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ABSTRACT

The present paper provides the most comprehensive assessment to date of the impact of short-time work (STW) schemes during the 2008-09 crisis. The analysis covers 19 OECD countries, 11 of which operated a short-time work scheme before the crisis, five countries introduced a new scheme during the crisis period and three countries never had a short-time work scheme. In order to identify the causal effects of short-time work, a difference-in-differences approach is adopted that exploits the variation in labour-adjustment patterns and the intensity with which STW schemes are used across countries and time. The estimates support the conclusion that STW schemes had an economically important impact on preserving jobs during the economic downturn, with the largest impacts of STW on employment in Germany and Japan among the 16 countries considered. However, the positive impact of STW was limited to workers with permanent contracts, thereby further increasing labour market segmentation between workers in regular jobs and workers in temporary and part-time jobs. The estimated jobs impact is smaller than the potential number of jobs saved as implied by the full-time equivalent number of participants in short-time work, suggesting that STW schemes end up supporting some jobs that would have been maintained in the absence of the subsidy. However, the estimated deadweight is less than that usually estimated for other job subsidy measures. As the OECD area is only just starting to emerge from the crisis, it is still too early to assess the impact of STW schemes in the longer term. Indeed, the main concerns about STW schemes relate to their potentially adverse impacts on the vigour of employment growth during the recovery and economic restructuring in the longer run.

RÉSUMÉ

Ce document fournit l'évaluation la plus complète à ce jour de l'impact des dispositifs de chômage partiel au cours de la crise de 2008-09. L'analyse couvre 19 pays de l'OCDE, dont 11 disposant d'un dispositif de chômage partiel avant la crise, cinq pays en ayant introduit un nouveau au cours de la période de crise et trois pays n'en ayant jamais eu. Afin d'identifier les effets de causalité du chômage partiel, une approche par différence en différences est adoptée, qui exploite la variation dans les modalités d'ajustement de l'emploi et l'intensité avec laquelle les dispositifs de chômage partiel sont utilisés à travers les pays et le temps. Les estimations viennent étayer la conclusion selon laquelle les systèmes d'indemnisation du chômage partiel ont un impact économique important dans la préservation de l'emploi en phase de ralentissement de l'économie, avec des dispositifs de chômage partiel ayant les plus forts impacts sur l'emploi parmi les 16 pays considérés en Allemagne et au Japon. Toutefois, l'incidence bénéfique du chômage partiel s'est limitée aux effectifs permanents, creusant ainsi encore davantage le fossé avec les travailleurs temporaires et à temps partiel L'impact estimé sur l'emploi est plus faible que le nombre potentiel d'emplois sauvés comme le sous-entend le nombre de participants au chômage partiel en équivalent plein temps, ce qui donne à penser que les dispositifs de chômage partiel soutiennent certains emplois qui auraient été maintenus même sans subvention. Toutefois, l'effet d'aubaine est inférieur à celui qui est généralement estimé pour d'autres types d'aides à l'emploi. La zone OCDE étant tout juste en train de sortir de la crise, il est trop tôt encore pour déterminer l'impact des dispositifs de chômage partiel à plus long terme. En effet, les principales préoccupations concernant les dispositifs de chômage partiel tiennent à leur impact potentiellement négatif sur la vigueur de la croissance de l'emploi pendant la reprise et les restructurations économiques à plus long terme.

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1. Introduction

1. Short-time work (STW) programmes are public schemes that are intended to preserve jobs at firms experiencing temporarily low demand by encouraging work-sharing, while also providing income-support to workers whose hours are reduced due to a shortened workweek or temporary lay-offs. The purpose of STW schemes is to avoid "excessive" layoffs, that is, the permanent dismissal of workers during a business downturn whose jobs would be viable in the long-run. In principle, a well-designed STW scheme can promote both equity and efficiency: *i)* equity, by sharing the burden of adjustment more equally across the workforce; and *ii)* efficiency, by preventing transitory factors from destroying valuable job matches (OECD, 2009a). A crucial aspect of all STW schemes is that the contract of an employee with the firm is maintained during the period of STW or the suspension of work.

2. Like other types of job subsidies, STW schemes are subject to *deadweight* and *displacement* effects that reduce their cost-effectiveness. Deadweight occurs when STW subsidies are paid for jobs that employers would have retained even in the absence of the subsidy, implying that this spending is a pure transfer which does not limit total job losses. This may occur when firms have sufficiently strong incentives to retain redundant workers during the period of reduced output demand or when private arrangements between social partners are employed to limit job losses (*e.g.* time-banking). Displacement effects occur when STW schemes preserve jobs that are not viable without the subsidy, even after business conditions recover. If these subsidies are maintained, they lock workers into low-productivity job matches and thus represent a barrier to job creation and efficiency-enhancing labour mobility.

3. During recessions the balance of costs and benefits associated with short-time work schemes may temporarily become more favourable. The efficiency cost of short-time working may be reduced during a recession since many more jobs are at risk, especially those in firms whose access to credit is limited, while the social cost of locking workers in unviable jobs is temporarily lower since there is little prospect they could move quickly into more productive jobs. The gains from preventing "excessive" layoffs during a recession may also increase due to the longer expected duration of unemployment and its adverse impact on future careers.

4. Indeed, governments have shown a strong interest in short-time work schemes during the downturn of 2008-09. Twenty-two OECD countries reported either setting up new measures or adjusting existing measures in response to the current downturn. Crisis-related reforms to short-time work schemes typically intended to increase their economic impact by encouraging take-up. As a result, participation in such schemes increased dramatically since the start of the crisis. Take-up was highest in Belgium, Turkey, Italy, Germany and Japan, accounting for over 3 to almost 6% of all employees in 2009.

5. Given the size and prominence of STW schemes during the 2008-09 recession, it is important to understand their role. A common conjecture is that the vigorous promotion of work-sharing via STW schemes deserves much of the credit for limiting the rise in unemployment during the 2008-09 crisis.[1]

1. For example, *The Economist* of 8 July 2010 cited Angela Merkel stating to German parliament that "It is only thanks to *Kurzarbeit* that more jobs were not lost".

Indeed, the rise in unemployment has been small in many countries compared with what would have been expected given the size of the decline in output, and this is due in large part to reductions in average hours having accounted for an unusually high share of the total adjustment in labour input (Möller, 2009; OECD, 2010). However, the true extent to which these labour adjustment patterns can indeed be attributed to the intensive use of STW schemes during the crisis is unclear, since there has been little systematic evaluation so far of the effectiveness of STW schemes in preserving jobs during the crisis.

6. Most of the evidence to date on the role of STW schemes in saving jobs during the 2008-09 recession is based on accounting exercises that, by converting the total number of hours subsidised into the number of full-time equivalent employees, provide an indication of the *potential* number of jobs saved as a result of STW schemes (see, for example, Bach *et al.*, 2009). However, this approach does not take account of the size of deadweight and displacement effects. The fundamental limitation of accounting exercises of this type is that they do not rely on a realistic *no-STW counterfactual* against which observed labour market outcomes can be assessed.

7. The present paper seeks to fill this gap in the literature by providing the most comprehensive assessment so far of the impact of short-time work schemes during the 2008-09 crisis on employment and average hours worked. An explicit and economically meaningful counterfactual is derived by means of a difference-in-differences approach that exploits the variation in labour-adjustment patterns and the intensity with which STW schemes are used across countries before and during the crisis. By benchmarking the cross-country comparison during the crisis to the period that preceded it, the analysis takes account of the role played by factors other than STW schemes, such as employment and hours regulations, that affect labour-demand adjustment but whose impact is independent of the crisis. Another key feature of the analysis is that it consistently distinguishes between *permanent* and *temporary* workers. This is crucial for analysing the implications of STW during the downturn since temporary workers are much more likely to lose their job in an economic downturn, but are less likely to participate in STW.

8. The structure of the paper is as follows. Section 2 outlines the institutional features of STW schemes in operation in OECD countries during the 2008-09 recession. Section 3 presents some basic descriptive statistics on take-up rates, highlighting the variation in take-up and hours reductions between countries. Section 4 summarises existing studies of the impact of STW schemes. Section 5 outlines the methodology used to analyse the impact of STW on labour market outcomes. Section 6 presents the results, along with various sensitivity tests. Section 7 concludes.

2. STW schemes during the recession

9. Most OECD countries have operated a short-time work or partial unemployment benefit scheme during the recession. In general, such schemes were in place prior to the crisis, although new schemes were introduced in Poland, the Netherlands, Hungary, the Czech Republic, the Slovak Republic, Mexico and New Zealand. In addition, many countries extended the coverage or generosity of existing schemes or relaxed eligibility or administrative requirements in order to encourage take-up. This section will present an overview of the main features of STW schemes operating during the recession in 24 OECD countries.[2] The discussion is organised around work-sharing requirements, eligibility requirements, conditionality requirements and generosity. Considerable diversity is present in all of these areas and these differences in national practice appear to reflect different strategies for balancing concerns about assuring adequate take-up and limiting deadweight and displacement effects. Special attention is given to the role of design for take-up as this plays a central role in the regression analysis reported below.

2. Due to data limitations, the empirical analysis only includes sixteen countries that operated STW schemes during the crisis.

2.1. Work-sharing requirements

10. Work-sharing requirements specify how working-time reductions are to be distributed across the workforce of participating firms, including by setting a minimum number or share of workers who must participate or limits on minimum or maximum hours reduction. Table 1 shows the range of permissible hours reductions for a short-time worker during the recession. Fifteen of the 24 countries set a minimum hours reduction limit which ranges from 40% in Norway to 10% or less in Austria, Germany, Switzerland and the Slovak Republic. In addition, Canada, Denmark, Hungary, Korea, Switzerland and the United States require that a minimum number of workers participate in STW. Relatively high minimum hours reductions, together with the requirements that a minimum number or proportion of workers participate in six countries, are probably intended to limit STW participation to firms experiencing a significant deterioration in business conditions. However, having minimum participation requirements along with maximum limits on hours reductions can also be justified as encouraging broader sharing of the hours reduction across the workforce.

Table 1. **Maximum and minimum permissible reductions in weekly working hours for short-time workers during the 2008-09 recession**

Percentage of normal working hours

	Minimum[a]	Maximum
Austria	10%	90%
Belgium	0%	100%
Canada	20%	60%
Czech Republic	0%	100%
Denmark[b]	40%	100%
Finland	25%	100%
France	0%	100%
Germany	10%	100%
Hungary	20%	100%
Ireland[c]	40%	100%
Italy	0%	100%
Japan	0%	100%
Korea	7%	100%
Luxembourg	0%	50%
Netherlands	20%	50%
New Zealand[d]	0%	12.5%
Norway	40%	100%
Poland	0%	100%
Portugal	0%	100%
Slovak Republic	4%	100%
Spain	33%	100%
Switzerland	10%	100%
Turkey	33%	100%
United States[e]	Typically 10-20%	Typically 40-60%

a) Reduction of 0% means that there is no minimum hours reduction specified. However, short-time workers must work less than their normal hours to qualify.
b) In Denmark, minimum hours reduction is two days per week, or one week work and one week of benefits.
c) In Ireland, minimum hours reduction is 2 days per week.
d) In New Zealand, maximum hours reduction is 10 hours per fortnight (cannot work more than 30 hours/week)
e) In the United States, minimum and maximum hours reductions vary by state.
Source: Information provided by delegates to the OECD Working Party on Employment.

11. In the majority of countries, there is no maximum hours reduction per worker, implying that short-time work can take the form of temporary layoffs (*e.g.* actual hours are reduced to zero), as well as partial reductions in working time. Austria, Canada, Luxembourg, the Netherlands, New Zealand and some US states have placed limits on the maximum reduction in working time in order to exclude the possibility

of temporary layoffs.[3] This may be motivated by the desire to encourage work-sharing and thereby spread the burden of adjustment across a larger group of workers. Denmark and Switzerland promote this goal directly by requiring that short-time work apply to at least an entire production unit. In countries where the maximum duration of STW participation is relatively long, work-sharing requirements may also reflect concerns about the impact of long temporary layoffs on future employability, since valuable work experience may be lost.

12. The implications of work-sharing requirements such as those set out in Table 1 for take-up are not clear *a priori*. While restrictions on working-time reductions may reduce take-up by employers, encouraging work-sharing across a larger group of workers within participating firms may raise take-up as measured by the number of workers affected, if not in terms of the total reduction in hours worked.

2.2. Eligibility and conditionality requirements

13. Eligibility requirements set conditions that employers or workers must meet in order to participate in the programme. In most countries, firm eligibility is based on the proof of economic need, such as a minimum reduction in production and/or business activity (Table 2).[4] An explicit agreement between the social partners or between employer and employees is also required in 15 countries. Both requirements are likely to reduce deadweight losses. When business activity declines sharply, firms are less likely to be capable of preventing job losses by themselves. Similarly, trade unions and other worker representatives are more likely to agree to STW, despite the loss in income that this typically entails for workers, when the only alternative for the firm is to dismiss workers.[5] Requirements for firm eligibility thus limit take-up in a way that is intended to increase cost-effectiveness. However, to the extent that eligibility requirements create substantial administrative costs, there is also a risk that they deter some firms from participating in STW schemes even though doing so would allow viable jobs to be preserved.

14. Worker eligibility for STW is sometimes conditional on meeting the eligibility requirements for regular unemployment benefits, typically minimum social security contribution thresholds. Where they apply, these requirements are likely to limit the eligibility of workers in temporary or part-time jobs for STW programmes. Some countries also exclude certain groups of irregular workers from participating in STW irrespective of their history of social security contributions. A number of countries have attempted to increase STW coverage of non-regular workers during the 2008-09 recession by relaxing eligibility requirements (*e.g.* France, Germany and Japan). However, even if workers in non-regular jobs are eligible for STW in principle, the incentive for firms to place them on STW is likely to be considerably weaker than for their core workforce. Participation in these schemes tends to be costly for employers, while hiring and firing costs tend to be low for workers in non-regular jobs.

