84% for higher gross wages up to a maximum of 4.5 times the minimum wage;</p> <p><i>France (ALDP):</i> 70% of gross wage for hours not worked;</p> <p><i>Germany:</i> 10% increase in the replacement rate for workers on STW for more than 3 months.</p> <ul style="list-style-type: none"> ○ Additional payments <p><i>Belgium (Force Majeure Corona):</i> Top-ups to worker subsidies from the social security office.</p> |
| <p style="text-align: center;"><i>Working-time arrangements</i></p> <p>Dispositions on working-time reductions across the workforce in the firm</p> | <p>On the working-time reduction:</p> <ul style="list-style-type: none"> ○ Days and/or hours (<i>hours in France, Germany, Italy; days or half-days in Belgium</i>) ○ Partial suspension or total halt of activity (<i>Belgium, France, Germany, Italy</i>) ○ Maximum duration and continuous use <p><i>Belgium:</i> 6 or 12 months for partial suspension; 3 months for a total halt; <i>France:</i> 6 months if partial suspension and 6 weeks if total halt; <i>Germany:</i> up to 12 months;</p> <p><i>Italy:</i> 36 months over a 5-year period.</p> <ul style="list-style-type: none"> ○ Division across the workforce: | <ul style="list-style-type: none"> ○ Increase in the maximum working-time reduction <p><i>France (ALDP):</i> 40% of total hours (50% in exceptional cases).</p> <ul style="list-style-type: none"> ○ Extension of the maximum duration and maximum period of continuous use <p><i>Belgium (Force Majeure Corona):</i> undefined duration; <i>France (APLD):</i> Limited to 24 months over a period of 36 months;</p> <p><i>Germany:</i> up to 24 months.</p> <ul style="list-style-type: none"> ○ Greater flexibility in the division across the workforce: <p><i>Germany:</i> 10% hours reduction for 10% – instead of 30% – of</p> |

⁶ The earnings cap on wage replacement also defines the generosity of STW.

⁷ Flat in the majority of countries (i.e. Belgium, France, Germany, Italy), dependent on the family situation for others.

| | | |
|--|--|--|
| | <ul style="list-style-type: none"> - a minimum number or share of employees (<i>Germany: 10% hours reduction for 30% of the workforce</i>⁸) - restrictions on the minimum and/or maximum number⁹ of hours (<i>France: up to 1,000 hours per year</i>). | <p>the workforce;</p> <p><i>France: the ceiling of hours reduced was set at 1,607 hours per year, rather than 1,000.</i></p> |
|--|--|--|

Sources: OECD (2020), Eichhorst et al. (2022).

Notes: This table describes the four main design features of STW systems in four selected European countries before the COVID-19 crisis and the policy modifications adopted as a response to this crisis. The four design features are entitlement conditions, conditionality requirements, cost sharing, and working-time arrangements. The selected countries are Belgium, France, Germany, and Italy. These countries are selected because they have well-established STW programs: *Chômage temporaire* in Belgium was introduced at the beginning of 1930, *Activité Partielle* was implemented in France in 1968, *Kurzarbeit* in Germany began in 1927, and *Cassa Integrazione* was introduced in Italy in 1940 (Boeri and Bruecker, 2011). For the COVID-19 period (starting in March 2020), STW policy changes for Belgium, France, and Italy refer to the rules for the newly introduced regimes: *Force Majeure Corona*, *Activité Partielle de Longue Durée (ALDP)*, and *CIG Covid*, respectively.

⁸ This is also an eligibility criterion for being entitled to STW in Germany.

⁹ Most countries do not impose maximum hour-reductions per worker, meaning that STW allows both partial and full suspension of activity.