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3. Workers who are temporarily laid off in Canada and some US states are entitled to full unemployment benefits. However, available data do not allow us to differentiate between temporarily laid-off and redundant workers, so only partial layoffs are discussed in this paper.

4. The exceptions are Denmark and the Netherlands. Both countries require an agreement with social partners which in practice may have a similar effect as requiring a justification of economic need since without significant economic need, social partners would be unlikely to enter a STW agreement.

5. To the extent that agreements with social partners prior to entering a STW programme may also involve negotiation over the features of the programme, for example, by insisting on no-layoff guarantees, the requirement of having an agreement with social partners could exacerbate displacement effects.

Table 2. **Eligibility and conditionality requirements for STW schemes**

	Eligibility requirements			Conditionality requirements			
	Firm must provide justification of economic need	Social partner agreement	Participating workers must be eligible for UB	Compulsory training	Recovery plan	No dismissal	Job-search requirement for employee
Austria	Yes	Yes	No	No	No	Yes	No
Belgium	Yes	BC: No WC: Yes (or business plan)	No	No	BC: No WC: Yes	No	No
Canada	Yes	Yes	Yes	No	No	No	No
Czech Republic	Yes	Yes	No	Yes	No	No	No
Denmark	No	Yes	No	No	No	No	Yes (when receiving UB)
Finland	Yes	Consultation	Yes	No	No	No	Yes
France	Yes	Yes	No	No	No	Yes	No
Germany	Yes	Yes	Yes	No	No	No	Yes
Hungary	Yes	No	No	Yes	No	Yes	No
Ireland	No	No	Yes	No	No	No	Yes
Italy	Yes	CIGO: No CIGS: Consultation	No	No	Yes	No	No
Japan	Yes	Yes	Yes	No	No	No	No
Korea	Yes	Consultation	Yes	No	No	No	No
Luxembourg	Yes	Yes	..	No	Yes	No	..
Netherlands	No	Yes	Yes	Yes (or secondment)	No	Yes	No
New Zealand	No	Yes	No	No	No	Yes	No
Norway	Yes	No	Yes	No	No	No	Yes
Poland	Yes	Yes	No	No	Yes	Yes	No
Portugal	..	..	..	Yes	No	No	..
Slovak Republic	Yes	Yes	No	No	No	No	No
Spain	Yes	No	No	No	Yes	No	Yes
Switzerland	Yes	Individual agreement with	No	No	No	No	No
Turkey	Yes	No	Yes	No	No	No	No
United States	Yes	Yes	Yes	No	No	No	No

BC: blue collar; CIGO: Cassa Integrazione Guadagni Ordinaria; CIGS: Cassa Integrazione Guadagni Straordinaria; UB: unemployment benefit; WC: white collar.
Source: Information provided by delegates to the OECD Working Party on Employment.

15. Conditionality requirements set behavioural requirements for both employers and workers participating in STW schemes. Behavioural requirements for firms include prohibitions of dismissals during or, in some cases, for a short period after participation in STW schemes (*e.g.* Austria, Hungary, the Netherlands, New Zealand and Poland) and the development of recovery plans (*e.g.* Italy, Luxembourg, Poland, Spain and for white-collar workers in Belgium).[6] Behavioural requirements for workers most frequently take the form of requiring them to engage in active job search during the period when they are not working, particularly in countries where STW is, in effect, a partial benefit administered by the UB system. During the 2008-09 recession, the Czech Republic, Hungary, the Netherlands and Portugal introduced a requirement that workers must participate in training during their idle hours. Several other countries provide subsidies for training during STW or reduce the cost to firms of taking part in STW if they provide training for workers on short-time schedules.

16. These conditionality requirements on workers may help to reduce displacements effects that arise when STW schemes support unviable jobs, since they have the potential to enhance either the viability of the current jobs (via up-grade training) or worker mobility (via job-search or general training). However, there would appear to be an inherent tension between targeting STW subsidies to preserve the most valuable job matches, where it is presumably the case that the workers' skills already correspond well to job requirements, and requiring further training or job search. Take-up of training during STW tends to be low in countries where it is not compulsory. In the current recession, it is estimated that 10% of short-time workers took part in training in Belgium, Denmark, Finland, Italy, Korea, Germany and Switzerland and 10-25% in Austria and Japan.[7] While this may provide a rationale to make training compulsory for governments seeking to reduce displacement effects, it could also indicate that training often is not appropriate or cannot easily be organised, as was concluded by a Canadian study of STW (HRDC, 2004).[8] More generally, conditionality requirements risk excessively reducing take-up, by increasing the costs to firms of programme participation. To minimise this risk, most of the countries that have made training compulsory during periods of short-time work, provide additional subsidies for training (*e.g.* Czech Republic, Hungary and Portugal).

2.3. Generosity

17. The generosity of a STW programme – incorporating the average subsidy to firms and workers and the maximum length of participation – determines the cost of participation for both firms and workers. Figure 1 shows that the extent to which firms share in the cost of STW differs considerably across countries. Even though requiring firms to share in the cost of STW appears to be an effective way of reducing deadweight loss, firms do not bear any part of the cost of STW in Belgium, Canada, Denmark, Finland, Ireland, Spain and Turkey. While firms in the United States are not required to share wage or social security costs for hours not worked, firms may face higher unemployment-insurance premia in the future as a result of participating in STW, due to the experience-rating system for unemployment insurance. In all other countries, firms bear a part of the wage costs for hours not worked (*e.g.* France, Hungary, Japan, Poland, Portugal, Slovak Republic), pay full wages for an initial period of STW (*e.g* Norway, Switzerland) or are responsible for part of the training costs incurred by workers on STW

6. Participating firms in the Work-Sharing programme in Canada were previously required to develop a recovery plan. However, this requirement has been suspended until at least March 2011 in response to the 2008-09 recession.

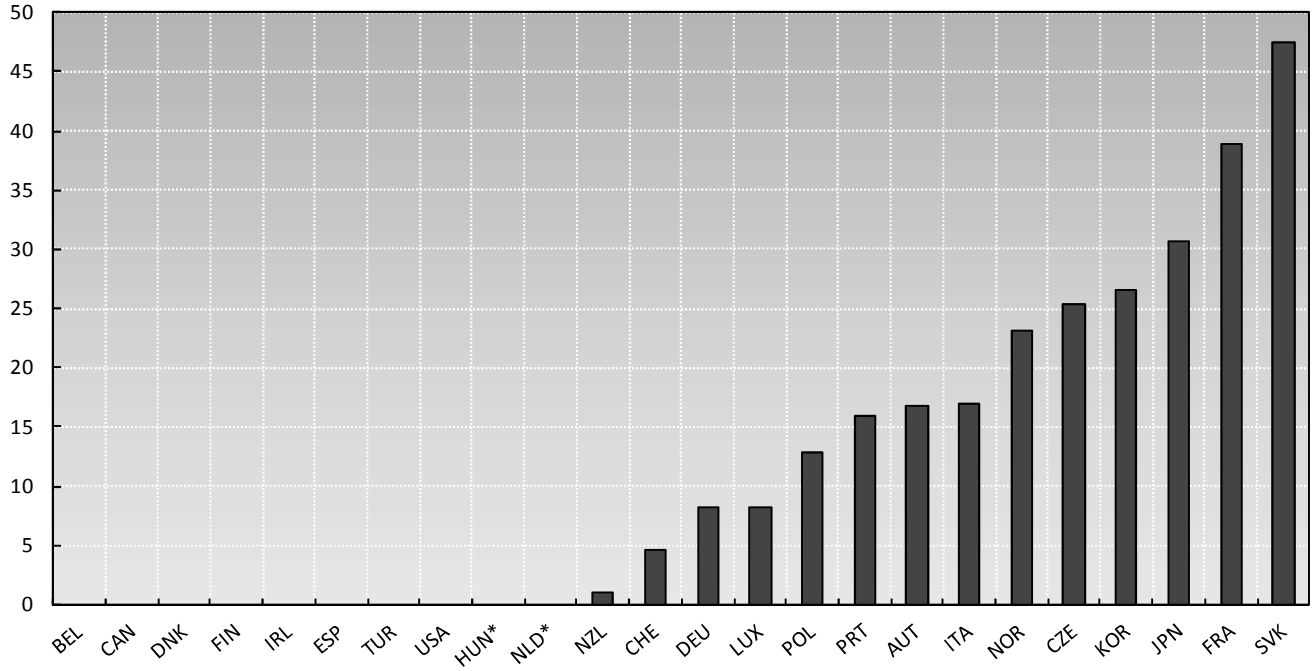
7. Crimmann *et al.* (2010) show using data from before the crisis for Germany, that more qualified and regular staff are more likely to participate in training while on STW than other groups of workers.

8. This may be particularly the case when training has to be provided externally. This requirement reflects the desire to promote job mobility, while avoiding subsidising firm-specific on-the-job training. However, in practice, it may not be straightforward to combine external training courses with variable work schedules in the context of STW schemes.

(*e.g.* Hungary, the Netherlands). Many countries also require firms to pay at least part of normal social security contributions for hours not worked. Firms may also top-up benefits to workers to match their normal wage, either voluntarily or in accordance with collective agreements. This is common in the Netherlands.

Figure 1. **Cost to employer for hours not worked**

Percentage of normal total labour cost for a single worker without children who usually earns the average wage



* Employers in Hungary and the Netherlands are responsible for at least part of the cost of training short-time workers. Participation in training is compulsory for short-time workers in both countries. No data on training costs are available.

Austria: Applies to first six months of STW only.
France: Cost varies from 38% for small firms to 40% for large firms. Average cost is shown in chart.
Germany: Applies for first six months of STW only. No cost if short-time workers take part in training.
Japan: Cost varies from 20% for small firms to 41% for large firms. Average cost is shown in chart.
Korea: Cost varies from 23% for small firms to 30% for large firms. Average cost is shown in chart.
Norway: Employers pay the full wage for the first five days of STW. Average cost over the first month is shown in the chart.
Poland: Cost varies from 6% for hours reductions with training to 12% for work stoppages to 20% for hours reductions without training. Average cost is shown in chart.
Switzerland: Employers must pay the full wage for one day of STW per month plus partial social security contributions. Average cost over a month is shown in the chart.
United States: No direct cost, but can increase future unemployment insurance premia.
Source: Authors' calculations using data from the 2009 OECD Taxing Wages Database and information provided by delegates to the OECD Working Party on Employment.

18. The generosity of income support to workers on STW is likely to be an important factor in explaining the relative ease with which social partners are willing to accept a STW agreement in countries where this is required. The replacement rate for short-time workers is typically the same as that for initial unemployment benefits. However, when combining income from hours worked with STW allowances, short-time workers generally have considerably more income than if they had been made redundant and were relying only on unemployment benefits.[9] Figure 2 shows the range of income that a short-time worker

9. Worker preferences between STW and unemployment are also likely to depend on the relative expected duration of STW and unemployment.

receives, with the range resulting from limits on the minimum and maximum hours reduction allowed under each scheme. In Hungary and Korea, short-time workers suffer no reduction in earnings regardless of the hours reduction because they receive their normal wage for hours not worked. This is considerably higher than the unemployment benefit replacement rate in both countries. In the majority of countries, income falls progressively as hours fall further below their normal level, but remains above the level provided by unemployment benefits, even when their work is completely suspended. In Germany, Denmark, Spain, Ireland, Norway and Poland, short-time workers receive more income than those on unemployment benefits for partial reductions in hours, but replacement rates between the two schemes converge when work is completely suspended. Even in these countries, hours reductions typically were much smaller than the maximum allowed (see section 3), so workers on STW typically receive much more than they would from unemployment benefits. Only in Portugal can unemployment benefits exceed income from STW for the average worker, and even then, only if the hours reduction on STW is more than 55%.[10]

Figure 2. **Worker income as a percentage of normal wage**

For a single worker without children who usually earns the average wage

Note: Data for STW replacement rates refer to the range of replacement rates resulting from the range of permissible hours reductions allowed under each scheme (see Table 1). Data for UB replacement rates are for 2008 and refer to the net replacement rate for unemployment benefits for the initial period of unemployment.
Source: Authors' calculations using data provided by delegates to the OECD Working Party on Employment and the OECD Benefits and Wages and Taxing Wages databases.

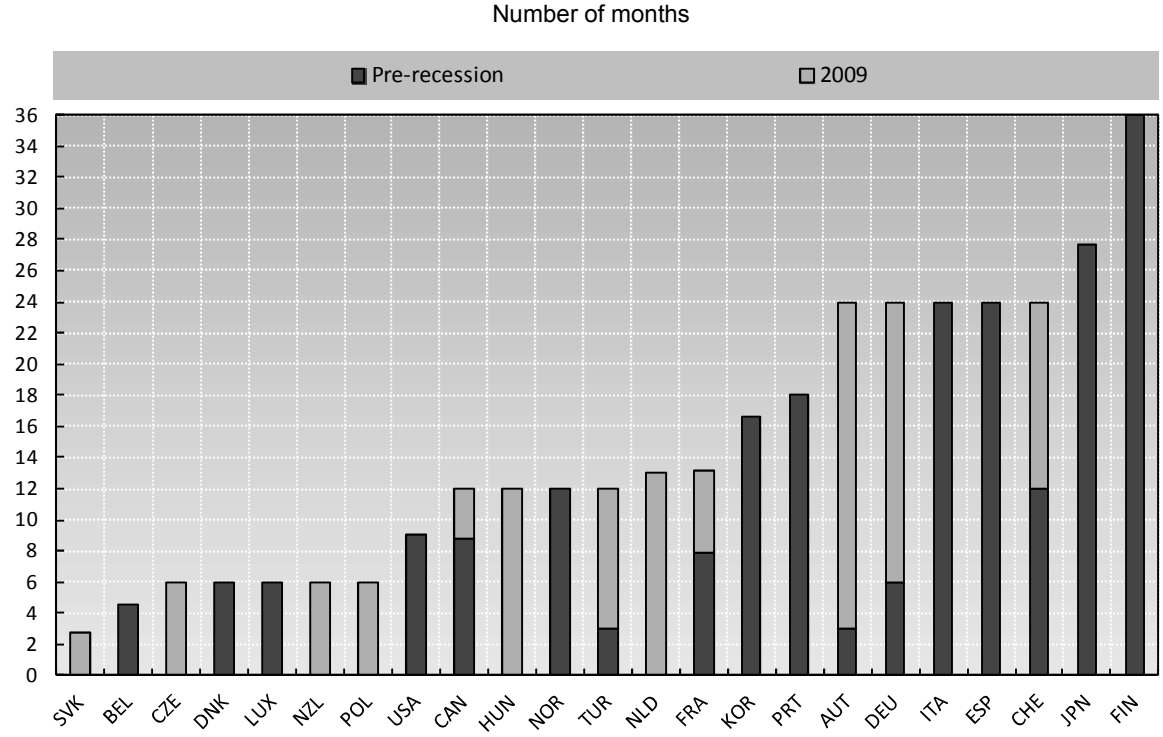
10. In section 3.3, we estimate that the average reduction in hours for short-time workers in Portugal during 2009 was over 80%, leading to a replacement rate (including earnings and STW subsidies) of 77% for workers on STW compared with 84% for unemployment benefits. This may be an important reason why STW take-up is particularly low in Portugal, although the requirement for short-time workers to take part in compulsory training may also discourage participation by firms.