Table A.2. Summary of recent impact evaluations of STW regarding the economic behavior of firms during the Great Recession.

| Study | Type of effect | Outcome | Cumulative effect: contemporaneous and past dynamic effects | Short run effects | Long run effects | STW design and context | Period of analysis | Method | Sample |
|--|------------------------------|---|---|---|---|---|--------------------------|----------------|--|
| | | | | <i>1 year of treatment</i> | <i>Up to 5 years of treatment</i> | | | | |
| Giupponi and Landais (2022) | Average effects | Headcount employment per firm | 0.382 (0.036) | 0.2 | close to 0 (not significant) | Shock: Protracted crisis. Target: manufacturin g and service firms experiencing temporary shocks, including firm restructuring. | 2009- 2014 | IV approach | Firms with 5 to 25 FTE |
| Italy | | Hours of work per employee per firm | -0.511 (0.036) | -0.3 | close to 0 (not significant) | | | | |
| Program: CIGS | | Probability of survival in the next year | 0.104 (0.038) | | | | | | |
| Year of introduction of the program: 1941 | Heterogeneous effects | Firms with low liquidity: Larger effects on headcount employment per firm (relative to hours reduction) and firm survival. | 2.53 (0.29) ^ψ and 16.69% (5.98%) | N/A | N/A | | | | |
| | | Firms with low pre-crisis productivity levels: Larger negative effect in hours per employee and lower effects in employment. No effect on firm survival. | 0.04 (0.24) and 0 | N/A | N/A | | | | |
| | | | | <i>2008-2009</i> | <i>2008-2011</i> | | | | |
| Cahuc et al. (2021) | Average effects | Headcount employment per firm | | 0.084 (0.064) | 0.314 (0.169) | Shock: temporary. Target: firms experiencing temporary economic shocks. | 2008- 2011 | IV approach | Single- establishment firms with more than 4 employees |
| France | | Hours of work per employee per firm | | -0.277 (0.028) | -0.190 (0.030) | | | | |
| Program: Chômage Partiel | | Hours per firm | | -0.191 (0.061) | -0.023 (0.162) | | | | |
| Year of introduction of the program: 1951 | Heterogeneous effects | Firms with large (but temporary) negative shocks: Large increase in the total number of hours per firm and headcount employment. No statistically significant differential effect in firm survival with respect to firms that suffer small shocks. | | Growth in headcount employment: +42% (16%) | Growth in headcount employment: +69.6% (21.3%) | | | | |
| | | | | Growth in total hours: +33.8% (13.5%) | Growth in total hours: +66.5% (26.0%) | | | | |
| | | | | Growth in hours per employee: -14.9% (4.2%) | Growth in hours per employee: -4.5% (9.4%) | | | | |

Notes: This table presents a summary of the studies discussed in Section 3. (†) The semi-elasticity effect is $(e^{0.382} - 1) * 100 = 46\%$ and $(e^{-0.511} - 1) * 100 = -40\%$, respectively. (ψ) Elasticity of headcount employment with respect to the drop in hours per worker.

Table A.2. (Continued): Summary of recent impact evaluations of STW regarding the economic behavior of firms during the Great Recession.

| Study | Type of effect | Outcome | Short run effects | Long run effects | STW design and context | Period of analysis | Method | Sample |
|---|-----------------------|--|--|---|---|--------------------|--|--|
| | | | 1 year after | 4.5 years after | | | | |
| Kopp and Siegenthaler (2021) Switzerland Program: Réduction de l'horaire de travail. Year of introduction of the program: 1982 | Average effects | Net share of dismissed workers * | -0.065 (0.008) and -0.123 (0.045) | -0.104 (0.024) and -0.152 (0.067) | Target: firms experiencing temporary cyclical economic shocks. Avoiding firms with structural problems. | 2007-2014 | Event study approach / IV approach | Establishments with fewer than 500 employees |
| | | FTE employment growth * | N/A | Between 0.094 (0.057) and 0.162 (0.057) ^ψ | | | | |
| | | Establishment survival rate | N/A | Between 0.055 (0.021) and 0.090 (0.020) | | | | |
| | Heterogeneous effects | Firms that took up STW between 2011-2012, where there was a permanent appreciation of the Swiss franc: Smaller effects in dismissals compared to those that took up the program in the V-shaped Great Recession (2009). | Take-up in 2011: -0.054 (0.040) Take-up in 2012: -0.017 (0.057) | Take-up in 2011: -0.070 (0.066) Take-up in 2012: 0.046 (0.164) | | | | |
| | | Small establishments (1 - 9 employees): Larger effects on dismissals than large establishments. | -0.068 (0.011) | -0.113 (0.033) | | | | |
| | | Exporter firms: larger effects on dismissals than non-exporters. | -0.051 (0.019) | -0.061 (0.022) | | | | |
| Kato and Kodama (2019) Japan Program: Koyo Chosei Joseikin. Year of introduction of the program: 1975 | Average effects | Profitability measure: ROA Profitability measure: Profit margin Log of sales | 1 year after the first year of subsidy 0.0047 (0.003) 0.003 (0.004) 0.015 (0.018) | 2 years after the first year of subsidy 0.016 (0.006) [†] 0.012 (0.005) 0.046 (0.018) | Target: firms experiencing temporary cyclical shocks | 2008-2014 | Propensity-score matching and a DID approach | Firms with 50 or more employees in the manufacturing, trade, and certain service sectors |