19. It is not clear whether the fact that workers on STW generally receive a higher replacement rate than those on unemployment benefits is intentional or results from a lack of coordination between the two schemes. There are arguments for and against having the same replacement rate for STW and unemployment benefits. On the one hand, the disparity between replacement rates creates adverse incentives for workers to cling to jobs that may not be viable in the longer term. On the other hand, receipt of unemployment benefits may be accompanied by other non-cash benefits such as discounts for public transport, housing or utilities that are not available to short-time workers, so the real replacement rate of unemployment benefits may be larger than the ones shown in Figure 2. However, even if there is little difference in the income workers receive from STW and unemployment benefits, unemployment comes with considerable costs to workers that could encourage them to agree to take part in STW. These costs, including deterioration of skills, loss of firm-specific human capital and uncertainty about whether a new job can be found, are considerably higher during a recession when there are fewer jobs available and competition for vacancies is more intense.

20. Limits to the maximum duration for which STW subsidies are available play a crucial role in ensuring that short-time work schemes do not end up becoming an obstacle to growth-enhancing job reallocation, but are also likely to be an important determinant of take-up, in particular in countries where the administrative costs associated with programme entry are relatively high. Excluding Finland, where there is no time limit, STW schemes operating during the crisis had an average maximum duration of 14 months (median 12 months). Figure 3 shows that several countries extended the maximum duration in response to the recession, quite substantially in Austria, Germany, Switzerland and Turkey. Most new schemes have relatively modest maximum durations of around six months. In Belgium, France, Japan and Korea, there is effectively a fixed number of hours or days of short-time work per employee, so maximum duration depends on the number of hours worked: the fewer hours worked, the shorter the duration. In the Netherlands, duration depends on the moment of application, the number of extensions and the share of the workforce on partial unemployment benefits, with duration being shorter, the larger the share of the workforce that participates in short-time work.[11]

11. By linking workforce participation to duration, employers are encouraged to be more selective when applying for short-time work. This may help to reduce the size of deadweight loss.

Figure 3. **Maximum duration of short-time work**



Note: Estimated maximum duration assumes 50% reduction in working time for France, Korea, Japan and Belgium. In Ireland (not shown), maximum duration depends on contribution record for unemployment benefits, days worked and possibly a decision by the Department of Social Protection.

Belgium: Ranges from 1-12 months for blue-collar and 4-6 months for white-collar workers, depending on the number of hours reduced.
Canada: 78 weeks in 2010.
Finland: Duration is unlimited. Previously 36 months.
France: 1000 hours per employee per year, which is equivalent to 64% of average annual hours actually worked per person in employment in 2008.
Germany: 18 months in 2010.
Japan: 300 days over three years.
Korea: 180 days over one year (90 day extension for vocational training).
Netherlands: Benefits are initially paid for 3 months, with two extensions possible of up to 6 months each time. The maximum duration also depends on the date of entry into the scheme and the number of employees taking part. More employees imply a shorter duration. Minimum duration is 26 weeks.
Source: Authors' calculations using data provided by delegates to the OECD Working Party on Employment.

2.4. Balancing take-up and efficiency during the recession

21. As is the case with conventional job subsidies, STW schemes confront a trade-off between cost-effectiveness, on the one hand, and scale (Martin and Grubb, 2001). Indeed, most of the institutional features discussed above tend to affect take-up and cost-effectiveness in opposite directions. Eligibility requirements seek to lower the unit cost per viable job saved by limiting deadweight, but are likely to do so at the expense of some desirable take-up. This may mean that in countries with strict eligibility conditions, the proportional impact of STW on jobs may be larger, but its absolute impact may be smaller. Conditionality requirements are likely to reduce take-up and, therefore, reduce the direct impact of STW in preserving jobs. However, by enhancing the viability of some continuing jobs and worker mobility, the medium-term impact of STW on employment and economic restructuring may be more positive. Finally, greater generosity is likely to increase take-up and, as a result, strengthen the absolute jobs impact of STW

in the short run. However, this may come at the expense of a lower cost-effectiveness in the short-run and lower employment and job reallocation in the medium run, especially if support for STW is maintained for too long into the recovery.

22. As outlined in this section, most OECD countries that already had a STW scheme at the start of the 2008-09 recession have made temporary adjustments to their schemes intended to encourage greater take-up, including by weakening eligibility and conditionality requirements and increasing generosity. This suggests that governments judged that the correct balance between assuring adequate take-up and avoiding deadweight and displacement effects had shifted temporarily towards placing a greater emphasis on expanding STW participation. This seems reasonable *a priori* since many more viable jobs are at risk in a steep recession, especially one in which firms' access to credit is limited, while the social cost of locking workers in unviable jobs is temporarily lower since there is little prospect they could move quickly into more productive jobs. The same reasoning, however, suggests that these crisis measures should be phased out during the recovery, as firms become better able to retain viable jobs without public subsidies and the efficiency cost of retaining workers in non-competitive jobs increases. The increasingly tight fiscal constraints confronting many OECD governments at present provide an additional reason to shift progressively towards emphasising greater cost-effectiveness.

3. The use of short-time work

3.1. Measurement issues

23. National data on the use of STW are not readily comparable across countries because of differences in programme coverage, the way take-up is recorded and differences in the corresponding reduction in working time. Despite significant efforts to improve the cross-country comparability of the data, substantial problems remain.

24. While the focus of this paper is on public STW schemes that provide partial unemployment benefits for *economic reasons*, in practice it is not always possible to exclude programmes that compensate for shortfalls in demand for seasonal or exceptional reasons since in many countries, both types of benefits are administered under a single programme. Germany is an exception in this regard and take-up for non-economic reasons has been excluded. Greece only has a programme that deals with shortfalls in demand for seasonal or exceptional reasons and is therefore not considered as having a STW scheme for the purposes of this paper. In order to reduce comparability problems in the econometric analysis of the impact of STW, the focus is restricted to the specific role of STW during the crisis period when STW for non-economic reasons is likely to have been relatively small relative to that for economic reasons. Furthermore, the agriculture sector, where the impact of the crisis was relatively modest and STW for seasonal reasons is likely to be most important, was excluded from the econometric analysis in order to reduce this bias. Finally, the analysis does not take account of part-time unemployment insurance where there is no explicit expectation that the reduction in working hours is temporary.[12]

25. Another complicating factor for making cross-country comparisons is that take-up is measured differently across countries. Ideally, take-up should be measured as the number of participants at a point of time, or the average number of participants during the reference period, relative to the number of employees. In practice, however, instead of the *average* number of participants, only the *total* number of participants during a certain time interval tends to be recorded. To the extent that some workers only participate during a fraction of this interval, the total number will tend to overestimate the average level of

12. However, it appears that in certain OECD countries, where part-time unemployment insurance can be obtained without having a concrete prospect of returning to full-time employment in the near future, it has been used as a practical substitute for formal short-time working schemes (*e.g.* Ireland).

take-up during this period. In order to minimise the resulting bias, take-up is measured on a *monthly* basis, the smallest available interval in most countries. Take-up rates for intervals longer than one month are calculated as averages of the monthly rates. In countries where a different concept is reported (Czech Republic, Denmark, Italy, Hungary, Poland, Slovakia and Spain), an imputation was made to improve the cross-country comparability of the data. As these imputations typically require additional assumptions, the measurement of take-up is likely to be less accurate for those countries.

26. A third issue is whether to measure take-up in terms of full-time equivalents (FTE) or the total number of participants. Using a measure of FTE would be more appropriate in principle for two reasons. First, by accounting for the intensive margin of STW (*e.g.* the average reduction in working time), it provides a more accurate indicator of the intensity with which STW is used across countries. Second, FTE take-up is an economically more interesting concept as it provides an indication of the potential number of jobs saved by short-time working. However, as the calculation of FTE take-up requires information on the average reduction in working time, which is not readily available in most countries, most of the analysis below will make use of take-up measured in terms of the number of participants instead. Nevertheless, an attempt is made to approximate the average reduction in working time and FTE take-up (see Section 3.3 below).

27. Data on the use of STW are obtained from three different sources: a joint EC/OECD questionnaire, Eurostat's LMP database and the update by Arpaia *et al.* (2010), or directly from national sources. Further details on sources, definitions and data adjustments can be found in Annex Table 1.

3.2. Participation in STW

28. Figure 4 shows that take-up, as measured by the average stock of participants, was highest in 2009 in Belgium, Turkey, Italy, Germany and Japan, accounting for over 3 to almost 6% of all employees.[13] With the exceptions of Belgium and Italy, few employees were participating in short-time work schemes prior to the onset of the crisis. The table also reports average take-up rates during the period from 2007 to the start of the crisis and those from the start of the crisis to 2009Q3, as these are the data that will be used for the econometric analysis in Section 6. Defining take-up over somewhat different periods does not qualitatively change the picture: participation in STW schemes increased dramatically during the recession.[14]

29. In countries where industry-level data on take-up are available, Figure 5 shows that STW tends to be heavily concentrated in the goods-producing sector (*e.g.* manufacturing). This is all the more striking when comparing take-up during the crisis and pre-crisis periods: almost the entire increase in take-up was concentrated in the manufacturing sector. In part, this reflects the disproportionate impact of the global crisis on manufacturing (OECD, 2010). However, it may also reflect the possibility that incentives to participate in STW schemes are greater in that sector. Incentives to hoard labour may be stronger in manufacturing than in other sectors that have also been hard hit by the crisis (*e.g.* construction) due to the greater importance of firm-specific skills and the perception that the fall in demand was largely temporary. The use of STW was also significant in agriculture and construction, but the proportional increase is

13. The number of participants may be seriously underestimated in the case of Italy. This is due to the fact that the use of STW is recorded in terms of hours instead of employees. In order to nevertheless get an estimate of the number of participants in STW, the total number of hours subsidised was simply divided by the average number of hours worked per employee over the same period. The implicit assumption therefore is that workers moving onto STW go from a typical working week to working zero hours. As in practice the average reduction is likely to be less than 100%, this may lead to a significant underestimate of take-up here. The estimated participation rate for Italy is more comparable to those for the other countries when take-up is measured in terms of FTEs in section 3.3.

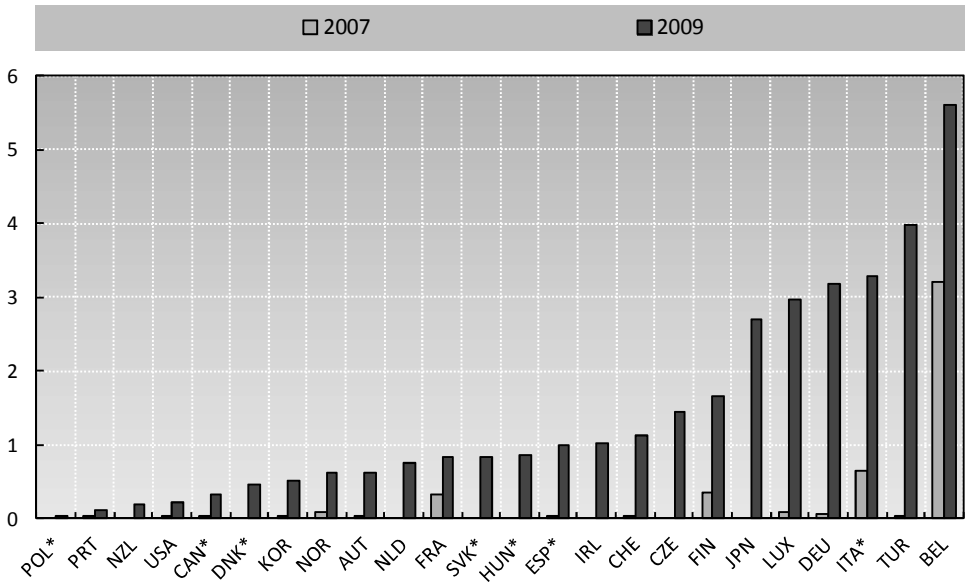
14. Take-up rates in panel B during the crisis tend to be lower than those for just 2009 as the former are averaged over a longer time period, including part of 2008 in which the use of STW was relatively modest.

modest compared to that in manufacturing. The relative importance of STW in those sectors before the start of the crisis may, in part, reflect the fact that non-economic STW schemes commonly cover weather-related or other seasonal disturbances to production that are likely to be more widespread in these industries and unrelated to the economic cycle.