Notes: This table presents a summary of the studies discussed in Section 3. (Ψ) These are Intention-to-Treat (ITT) effects in that they refer to the effect of a successful STW application on the outcome analyzed. They go from 9% to 17% depending on the specification. The corresponding Average Treatment on the Treated (ATT) effect is calculated dividing each ITT effect by the share of workers of treated firms covered by STW, which is 0.47. The ATT results suggest that around 0.19–0.36 full-time jobs were saved for every worker in an STW program in Switzerland during the Great Recession. (†) Sizable effect. Considering that the mean Return-on-Assets (ROA) is 4 percent, the effect suggests that ROA will be around 1 percentage point higher two years after the use of STW. (φ) Effects can be interpreted as elasticities per each additional hour in STW. For example, a 10% increase in hours in STW causes a decline of 0.07 points in ROA. (*) The net share of dismissed workers captures the net effect of an establishment's hiring and firing on the stock of the unemployed. The FTE employment growth is not the actual FTE worked but, rather, contractual FTE work; it distinguishes employment according to the number of contractual hours of work.

Table A.2. (Continued): Summary of recent impact evaluations of STW regarding the economic behavior of firms during the Great Recession.

| Study | Type of effect | Outcome | Short run effects | Long run effects | STW design and context | Period of analysis | Method | Sample | |
|--|------------------------------|---|---|-----------------------|--|--------------------|-------------|-----------------------------------|--|
| | | | Year of take-up | 2 years after take-up | | | | | |
| | | | Working hours per employee | -0.020 (0.011) | -0.008 (0.049) | | | | |
| | | | Hourly productivity (value added per hour) | -0.004 (0.018) | -0.016 (0.031) | | | | |
| | | | Average effects Per capita labor productivity (value added per employee) | -0.034 (0.014) | 0.013 (0.033) | | | | |
| | | | Profitability (ROA) | -0.700 (0.306) ϕ | 0.986 (1.015) | | | | |
| | | | Per capita labor costs | -0.055 (0.025) | -0.014 (0.020) | | | | |
| Biancardi et al. (2022) Italy Program: CIGS. Year of introduction of the program: 1941 | Heterogeneous effects | Level of firm unionization: Low-unionized firms benefit the most in terms of per capita labor cost savings from STW compared to highly unionized firms. | Working hours per employee: -0.018 (0.013) vs. -0.046 (0.023) Labor cost per employee: -0.070(0.035) vs. -0.006(0.022) | N/A | Shock: Protracted crisis. Target: manufacturing and service firms experiencing temporary shocks, including firm restructuring | 2009-2015 | IV approach | Sample of metal engineering firms | |
| | | Duration of use of STW: Larger savings in labor costs per employee for firms that use STW for less than one year with respect to those that use it for a longer period of time. Larger losses in labor productivity and profits. | Labor cost per employee: -0.086 (0.052) vs. -0.045 (0.029) | N/A | | | | | |
| | | Pre-crisis Liquidity level: Larger savings in labor costs per employee for firms with liquidity levels below the median than firms with liquidity levels above the median. | Labor cost per employee: -0.095(0.046) vs. -0.024 (0.018) | N/A | | | | | |

Note: This table presents a summary of the studies discussed in Section 3.