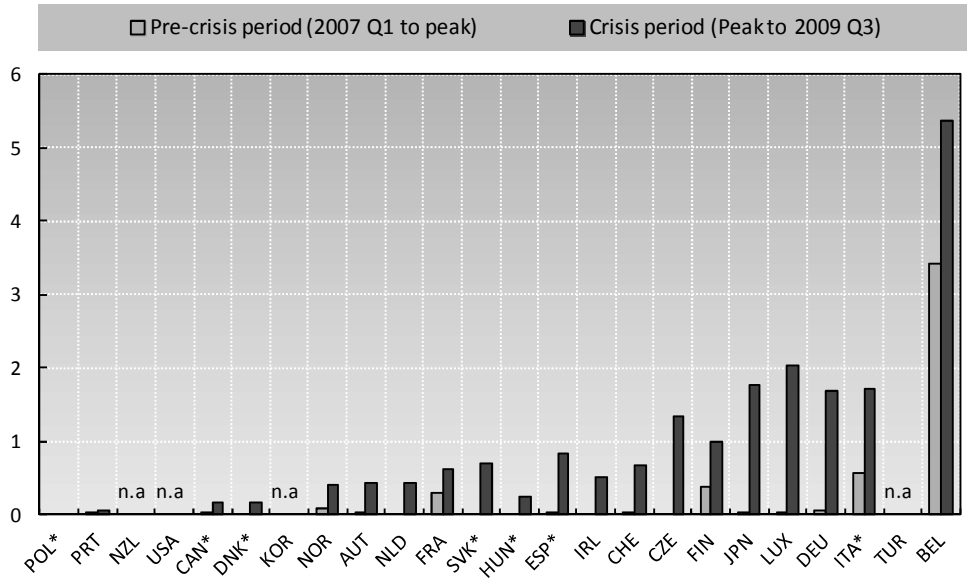
Figure 4. **Average monthly take-up rate by country**

Percentage of employees

Panel A. **Average monthly take-up rate in selected years**[a]



Panel B. **Average monthly take-up rate before and during the crisis**



n.a.: not available.

* Raw data have been adjusted to render them more comparable across countries. See Annex Table 1 for details.

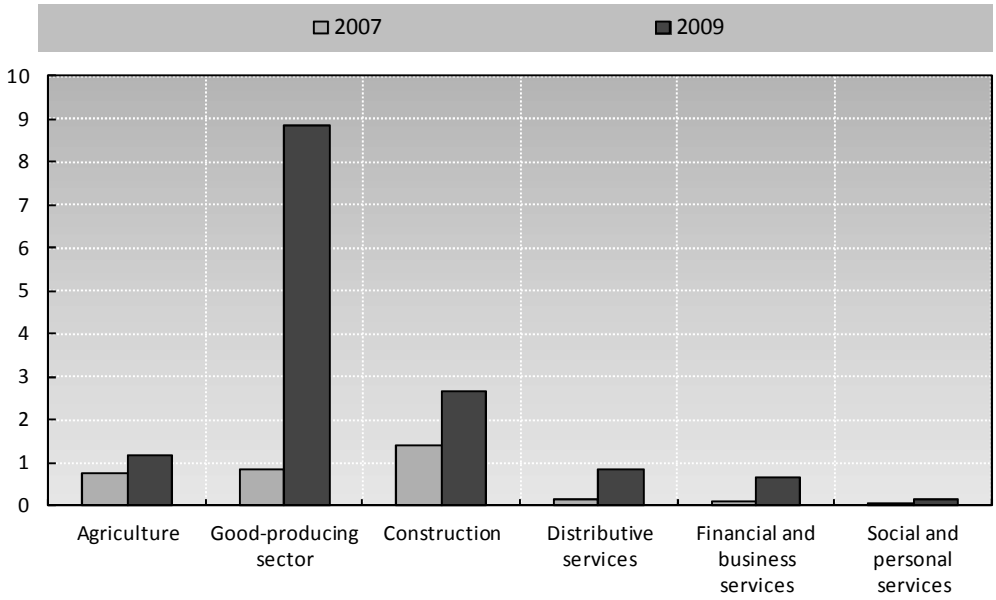
a) 2009 refers to 2009 Q1 - 2009 Q3 for Austria, Luxembourg, the Netherlands, New Zealand, Portugal, the Slovak Republic and Spain.

Source: Authors' calculations using data provided by delegates to the OECD Working Party on Employment, Eurostat's LMP database and national sources.

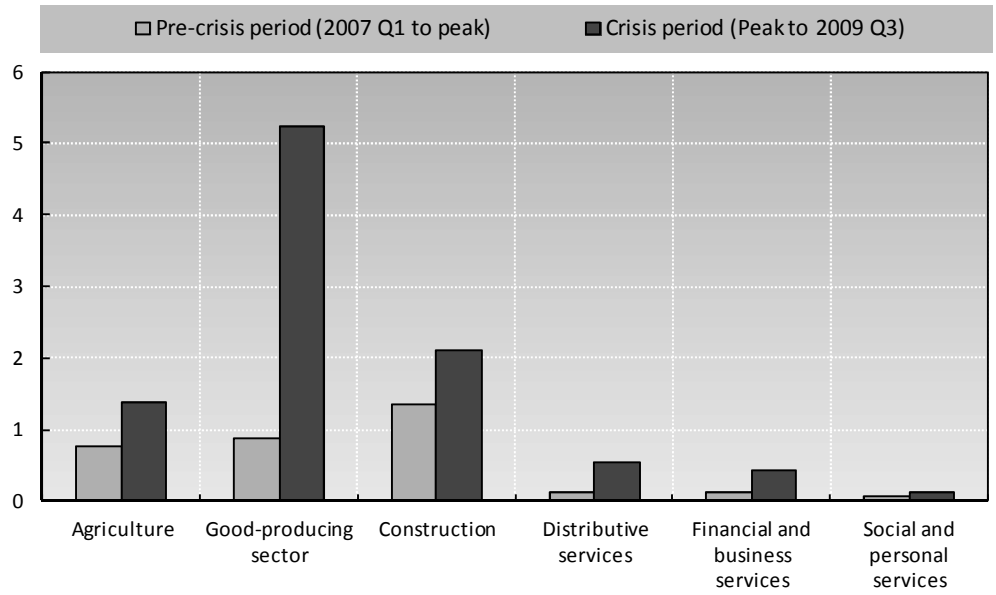
Figure 5. **Average monthly take-up rate by industry**

Percentage of employees

Panel A. **Average monthly take-up rate in selected years**



Panel B. **Average monthly take-up rate before and during the crisis**



Note: Weighted average of the following countries: Austria, Belgium, the Czech Republic, Finland, France, Germany, Ireland, Italy and the Netherlands. Data have been imputed for Finland and France in 2007 using the country-wide evolution of total take-up. 2009 refers to 2009 Q1 - 2009 Q3 for Austria and the Netherlands. Raw data in 2007 have been assumed to be zero for Ireland and have been imputed for Finland and France by applying the country-wide evolution of take-up between 2007 and 2008 to the industry data for 2008.
Source: Authors' calculations using data from national sources.

30. Crimmann *et al.* (2010) conduct a detailed analysis of the characteristics of firms that participated in short-time work during the crisis using micro data for Germany. They find that small firms are significantly less likely to participate in short-time work than medium-sized and large firms. They attribute this to the more limited ability of small firms to adjust work processes and to manage flexible working

arrangements more generally. To the extent that excessive layoffs among small firms may be more likely as such firms are often considered to suffer disproportionately from a credit crunch, additional measures to help small firms overcoming the barriers to participate in short-time work may be warranted. As one would expect, firms with lower levels of profitability prior to the crisis are more likely to participate in short-time work. It is not clear to what extent this reflects stronger incentives to participate in short-time work when hit by an adverse shock or whether this reflects the requirement that firms provide proof of the economic need for participation in STW. Interestingly, they also find that firms with higher shares of skilled labour are less likely to participate in STW. This is surprising as the incentive to hoard labour tends to be stronger for skilled workers than for less skilled workers (OECD, 2010). This may reflect the disproportionate impact of the global crisis on specific types of firms.

3.3. Full-time equivalent (FTE) take-up of STW

31. To convert the participant take-up rates in the previous section into FTE take-up rates, estimates of the average reduction in hours for short-time workers are needed. Administrative data on average hours reductions are available for Germany. For other countries, two alternative methods are used to impute the average reduction in working time. First, in countries where official data on hours spent on STW are available, these are combined with data on stocks of participants to compute the average hours reduction directly, assuming that all short-time workers would work full-time in the absence of STW.[15] Second, in countries where no data were available on STW hours, total hours spent on STW are estimated using data on government spending on STW schemes divided by the average budgetary cost of an hour of STW. Average budgetary costs of STW are estimated using data from the OECD Taxing Wages database, based on labour costs for a single worker with no children who usually earns the average wage. Data on average wages were only available for 2008 at the time of publication, so these were used to estimate 2009 costs. Annual wage data are converted into hourly wage data by assuming that workers are paid for ordinary full-time hours per week (40 hours in most countries, but this varies depending on the legislated limits, see footnote 16) for 52 weeks per year.[16]

32. Figure 6 shows average reductions in hours for workers on STW and FTE take-up rates in 2009 for countries for which these could be calculated. In most countries, STW participants worked, on average, 60-80% or more of their normal working hours. Average hours reductions were highest in Spain, Finland, Norway and Portugal, where average hours fell by more than 80%.[17] In contrast, relatively small hours reductions per worker took place in Poland and the Netherlands. As a result, FTE take-up is much smaller than take-up based on participants in Belgium, Turkey, Japan and Germany. Using FTE take-up, Italy, Finland, Spain and Norway move up the ranking of countries with the most intensive use of STW, while Belgium, Germany and Japan move down.

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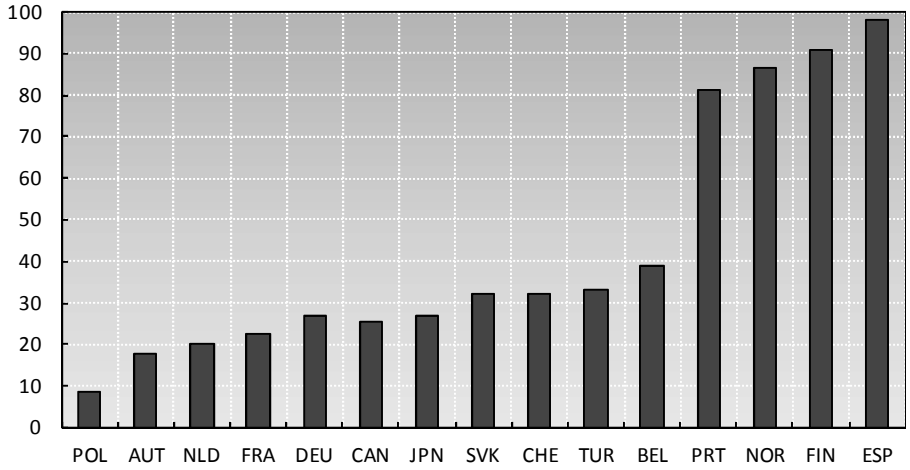
15. Ordinary full-time hours are based on legislated limits on weekly hours (not including overtime) for those countries where limits exist, or on the average hours limits in collective agreements where there is no legislated limit. See OECD (2010) for details on working-time regulation. For Belgium, only data on total days spent on STW are available. These are converted to total hours by assuming that a full day of layoff is equivalent to 7.5 hours.

16. We can compare the accuracy of the different methods for Germany, where we have administrative data that gives an average hours reduction of 27% plus data on total hours and spending on STW. Using total hours data for Germany, we estimate an average hours reduction of 25%, whereas using budgetary data gives an estimate of 22%. It is encouraging that the estimates are relatively similar, although we have no way of knowing how accurate the figures are for other countries. If anything, estimates using budgetary data should overestimate the true figures as we take no account of fixed administrative costs. This suggests that short-time workers in Germany may be below-average earners, which could be the case: Crimmann *et al.* (2010) report that firms with more skilled workers were less likely than others to participate in STW in 2009.

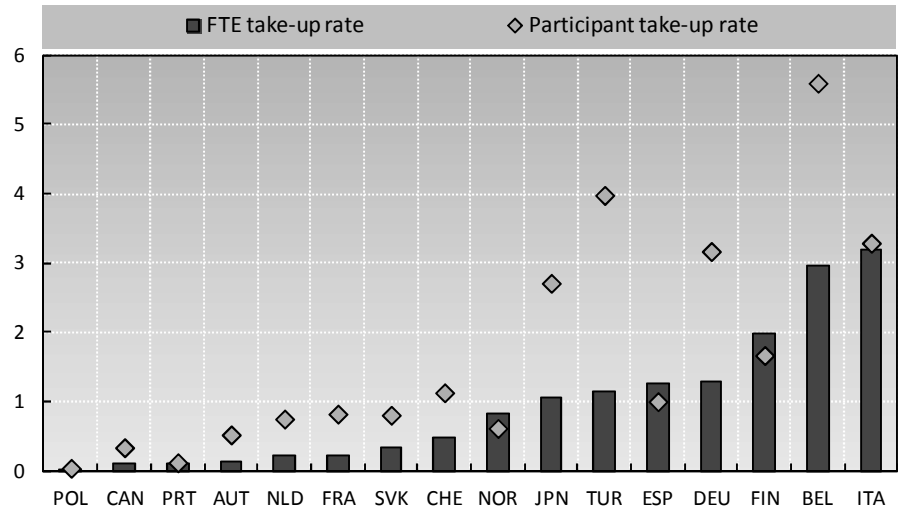
17. This reflects the relative importance of temporary layoffs in those countries.

Figure 6. **Average hours reductions and full-time equivalent take-up rates in selected countries**

Panel A. **Average hours reductions (% of normal full-time working hours), 2009**



Panel B. **Full-time equivalent take-up rates, 2009**



FTE: Full-time equivalent.

Note: FTE take-up rates are calculated as: Total STW hours / (Total hours worked in the economy + Total STW hours). Country-specific assumptions and calculations:

Finland: Budgetary cost of STW varies depending on hours reduction. Estimates in this chart are made by modelling a range of cost per hour and hours reductions and choosing the average level of hours reductions that corresponds to actual spending on STW.
Italy: No data on average hours reduction are available. FTE calculated as the ratio of total hours subsidised divided by FTE total hours worked in the economy.
Japan: The cost to the government is assumed to correspond to the average cost of subsidies to large and small firms.
Netherlands: Calculations using budget data yielded estimates of average hours reductions that were smaller than the minimum allowable hours reduction, so the minimum allowable limit (20%) was used instead.
Norway: Data on total STW hours and budget are not available. Estimates of average hours reduction use data that show that 55% of the inflow to STW was full layoffs and calculates a range of estimates using assumptions about average hours reductions for partial layoffs (which must be between 40% and 100% of normal working time). This yields estimates of average hours reductions for all short-time workers of between 73% and 100%. The average of these estimates is shown in the chart.
Spain: Data on total STW hours and budget are not available. Estimates of average hours reduction use data that show that 95% of the inflow to STW was full layoffs and calculates a range of estimates using assumptions about average hours reductions for partial layoffs (which must be between 33% and 100% of normal working time). This yields estimates of average hours reductions for all short-time workers of between 97% and 100%. The average of these estimates is shown in the chart.
Source: Authors' calculations using data provided by delegates to the OECD Working Party on Employment.

33. Full-time equivalent take-up rates presented in Figure 6 provide a first indication of the potential job-saving impact of STW schemes, as they operated during the 2008-09 recession. However, these figures should be considered as yielding an upper limit on the number of jobs *potentially saved*, because they take no account of the fact that subsidies may support jobs that would have been maintained anyway (deadweight) or that some of the jobs supported by STW subsidies may be terminated during the programme or soon after its completion. These leakages may be quite large. For example, an evaluation of the Canadian *Work Sharing Programme* shows that about half of the jobs that were initially maintained by the programme were lost soon after its termination (HRDC, 2004). Similarly, an *ex-ante* study by the CPB (2009) for the Netherlands suggests that deadweight cost may amount to 50% of the total cost.[18]

34. The fundamental limitation of the type of accounting exercises undertaken in this section is that they do not rely upon a realistic no-STW counterfactual, against which observed outcomes in employment and hours can be assessed.[19] In order to draw reliable conclusions about the effectiveness of STW programmes in preserving jobs during an economic downturn, it is essential to construct a realistic counterfactual. Section 6 attempts to do so for the operation of STW schemes during the 2008-09 recession.

4. Existing econometric studies of STW

35. Despite their widespread use in previous recessions, there has been relatively little econometric evaluation of the effectiveness of STW schemes.

36. A limited number of studies have used firm-level data from administrative sources to assess the impact of STW schemes on various outcomes, including their potential for preserving jobs. The main challenge confronting such studies is the *selection bias* that arises because participating firms tend to be less competitive than other firms that can serve as a control group. If the selection pattern is not addressed appropriately, it may be falsely concluded that short-time work subsidies result in lower job stability and employment. Calavrezo *et al.* (2009a and b) make use of firm-level data to analyse the impact of the French system of *chômage partiel* on layoffs and firm survival. They find that *chômage partiel* tends to increase layoffs and reduce firm survival. This may indicate that despite the use of sophisticated econometric methods, the problem of selection bias has not been entirely removed. Berkeley Planning Associates & Mathematica Policy Research, Inc. (1997) provide a comprehensive assessment of short-time compensation programmes in the United States using a variety of methods and conclude that the available firm-level data do not allow one to reliably attribute differences in outcomes between participating and control firms to short-time compensation.

37. The aggregate approach taken by Abraham and Houseman (1994) and other studies that they cite provides a potentially fruitful alternative to micro studies based on comparisons between participating and non-participating firms. Abraham and Houseman compare aggregate adjustment patterns in employment and hours worked across countries and over time using quarterly time-series data for Belgium, France, Germany and the United States. They show that adjustment in total hours worked is fairly similar across the four countries, even though employment adjustment is much slower in the three European countries. This implies that average hours worked adjust more strongly in the three European countries than in the

18. The length of the recession may increase or reduce deadweight loss. In a short and shallow recession, short-time work schemes may be more likely to support jobs that would have been maintained anyway, while in a long and deep recession, there is a greater risk that jobs supported by short-time work are lost during the programme or soon after its termination (CPB, 2009).

19. Put differently, perfect substitution is assumed between each hour of STW and an hour of layoff.

United States.[20] In order to estimate the impact of STW schemes, Abraham and Houseman estimate adjustment speeds based on total hours worked and show that the speed of adjustment is substantially higher in the presence of STW, which suggests that STW schemes make an important contribution to hours flexibility in Belgium, France and Germany.

38. While very instructive, this approach provides little insight into how effectively STW schemes preserved jobs in the 2008-09 recession. One limitation is that Abraham and Houseman do not assess the quantitative impact of STW schemes on labour market outcomes, nor do they explicitly relate STW to employment stability. The fact that the analysis is limited to a small number of countries also means that disentangling the impact of STW schemes on labour demand adjustment from other factors that differ across countries is very difficult. Finally, Abraham and Houseman's evidence is now rather dated since STW schemes and labour market structures more generally have evolved significantly since the 1980s and early 1990s.

39. The next section outlines the methodology adopted in the current paper, which attempts to overcome some of the limitations of previous studies and take advantage of significant cross-country variation in the take-up of STW during the 2008-09 recession.

5. Empirical methodology

40. We exploit the country and time variation in take-up rates to analyse the quantitative impacts of STW schemes on employment and average hours. Exploiting the variation in the intensity with which STW is used across countries and time has a number of advantages. First, it allows one to construct a realistic counterfactual against which the role of STW schemes can be assessed. Second, exploiting the variation across countries, rather than between participating and non-participating firms within countries, avoids the selection problem that characterises firm-level studies. Third, the approach used here focuses on the *net* effects of short-time working on employment or hours, after taking account of its effects on both participating and non-participating firms. To the extent that short-time working also affects labour market outcomes in non-participating firms, for example, by reducing labour mobility, this could be potentially important.[21]

41. The main challenge of using the cross-country variation to identify the causal impact of STW schemes is that countries differ in many ways that affect labour-demand adjustment in addition to STW schemes. Regulations affecting dismissals and hours flexibility – which vary substantially across countries – are of particular concern in this respect. In addition, there is a tendency for strict employment protection to be associated with both STW schemes and alternative arrangements that provide additional flexibility on the hours margin such as hours averaging and the use of overtime.[22] This may lead to an upward bias in the estimated impact of STW in encouraging greater work-sharing during a recession. The difference-in-differences framework discussed below addresses this challenge by: *i)* controlling for factors that affect the responsiveness of employment and average hours to changes in output that are independent of the crisis; and *ii)* controlling directly for the role of employment protection for labour demand adjustment patterns during the downturn.

20. Van Audenrode (1994) provides similar statistics for about 10 OECD countries and reaches similar conclusions.

21. However, the size of such spillover effects cannot be isolated with the current data.

22. This probably reflects the greater perceived need to enhance *internal flexibility* within firms when *external flexibility* is discouraged by relatively strict employment protection. See OECD (2010) for details of tradeoffs between internal and external flexibility in labour market regulations.

42. A key feature of the analysis here that distinguishes it from previous studies is that it consistently differentiates between *permanent* and *temporary* workers when looking at employment and average hours worked. This is crucial for analysing the implications of STW during the downturn since temporary workers are much more likely to lose their job in an economic downturn, but are far less likely to participate in STW.[23] Even if workers in non-regular jobs are eligible for STW in principle, the incentive for firms to place such workers on STW is likely to be considerably weaker than for their core workforce. Participation in these schemes tends to be costly for employers, while hiring and firing costs tend to be low for workers in non-regular jobs.[24]

43. More specifically, the impact of public STW schemes on any labour market outcome *z* is estimated using the following general difference-in-differences specification:

$$\eta_{z,ikp} = \alpha_1 + \alpha_2 D_{kp}^{crisis} + \alpha_3 T_{ik}^{stw} + \alpha_4 D_{kp}^{crisis} * T_{ik}^{stw} + \varepsilon_{ikp} \quad [1]$$

where the dependent variable η_z refers to the elasticity of labour market outcome *z* with respect to real gross output, $\eta_z = \frac{\partial z}{\partial y}\frac{y}{z} \equiv \frac{\partial \ln z}{\partial \ln y}$ and *z* may refer to the employment or average hours worked of either permanent or temporary employees. D^{crisis} refers to a crisis dummy which equals one from the last peak in quarterly GDP to the end of the sample (2009 Q3) and T^{stw} to a STW take-up variable which measures the increase in the average level of take-up during the crisis relative to the average level of take-up during the pre-crisis period. ε is an independent error term. Subscripts *i, k*, and *p* refer to industry, country and period (pre-crisis and crisis), respectively.

44. The coefficient on the interaction term (α_4) captures the difference-in-differences effect: the average change in the output elasticity between the pre-crisis period and the crisis period in countries with STW schemes relative to countries without a STW scheme. Countries without STW schemes thus provide the counterfactual against which the impact of short-time work is assessed. By focusing on the change in the output elasticity between the pre-crisis and the crisis period, the analysis takes account of any factors other than STW schemes that affect the output elasticity such as product and labour market regulations but do not depend on the business cycle.[25]

45. The short-term elasticity of labour market outcome *z* with respect to output is estimated using a simple difference model:

$$\Delta ln z_{ikt} = \alpha_0 + \eta_z \Delta ln y_{ikt} + \beta_t D_t + \epsilon_{ikt} \quad [2]$$

23. One reason for this is that some countries limit eligibility to regular workers or workers meeting social security contribution thresholds (see Table 1), which many workers in non-regular jobs may not meet in practice.

24. Crimmann *et al.* (2010) show that German firms which make intensive use of part-time, freelance or temporary agency workers are less likely to participate in STW during the crisis.

25. The constant, α_1, gives the average output elasticity before the crisis in countries without short-time work schemes. The coefficient on the crisis dummy (α_2) measures the difference in η_z between the crisis and pre-crisis periods in countries without short-time work schemes, while the coefficient on the variable (α_3) measures the difference in η_z between countries with and without short-time work schemes before the start of the crisis.

where subscripts *i, k*, and *t* refer to industry, country and time (year and quarter) respectively; z refers to the labour market outcome of interest, *y* to real gross output and *D* to time dummies.[26] Estimating the model in differences removes the role of time-invariant fixed effects. Time fixed effects control for the role of factors that vary over time but are common across industries and countries such as global macro-economic conditions.[27]

46. Substituting [1] in [2] yields the following estimable model:

$$\Delta lnz_{ikt} = \alpha_0 + \alpha_1 \Delta lny_{ikt} + \alpha_2 \Delta lny_{ikt} * D_{kt}^{crisis} + \alpha_3 \Delta lny_{ikt} * T_{ik}^{stw} +$$

$$\alpha_4 \Delta lny_{ikt} * D_{kt}^{crisis} * T_{ik}^{stw} + \beta_t D_t + v_{ikt} \qquad [3]$$

47. Thus, the model relates the responsiveness of labour market outcome *z* to the change in output to the intensity of STW or, equivalently, relates the change in labour market outcome *z* to the variation in take-up of STW schemes conditional on the change in output. Indeed, conditional on the change in output, the intensity of STW may be interpreted as a proxy for the attractiveness of participating in a country's STW scheme. The attractiveness of a STW scheme may reflect its relative generosity in terms of the level and maximum duration of compensation for reduced working time, as well as administrative features that affect the ease with which firms can enter and exit the programme (*e.g.* conditionality and eligibility requirements).

48. The impact of STW schemes on the responsiveness of labour market outcomes to output shocks during the crisis period is captured by the interaction term of the change in output, the crisis dummy and the STW take-up rate (α_4). The average marginal effect of a change in output during the crisis period on the outcome variable of interest in countries without a STW scheme can be obtained by taking the sum of the coefficients on the change in output (α_1) and the interaction term of the change in output and the crisis dummy (α_2). The average marginal effect of a change in output during the crisis period in countries with a STW scheme is given by the sum of the coefficient on the change in output (α_1), the coefficient on the interaction term of the change in output and the crisis dummy (α_2), and the coefficient on the interaction term of the change in output, the crisis dummy and the take-up rate (α_4) multiplied by the average take-up rate in the sample during the crisis period. Country-specific marginal effects can be obtained by using the average take-up rate within a country during the crisis period instead of the sample average. The total proportional impact of the change in output during the crisis period within a country can be obtained by multiplying the country-specific marginal effects with the corresponding changes in output during the crisis period. In countries that have newly introduced a STW scheme during the crisis, the change in output during the period in which the scheme was operational is used. The absolute impact of STW can be obtained by multiplying its proportional impact by the actual level of the outcome of interest at the start of the crisis.

26. The model, thus, treats output as exogenous. While this assumption would be inappropriate in many contexts, it appears to be reasonable in the context of a deep economic downturn, when changes in aggregate demand conditions drive the variation in output and hence labour demand.

27. In previous estimates published in OECD (2010), time-by-country fixed effects were included to control for common developments over time across industries within countries instead of just time fixed effects. This does not have a major impact on the results.

49. The analysis is based on an unbalanced panel of quarterly data for the period 2003 Q1 to 2009 Q3 for 19 countries (18 European countries plus Japan)[28] and four industries (manufacturing, construction, distribution and business services). The agriculture and non-market sectors are excluded from the analysis.[29] Of the 19 countries included in the analysis, 11 countries operated a STW scheme during the entire period, five countries introduced a new scheme during the crisis period and three countries never had a STW scheme during the sample period.[30] The core database on employment, hours and output is derived from Eurostat's Quarterly National Accounts and the European Labour Force Survey for the European countries and the Ministry of Economy, Trade and Industry (METI) and the national labour force survey for Japan. In order to account for the seasonality in the data and to allow for some time lag in the impact of output change on labour market outcomes, differences in the model refer to year-on-year differences rather than quarter-on-quarter differences.

6. Evidence on the impact of STW schemes during the 2008-09 recession

6.1. Baseline results

50. The baseline specifications in this sub-section make use of two simplifying assumptions. First, the average level of take-up before the start of the crisis is assumed to be zero. As take-up before the crisis was negligible in most countries, this assumption is not very restrictive (see Figure 4). From a practical perspective, this restriction is useful as comparable data on average take-up during the entire pre-crisis period are not available for most countries. Nevertheless, in Section 6.3 an attempt is made to relax this assumption by using a rough approximation of take-up during the pre-crisis period. Second, rather than defining take-up at the industry level as implied by the empirical model, take-up is defined at the national level. This involves making the implicit assumption that take-up rates are constant across industries within countries. Standard errors are clustered within countries in order to correct for the possibility that they are biased downward due to the cross-sectional correlation that arises from the inclusion of variables at the country level (Moulton, 1990). Using national take-up rates rather than industry take-up rates increases the number of countries in the sample with STW schemes from 8 to 16 (and in the total sample from 11 to 19). Industry-level take-up rates for a smaller number of countries are used in Section 6.3 below.

51. Key estimation results are highlighted in Figure 7 which reports the average marginal effects of a 1% decline in output during the crisis period for typical countries with *and* without STW schemes. Panel A of Table 3 reports the full results for the baseline model. The results provide clear evidence that STW schemes helped preserve permanent jobs during the economic downturn, while also providing some evidence that STW schemes promoted average hours reductions among permanent workers.[31] This is indicated by the smaller (in absolute value) average marginal effect for permanent employment of a 1%

28. The country coverage was determined primarily by the availability of comparable data. Ireland, for which data were available, was dropped from the baseline analysis because it was found to be an outlier (see Section 6.2 below).

29. The use of STW in those sectors tends to be relatively small and it typically is not for economic reasons, which is the focus here.

30. The eleven countries included in the analysis that already operated a STW scheme before the start of the crisis are: Austria, Belgium, Denmark, France, Finland, Germany, Italy, Japan, Norway, Portugal and Spain. The following countries introduced a new STW scheme in response to the crisis (entry in force in brackets): Czech Republic (2008 Q4), Hungary (2009 Q2), the Netherlands (2008 Q4), Poland (2009 Q3), Slovakia (2009 Q2). The three countries without a STW scheme at any time during the sample period included in the analysis are: Greece, Sweden and the United Kingdom.

31 . While the impact of STW on the average hours of permanent workers is not statistically significant in the baseline regressions, it is statistically significant in the majority of specifications reported in the remainder of this paper.

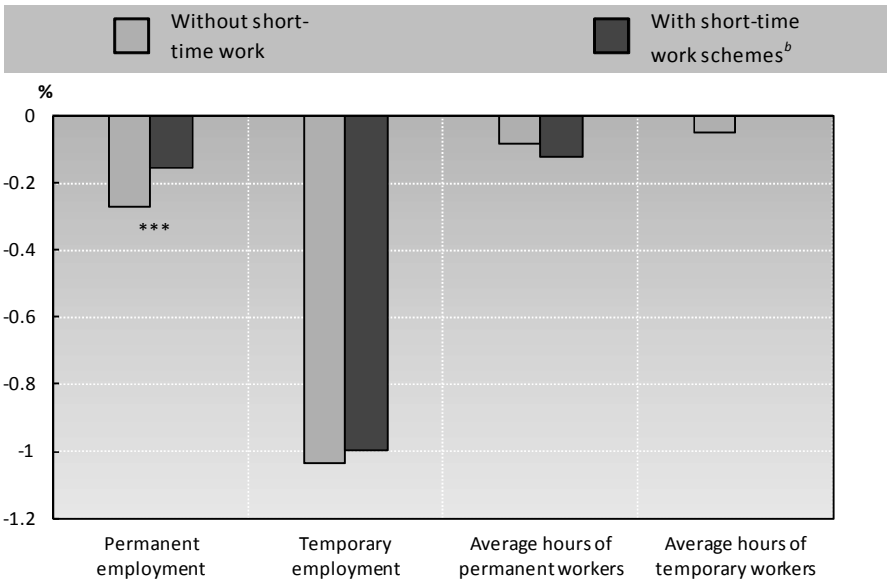
reduction in output during the crisis period in countries with STW schemes relative to countries without such schemes, and the larger (in absolute value) average marginal effect for the average hours of workers with a permanent contract. This can also be seen in Table 3 by looking at the coefficients of the interaction terms of the change in output, the crisis dummy and the take-up rate in the columns for the employment and average hours of permanent workers.

52. There is no evidence that STW schemes had a significant impact on the employment and average hours of temporary workers. However, the results indicate that even in the absence of STW, temporary employment is much more sensitive to economic downturns relative to workers with a permanent or open-ended contract and average hours much less sensitive. This is a clear sign that the labour markets of temporary and permanent workers tend to be segmented. By helping to preserve the jobs of workers with permanent or open-ended contracts, without providing additional job stability to temporary workers, STW schemes have a tendency to enhance the position of insiders relative to outsiders and thereby further increase the degree of labour market segmentation.

53. One important concern is that the baseline specification might not take sufficient account of the role of various labour market regulations in influencing employers' choices between adjusting employment and average hours, despite the difference-in-differences framework that controls for the impact of such regulations on the output elasticity during the pre-crisis and the crisis period. In the specification that is reported in Panel B of Table 3, an indicator of the strictness of employment protection is added to the model. The results do not suggest that employment protection had a significant impact on the pattern of labour demand adjustment during the downturn in countries with STW schemes compared with those without such schemes. This may reflect the possibility that the impact of employment protection does not differ significantly between the pre-crisis and the crisis period and consequently may already be appropriately accounted for by the difference-in-differences framework employed here. The results with respect to the intensity of the impact of STW are qualitatively and quantitatively similar to those reported in Panel A.

Figure 7. **Short-time work schemes reduced the output sensitivity of employment, but increased that of average hours**

The impact of short-time work schemes on the responsiveness of employment and hours to a 1% reduction in output[a]



*, **, *** difference statistically significant at the 10%, 5% and 1% level, respectively.
a) Based on 19 countries, of which 16 with short-time work schemes. Estimates over four industries: manufacturing, construction, distributive services and business services (agriculture and non-business services are excluded).
b) Take-up rate assumed to equal the average across countries operating a short-time work scheme during the 2008-09 recession.
Source: Authors' estimates based on regression results in Table 3, Panel A.

Table 3. **The impact of short-time work schemes: full baseline specification**

OLS estimates, dependent variable expressed in year-to-year percentage change[a]

	Permanent employment			Temporary employment			Average hours of permanent workers			Average hours of temporary workers		
	Coeff.	*Std. error*	*Sig.*	*Coeff.*	*Std. error*	*Sig.*	*Coeff.*	*Std. error*	*Sig.*	*Coeff.*	*Std. error*	*Sig.*
Panel A. **Baseline specification**												
Output[b]	0.102	*(0.054)*	*	0.030	*(0.097)*		-0.002	*(0.013)*		-0.001	*(0.028)*	
Interaction term of output[b] and crisis dummy	0.168	*(0.057)*	***	1.005	*(0.314)*	***	0.087	*(0.044)*	*	0.049	*(0.055)*	
Interaction term of output[b] and average take-up rate	2.210	*(2.639)*		6.004	*(8.271)*		2.654	*(0.772)*	***	7.114	*(3.049)*	**
Interaction term of output,[b] crisis dummy and average take-up rate	-10.768	*(3.691)*	***	-3.346	*(20.015)*		3.650	*(2.220)*		-5.850	*(3.855)*	
Observations	1632			1632			1632			1540		
R-squared	0.240			0.120			0.270			0.070		
Panel B. **Baseline specification plus EP interaction**												
Output[b]	0.079	*(0.206)*		-0.755	*(0.350)*	**	0.045	*(0.055)*		-0.002	*(0.120)*	
Interaction term of output[b] and crisis dummy	0.172	*(0.070)*	**	1.138	*(0.266)*	***	0.079	*(0.040)*	*	0.049	*(0.059)*	
Interaction terms of output[b] and average take-up rate	2.445	*(3.086)*		14.034	*(12.913)*		2.169	*(0.856)*	**	7.129	*(3.082)*	**
Interaction terms of output[b], crisis dummy and average take-up rate	-10.979	*(3.799)*	**	-10.569	*(23.301)*		4.086	*(2.194)*	*	-5.868	*(3.651)*	
Interaction term of output[b] and average EP	0.010	*(0.090)*		0.348	*(0.187)*	*	-0.021	*(0.023)*		0.001	*(0.049)*	
Observations	1632			1632			1632			1540		
R-squared	0.240			0.130			0.270			0.070		

*, **, *** statistically significant at the 10%, 5% and 1% level, respectively. Standard errors are clustered by country.

EP: index of strictness of employment protection

a) Regressions include a full set of time dummies and are based on 19 countries, of which 16 with short-time work schemes. Estimates over four industries: manufacturing, construction, distributive services and business services (agriculture and non-business services are excluded).

b) Year-on-year percentage change of log real gross output.

Source: OECD estimates based on data from OECD Working Party on Employment, Eurostat's LMP database and national sources for the use of short-time work and the European Quarterly National Accounts and the European Union Labour Force Survey (EULFS) for the European countries and the Ministry of Economy, Trade and Industry (METI) and the national labour force survey for Japan for all other variables.

6.2. Sensitivity analyses

54. This section discusses the impact of various sample and measurement issues on the results. We first test the sensitivity of the baseline results to the countries, sectors and time periods included in the sample. Then three measurement issues are examined: *i)* the use of national versus industry take-up rates;

ii) adjusting take-up rates for average hours reductions; and *iii)* the assumption that take-up of STW was essentially zero before the crisis. These alternative estimates are qualitatively similar to the baseline results, but the estimated size of the impact of STW on employment varies, sometimes quite considerably. For ease of exposition, the discussion of the sensitivity analyses in this section generally focuses on the results for permanent employment. The results for average hours worked among permanent employees are fairly stable across specifications and the results for the employment and hours for temporary employees tend to be insignificant. Results for all four dependent variables are shown in the Tables discussed below.

Sample issues

55. Given the relatively limited number of countries included in the analysis, one may be concerned about the sensitivity of the results to the set of countries included. In order to assess the sensitivity of the results to country outliers, the regressions are re-estimated excluding one country at a time. The starting point is the full sample of countries for which appropriate data are available, including Ireland which was excluded in the baseline specifications analysed in section 6.1. The results are reported in Panel A of Table 4, where the regression in which Ireland is excluded corresponds to the baseline specification in Panel A of Table 3.

56. The results tend to be relatively insensitive to the exclusion of countries one-by-one except in the cases of Belgium and Ireland. Excluding Belgium (Ireland) from the sample greatly increases (reduces) the impact of STW on permanent employment. This may suggest either that the effectiveness of STW in preserving jobs is much smaller (greater) in Belgium (Ireland) than in other OECD countries or that factors other than STW that affect labour market adjustment but are not captured by the econometric framework counteract (reinforce) the impact of STW on employment. The relatively stability of the results in general is quite striking and suggests that the DID framework used here absorbs a large part of the country heterogeneity in labour-market adjustment patterns that are unrelated to short-time work.

57. The sensitivity of the results to the exclusion of Belgium is likely to reflect measurement problems with take-up. The increase in take-up related to the crisis is likely to be substantially overestimated due to the assumption that take-up is zero in the period before the crisis, which was far from being the case in Belgium (see Figure 4), primarily because of the widespread operation of STW schemes for non-economic reasons. As a result, the effectiveness of STW during the crisis is likely to be underestimated in the case of Belgium. As this explanation is directly related to STW, Belgium is maintained in the sample for the baseline and subsequent results. The assumption that STW take-up was zero before the crisis will be relaxed in the next section.

58. By contrast, the sensitivity of the results to excluding Ireland probably indicates that the empirical model used here fails to account satisfactorily for the specificities of the Irish jobs crisis. In particular, the size and persistence of the decline in real GDP experienced in Ireland is significantly greater than that in the 19 countries retained in the estimation sample. It may well be that the severity of the Irish recession was such as to overwhelm the normal capacity of STW schemes to encourage employers to make greater use of work-sharing in the context of declining demand. Moreover, the results are not just sensitive to the inclusion of Ireland, but also become sensitive to the selection of countries once Ireland is included. In other words, the results become unstable. While including Ireland in the estimation sample used to generate the baseline results substantially increases the estimated impact of short-time work on permanent employment, including Ireland in the estimates based on industry-level take-up rates leads to STW having no discernable effect on permanent employment. This is because the decline in employment was exceptionally large and changes in the sample shift the position of Ireland in terms of average take-up during the crisis relative to the sample mean. Consequently, it was decided to exclude Ireland from the entire analysis.

59. The baseline results also exclude the social & personal services sector and the agricultural sector. The use of STW in the social & personal services sector is very small and many of these service providers tend to be public which makes it difficult to assess the effectiveness of STW schemes in this sector. In the agricultural sector, STW tends to be important, but its role in this sector tends to be quite different from that in other sectors of the economy as STW is more likely to be related to weather conditions than to temporary shortfalls in demand, the focus here. As expected, excluding these sectors tends to strengthen the results with respect to permanent employment, while there is little impact on any of the other outcome variables.

60. Finally, the baseline regressions are estimated by pooling all observations across quarters. Since the estimations are conducted in year-on-year differences, the change in output may be correlated with the error term, leading to a bias in the results. The reason for pooling across quarters is that quarter-by-quarter estimates lead to a significant loss of sample size. Moreover, as can be seen from the table, the quantitative results differ quite significantly across quarters and it is not straightforward to determine which quarter should be used. However, the results by quarter are qualitatively similar to the results in the baseline specification.

Table 4. **Sensitivity of baseline results to sample exclusions**

Average difference-in-difference effect between countries without STW and the typical country with STW

	Permanent employment			Temporary employment			Average hours of permanent workers			Average hours of temporary workers		
	Coeff.	*Std error*	*Sig.*	*Coeff.*	*Std error*	*Sig.*	*Coeff.*	*Std error*	*Sig.*	*Coeff.*	*Std error*	*Sig.*
Baseline (excluding Ireland)	-0.115	*(0.039)*	***	-0.036	*(0.214)*		0.039	*(0.024)*		-0.063	*(0.041)*	
Panel A. **Excluding one country at a time**												
Austria	-0.172	*(0.080)*	**	-0.018	*(0.207)*		0.050	*(0.022)*	**	-0.066	*(0.042)*	
Belgium	-0.251	*(0.134)*	*	-0.278	*(0.308)*		0.070	*(0.035)*	**	0.002	*(0.080)*	
Czech Republic	-0.168	*(0.079)*	**	-0.016	*(0.213)*		0.048	*(0.024)*	**	-0.081	*(0.031)*	***
Denmark	-0.178	*(0.086)*	**	-0.004	*(0.211)*		0.054	*(0.024)*	**	-0.075	*(0.041)*	*
Finland	-0.166	*(0.078)*	**	-0.021	*(0.211)*		0.042	*(0.022)*	*	-0.070	*(0.039)*	*
France	-0.169	*(0.080)*	**	0.003	*(0.205)*		0.043	*(0.023)*	*	-0.068	*(0.042)*	
Germany	-0.150	*(0.073)*	**	0.040	*(0.199)*		0.040	*(0.021)*	*	-0.072	*(0.039)*	*
Greece	-0.126	*(0.057)*	**	0.002	*(0.212)*		0.044	*(0.026)*	*	-0.079	*(0.038)*	**
Hungary	-0.189	*(0.089)*	**	-0.037	*(0.216)*		0.043	*(0.025)*	*	-0.066	*(0.044)*	
Ireland	-0.115	*(0.039)*	***	-0.036	*(0.214)*		0.039	*(0.024)*		-0.063	*(0.041)*	
Italy	-0.158	*(0.076)*	**	0.002	*(0.205)*		0.042	*(0.022)*	*	-0.066	*(0.042)*	
Japan	-0.133	*(0.062)*	**	0.132	*(0.147)*		0.041	*(0.024)*	*	-0.067	*(0.041)*	
Netherlands	-0.171	*(0.082)*	**	-0.018	*(0.207)*		0.041	*(0.024)*	*	-0.073	*(0.041)*	*
Norway	-0.178	*(0.080)*	**	0.012	*(0.212)*		0.048	*(0.023)*	**	-0.073	*(0.042)*	*
Poland	-0.170	*(0.079)*	**	-0.002	*(0.205)*		0.044	*(0.023)*	*	-0.067	*(0.041)*	
Portugal	-0.177	*(0.083)*	**	-0.006	*(0.210)*		0.042	*(0.024)*	*	-0.068	*(0.043)*	
Slovak Republic	-0.200	*(0.093)*	**	0.099	*(0.151)*		0.048	*(0.024)*	**	-0.047	*(0.050)*	
Spain	-0.169	*(0.076)*	**	0.006	*(0.210)*		0.044	*(0.023)*	*	-0.066	*(0.042)*	
sweden	-0.188	*(0.091)*	**	-0.007	*(0.217)*		0.037	*(0.024)*		-0.059	*(0.048)*	
United Kingdom	-0.170	*(0.085)*	**	-0.019	*(0.218)*		0.032	*(0.020)*		-0.085	*(0.034)*	**
Panel B. **Industry selection (excluding Ireland)**												
All sectors	-0.012	*(0.073)*		0.037	*(0.174)*		0.116	*(0.022)*	***	0.037	*(0.036)*	
Excl. non-market sector	-0.114	*(0.040)*	***	-0.007	*(0.204)*		0.040	*(0.026)*		-0.055	*(0.042)*	
Excl. agricultural sector	-0.114	*(0.040)*	***	-0.007	*(0.204)*		0.040	*(0.026)*		-0.055	*(0.042)*	
Panel C. **By quarter (excluding Ireland)**												
Q1	-0.108	*(0.075)*		-0.495	*(0.394)*		0.030	*(0.028)*		-0.172	*(0.060)*	***
Q2	-0.197	*(0.111)*	*	-0.140	*(0.200)*		0.079	*(0.026)*	***	0.035	*(0.071)*	
Q3	-0.242	*(0.088)*	***	0.462	*(0.123)*	***	0.010	*(0.053)*		-0.118	*(0.078)*	
Q4	-0.127	*(0.083)*		0.662	*(0.384)*	*	0.045	*(0.031)*		0.020	*(0.054)*	

*, **, *** statistically significant at the 10%, 5% and 1% level, respectively.
Source: Authors' estimates.

Measurement issues

61. In the baseline specification, take-up of STW has been measured by the average number of participants over the number of employees within a country during the crisis period. While this measure is available for a large number of OECD countries with STW schemes, it is subject to a number of shortcomings, which will be addressed in this section.

62. First, by defining take-up at the national level, it does not exploit the *industry* variation in the data. Standard errors may be downward-biased due to the cross-industry correlation within countries that arises when STW take-up is measured at the country level. While clustering standard errors within countries should, in principle, address the biased errors, defining take-up at the industry level would improve the analysis by exploiting the cross-industry variation within countries in the data. The reason for not using industry take-up in the baseline specifications is that this reduces the country coverage drastically: the necessary data are only available for 8 of the 16 countries with STW schemes used in the baseline specification, thus greatly reducing the generality of the results. Panel A of Table 3 reports the results that are obtained using national take-up and industry take-up rates, respectively, for the set of countries for which industry-level data are available. The results are qualitatively similar and comparable to the baseline results.

63. A second caveat relates to defining the STW take-up variable in terms of the number of participating workers rather than the number of full-time equivalent (FTE) participants. This could introduce a bias in the country-specific estimates of the impact of STW to the extent that the average reduction in working time, as a result of STW, differs across countries. To test whether this affects the baseline results, the total number of participants is converted into full-time equivalents using the estimated average reduction in working hours associated with short-time working in 2009 from Figure 6. Panel B of Table 5 shows that the results using both industry and national take-up rates are qualitatively similar to those in the baseline. The coefficients for permanent employment and average hours are somewhat larger when using FTE take-up rates. This is to be expected as the level of FTE take-up is necessarily smaller than when take-up is measured in terms of the number of participants. .

64. A final caveat related to the measurement of STW in the baseline regressions relates to the assumption that participation in STW was negligible in all countries prior to the crisis. While this is appropriate for the majority of countries, STW was already quite substantial in a number of countries prior to the crisis (*e.g.* Belgium, Italy). To relax this assumption, an approximation of the average level of take-up during the pre-crisis period is made. As appropriate data on take-up for the entire pre-crisis period in the sample are not available for most countries, this is done using data from the first quarter of 2007 to the start of the crisis instead. The results, shown in Panel C of Table 4, are again qualitatively similar to the baseline estimates using the same sample. However, the estimated impact is considerably weaker. It cannot be determined to what extent the baseline results overestimate the effectiveness of STW in preserving permanent jobs or whether these differences can be attributed to the poor measurement of take-up rates before the crisis.

Table 5. **Sensitivity of baseline results to measurement issues**

Average difference-in-difference effect between countries without STW and the typical country with STW

Specification	Number of countries	Permanent employment			Temporary employment			Average hours of permanent workers			Average hours of temporary workers		
		Coeff.	*Std error*	*Sig.*	*Coeff.*	*Std error*	*Sig.*	*Coeff.*	*Std error*	*Sig.*	*Coeff.*	*Std error*	*Sig.*
Panel A. **National versus industry take-up rates**													
Baseline	19	-0.115	*(0.039)*	***	-0.036	*(0.214)*		0.039	*(0.024)*		-0.063	*(0.041)*	
National take-up rate	11	-0.138	*(0.044)*	***	0.207	*(0.099)*	**	0.051	*(0.033)*		-0.059	*(0.056)*	
Industry take-up rate	11	-0.054	*(0.017)*	***	0.133	*(0.207)*		0.045	*(0.023)*	*	0.021	*(0.055)*	
Panel B. **Participant versus FTE take-up rates**													
National take-up rate	14	-0.114	*(0.040)*	***	-0.113	*(0.251)*		0.051	*(0.028)*	*	-0.087	*(0.032)*	***
National FTE take-up rate	14	-0.181	*(0.064)*	***	0.200	*(0.249)*		0.074	*(0.039)*	*	-0.097	*(0.063)*	
Industry take-up rate	10	-0.060	*(0.017)*	***	0.108	*(0.215)*		0.046	*(0.024)*	*	0.023	*(0.058)*	
Industry FTE take-up rate	10	-0.062	*(0.019)*	***	0.179	*(0.222)*		0.049	*(0.028)*	*	0.018	*(0.065)*	
Panel C. **Take-up assumed zero in pre-crisis period versus imputed take-up rates in pre-crisis period**													
National take-up rate - pre-crisis rate set to 0	18	-0.112	*(0.038)*	***	-0.044	*(0.224)*		0.050	*(0.025)*	**	-0.070	*(0.041)*	*
National take-up rate - pre-crisis rate imputed	18	-0.069	*(0.041)*	*	-0.287	*(0.339)*		-0.008	*(0.053)*		-0.017	*(0.146)*	
Industry take-up rate - pre-crisis rate set to 0	10	-0.060	*(0.017)*	***	0.108	*(0.215)*		0.046	*(0.024)*	*	0.023	*(0.058)*	
Industry take-up rate - pre-crisis rate imputed	10	-0.010	*(0.015)*		0.239	*(0.112)*	**	0.026	*(0.015)*	*	-0.005	*(0.030)*	

FTE: Full-time equivalent.

*, **, *** statistically significant at the 10%, 5% and 1% level, respectively.
Source: Authors' estimates.

6.3 How many jobs were saved by STW during the recession?

65. The results presented so far provide evidence that STW schemes helped to preserve permanent jobs during the 2008-09 recession by inducing firms to reduce average hours worked. However, they do not provide much insight about the quantitative importance of STW schemes. Table 5 uses the regressions coefficients from the baseline model in section 6.1 and various alternative specifications in Table 5 to provide estimates of the difference in permanent employment in 2009 Q3 that may be attributed to the operation of STW schemes during the crisis period.[32] Panel A reports the *proportional* impact, while the *absolute* job impact is reported in Panel B. The proportional job estimates are obtained by the product of three terms: *i)* the coefficient on the interaction term of the change in output, the crisis dummy and average take-up (α_4); *ii)* the total change in output during the crisis period; and *iii)* the average increase in the level of the STW take-up rate during the crisis. The absolute number of jobs saved is calculated by multiplying the proportional change in employment by the level of employment at the onset of the crisis. In countries where STW schemes were only established after the start of the crisis, the impact of short-time work programmes is calculated from the time where the scheme became operational.

32. The impact on temporary employment is ignored as this is insignificant in the vast majority of specifications in Tables 4 and 5.

66. The estimates support the conclusion that STW schemes had an economically important impact on preserving jobs during the economic downturn, with the largest proportional impact of STW on permanent employment among the 16 countries considered in Japan and Germany. Using the baseline coefficients, the results in Table 6 estimate that 235 000 and 415 000 jobs, corresponding to 0.8 to 0.9% of employees, were saved in Germany and Japan, respectively. However, given the variability in coefficients resulting from the use of different measures of take-up and different assumptions (see Table 5), these results should be seen as providing, for most countries, an upper limit to the true number of jobs saved. The main differences between the baseline estimates and those derived from alternative specifications are:

- Defining take-up at the *industry* instead of the *national* level tends to reduce the estimated impact of STW in most countries. This is entirely due to the change in the measurement of take-up and not to the change in sample. It is not obvious why the estimated impact of STW declines when defining take-up at the industry level. One reason may be that, despite the use of the difference-of-differences framework to account for the role of rules and regulations that affect labour market adjustment patterns, take-up defined at the country level is still correlated with institutions that, like STW, tend to favour hours over employment adjustment. By exploiting the industry variation in take-up this problem may be reduced somewhat, reducing the estimated impact of STW on permanent employment.

- Measuring take-up in terms of FTEs instead of the number of participants has an important impact on the estimated jobs impact of STW across countries. As one would expect, the estimated impact of STW is considerably smaller when using FTEs instead of the number of participants in countries where the average reduction in working hours associated with STW is relatively small (e.g. Austria, France). In countries where STW tends to take the form of temporary layoffs, using FTEs substantially increases the estimated size of the impact of STW (e.g. Finland and Spain). In Italy, the estimated impact of STW also increases substantially due to the fact that the standard take-up rate is already close to a FTE take-up rate as data are only available for the number of hours subsidised. The average impact of STW on permanent employment across countries does not change much when using FTE instead of participant take-up.

- Taking account of the intensity with which STW is used before the start of the crisis tends to reduce the estimated average impact of STW, but also has important implications for its distribution across countries. Accounting for the use of STW before the crisis substantially reduces the estimated impact in countries such as Belgium, Finland, France and Italy that made intensive use of STW before the crisis. The change is particularly large for Belgium. The baseline estimates suggest that the decline in permanent employment from the start of the crisis to the end of 2009 Q3 was about 55 000 jobs less (1.6% of total employees) in Belgium than what it would have been in the absence of the STW scheme. After taking account of the use of STW before the crisis, the estimated impact falls to about 14 000 jobs (0.4% of total employees).

Table 6. **Proportional and absolute impact on permanent employment due to short-time work schemes from the start of the crisis to 2009 Q3**

	National take-up rate			Industry Takeup			Average national take-up rate[a]	FTE take-up rate in 2009
	Baseline	FTE take-up rate	Pre-crisis take-up rate	Baseline	FTE take-up rate	Pre-crisis take-up rate		
Austria	0.15	0.08	0.11	0.09	0.04	0.03	0.11	0.13
Belgium	1.58	1.71	0.42	1.33	1.23	0.11	1.24	2.97
Czech Republic	0.54	. .	0.39	0.12	. .	0.04	. .	. .
Denmark	0.07	. .	. .	. .	. .	. .	. .	. .
Finland	0.98	2.44	0.44	0.41	0.96	0.08	1.29	1.98
France	0.11	0.07	0.04	0.15	0.09	0.03	0.07	0.23
Germany	0.91	0.75	0.63	0.44	0.33	0.13	0.76	1.28
Hungary	0.11	. .	0.08	. .	. .	. .	. .	. .
Italy	0.92	1.89	0.44	0.47	0.89	0.10	1.09	3.19
Japan	1.05	0.84	0.76	. .	. .	. .	0.88	1.07
Netherlands	0.11	0.07	0.08	0.11	0.06	0.04	0.09	0.23
Norway	0.00	0.01	0.00	. .	. .	. .	0.01	0.82
Portugal	0.01	0.03	0.01	. .	. .	. .	0.02	0.11
Spain	0.30	0.78	0.22	. .	. .	. .	0.43	1.26
Total	-	-	-	-	-	-	**0.87**	**1.85**

Panel B. **Absolute jobs impact**

	National			Industry			Average jobs impact at national level[a]	FTE participants in STW in 2009
	Baseline	FTE take-up rate	Pre-crisis take-up rate	Baseline	FTE take-up rate	Pre-crisis take-up rate		
Austria	4 971	2 546	3 560	3 002	1 428	998	3 692	3 253
Belgium	54 560	58 923	14 409	45 804	42 319	3 951	42 631	81 879
Czech Republic	21 746	. .	15 745	4 758	. .	1 582	. .	. .
Denmark	1 852	. .	. .	. .	. .	. .	. .	. .
Finland	18 762	46 696	8 426	7 823	18 331	1 622	24 628	32 071
France	22 636	14 594	8 434	31 406	18 986	5 389	15 221	42 968
Germany	279 080	230 781	192 983	134 940	100 781	41 385	234 281	293 980
Hungary	3 737	. .	2 706	. .	. .	. .	. .	. .
Italy	156 971	320 741	75 287	80 636	150 655	16 906	184 333	441 417
Japan	494 538	396 076	357 671	. .	. .	. .	416 095	397 850
Netherlands	7 068	4 430	5 118	6 886	3 979	2 289	5 539	11 903
Norway	103	282	58	. .	. .	. .	148	12 254
Portugal	481	900	312	. .	. .	. .	564	3 879
Spain	38 004	98 484	27 167	. .	. .	. .	54 552	154 972
Total	-	-	-	-	-	-	**981 684**	**1 476 428**

. : Not available; -: Not applicable.

FTE: Full-time equivalent.
a) Unweighted average of the three first columns..
Source: Authors' estimates based on Table 4.

67. Overall, it is difficult to draw strong conclusions about the *effectiveness* of STW in preserving jobs during the crisis in individual countries. While the estimates in Table 6 give some indication of the country-specific impact of STW during the crisis, they give no insight into the relative effectiveness of STW across countries since the country-specific jobs estimates are based on estimates of the *average* impact of STW across countries. No account is taken of how the effectiveness of any particular country's STW scheme is affected by the eligibility and conditionality requirements or generosity of schemes discussed in Section 2. Nevertheless by comparing the average estimates at the national level in the table of

the net effect of STW schemes in preserving permanent jobs with the potential number of jobs preserved calculated by translating the total hours subsidised into FTEs (*i.e.* using FTE estimates of take-up as outlined in Section 3.3), one may be able to get a rough indication of the average effectiveness of STW schemes. The difference between the two measures provides an indication of the size of deadweight effects. The accounting calculation for the eleven OECD countries for which appropriate data are available suggests that the potential number of jobs saved by STW in total in 2009 was almost 1.5 million.[33] FTE take-up for 2009 Q3 can only be calculated for a very few countries, but at least for Germany - where appropriate data are available to calculate FTE take-up by quarter – take-up for 2009 Q3 is similar to the average level of FTE take-up over 2009. As this may not be the case for all countries, one should therefore be careful to compare the jobs saved estimates in this paper with the potential number of jobs saved based on FTEs. As the average national-level estimates suggest that only about one million jobs may have been saved by 2009 Q3, this would imply that deadweight losses accounted for over one third of the subsidy.[34]

7. Short-time work in the recovery

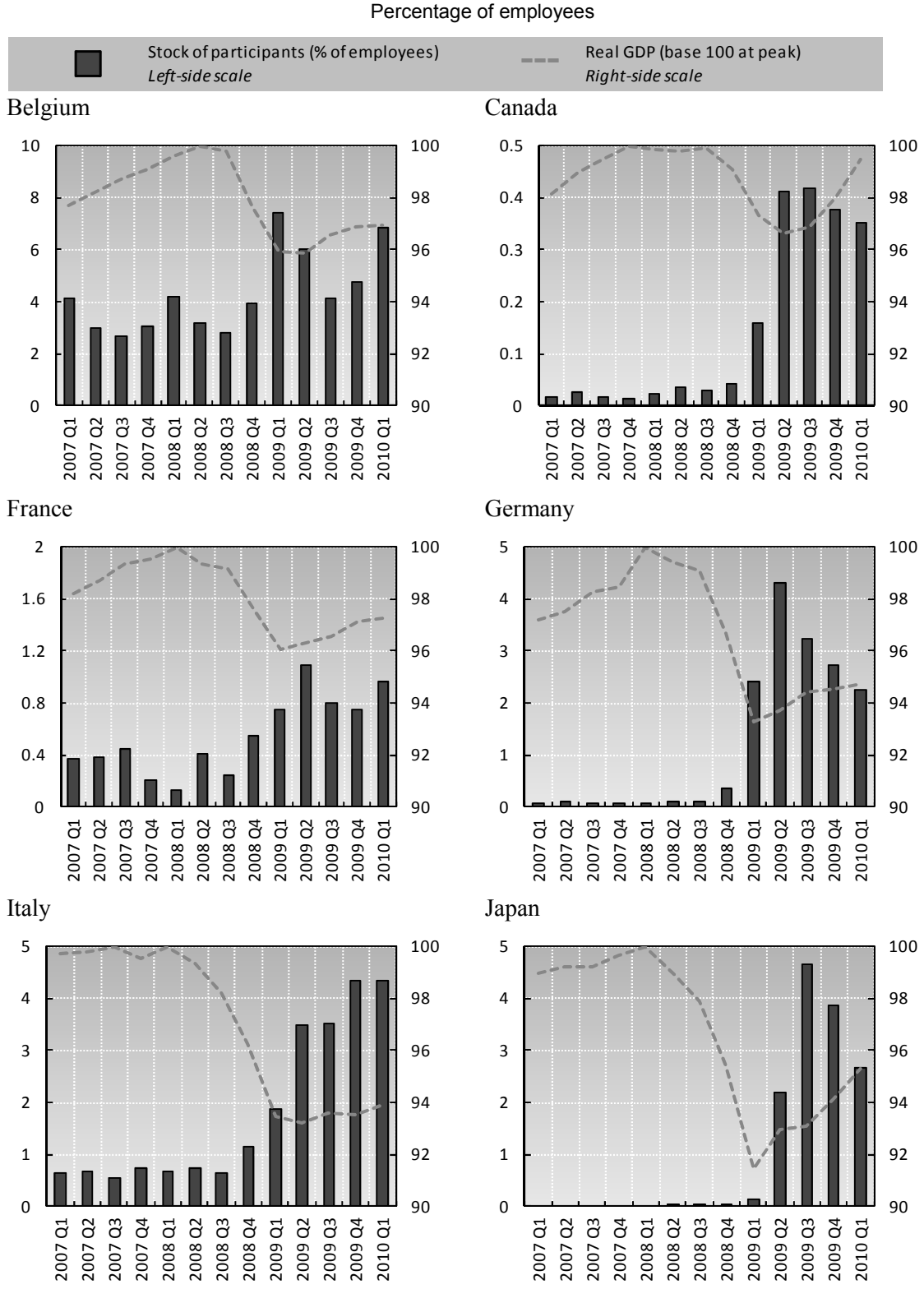
68. As the OECD area is only just emerging from the crisis, it is not possible yet to assess how the intensive use of STW schemes during the 2008-09 recession will affect the vigour of employment growth in the recovery and economic restructuring in the longer run. However, the trade-off between supporting existing jobs and facilitating labour reallocation is likely to become less favourable in the recovery as firms become better able to retain viable jobs without public subsidies and the efficiency cost of retaining workers in non-competitive jobs increases. Indeed, the potential of STW to become an obstacle to economic growth is one of the main concerns related to STW.

69. To prevent STW schemes from protecting unviable jobs and hindering the required reallocation of labour in the recovery, it will be important to ensure that firms and workers face appropriate incentives to move out of STW schemes as the economy recovers; that clear and credible time limits are imposed on STW arrangements; and that temporary measures implemented in response to the crisis are phased out in a timely manner. Most OECD countries that made changes to STW schemes or introduced new schemes during the recession are scheduled to phase out these changes during or at the end of 2010. Nevertheless, in countries with relatively long durations of STW, particularly Finland, Japan, Italy and Spain where normal duration is two years or longer, it could take some time for the large stock of short-time workers to exhaust their entitlements and move out of STW. However, there are already signs that the use of STW is receding in the recovery. Figure 8 shows that take-up rates for STW schemes peaked in many OECD countries in early to mid-2009. Whether this is due to existing short-time workers reaching maximum duration limits, workers withdrawing from schemes prior to reaching the limit, fewer workers and firms taking up STW or some combination of these factors is not clear.

33. It is preferable to focus on the absolute jobs impacts as the denominators of the FTE take-up rates and the proportional jobs estimates are not the same.

34. The discrepancy between the net number of jobs preserved and the total potential number of jobs preserved actually represents the sum of deadweight and displacement effects. However, it is unlikely that displacement effects would have been very large as of 2009 Q3.

Figure 8. **Stock of participants in STW schemes, 2007 Q1 to 2010 Q1**



Source: Authors' calculations.

8. Conclusion

70. The results in this paper show that public STW schemes have played an important role in preventing many workers from unnecessarily facing unemployment during the 2008-09 crisis in a number of countries. The largest impacts of STW on employment among the 16 countries considered were in Germany and Japan. However, the positive impact of STW was limited to workers with permanent contracts, further increasing labour market segmentation between workers in regular jobs and workers in temporary and part-time jobs. The analysis also shows that operating public STW schemes involves some additional costs. STW schemes may end up supporting some jobs that would have been maintained anyway, while other jobs supported by the scheme may be terminated during or shortly after the end of the programme. There is also a risk that some jobs are not created as potential job candidates are locked in their existing jobs by the subsidy. While considerable uncertainty about the magnitude of these costs remains, the results from the baseline specification in this paper suggest that these may be modest in comparison with that of other types of job subsidies.

71. The paper also shows that the institutional features of STW schemes vary substantially across countries. In light of this variation, it is useful to think about the optimal design features for STW schemes to minimise deadweight loss and displacement effects while at the same time reducing excess layoffs during a recession. Eligibility requirements – such as having to prove economic need or a prior agreement between social partners – and requiring firms to share some of the cost of STW are likely to reduce deadweight losses.[35] Conditionality requirements – which require particular behaviour such as job search or training from firms and workers while participating – can reduce displacement effects. However, in all cases the trade-off is likely to be lower take-up, which may be inefficient during a sharp recession. It is likely that the mix of design features should change over the course of the business cycle to foster take-up when the economy is deteriorating rapidly but encourage firms and workers to move off STW as the economy recovers, reducing the risk of long-term reliance on subsidised STW.

72. While this paper presents several novel advances in the study of STW schemes and their impact, a number of areas for further research remain. As the OECD area is only just starting to emerge from the crisis, it is still too early to assess the impact of STW schemes in the longer term, when the balance of costs and benefits associated with STW is likely to turn more negative. Indeed, the main concerns about STW schemes relate to their potentially adverse impacts on the vigour of employment growth during the recovery and economic restructuring in the longer run. The analysis in this paper in principle allows one to assess how the balance of costs and benefits changes between the pre-crisis period and the crisis. The results (not reported) suggest that while the impact of STW on average hours worked is similar in both periods, the positive role of STW in preserving permanent jobs is limited to the crisis period. However, it is not clear to what extent the insignificant impact of STW on permanent employment before the crisis can be attributed to a more negative balance between costs and benefits associated with STW before the crisis or whether this reflects the considerable problems with measuring take-up accurately before the crisis. Analysing the role of STW – including the optimal mix of eligibility and conditionality requirements and generosity – over the entire business cycle, therefore, remains an important area of future work.

35. There are also growing calls for the use of experience-rating – where longer participation in STW by firms would increase their future unemployment insurance premia – to improve the efficiency of STW schemes (*e.g.* Cahuc and Carcillo, 2010). It could be argued that requiring firms to share some of the cost of STW could achieve the same aim with less complexity, particularly given that some countries operate STW schemes independently of unemployment insurance systems.

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ANNEX TABLES

Table A.1. **Sources and definitions of short-time work schemes data**

	Program	Source	Frequency	Breakdown by industry	Raw measure	Adjustments
Austria	*Kurzarbeitsbeihilfe* (Short-time working allowance)	Arbeitsmarktservice	Monthly	Yes	Stock of participants	-
Belgium	*Chomage temporaire pour causes économiques* (partial unemployment, for blue collar workers only); *Regime temporaire et collectif de suspension totale ou partielle de l'exécution du contrat de travail* (for white collar workers in private sector).	RVA - Rijksdienst voor Arbeidsvoorziening / ONEM - Office national de l'emploi	Monthly	Yes	Stock of participants	-
Canada	Work Sharing	StatCan	Monthly	No	Stock of persons receiving work sharing benefits	-
Czech Republic	Subsidised training for workers on partial unemployment (Educate yourself "Vzdělávejte se")	Ministry of Labour, MPSV	Monthly	Yes	Inflows of employees positively handled applications	The monthly stock is estimated assuming an average duration into this program of six months
Denmark	*Arbejdsfordelingsordning* (Work Sharing)	Arbejdsmarkedsstyrelsen	Annual	No	Cumulative inflows of people receiving Unemployment insurance for work sharing (less or more than 13 weeks)	Monthly inflows are calculated by dividing total cumulative inflows by 12 (the number of months during which this programme was operational in 2009). The average monthly stock is estimated assuming an average duration into this program of three or six months.
Finland	Adjusted unemployment allowance for partial unemployment	Ministry of Employment and the Economy, Employment service statistics	Monthly	Yes	Stock of participants	-
France	*Chômage partiel* (partial unemployment)	INSEE	Quarterly	Yes	Stock of participants	-
Germany	*Kurzarbeit § 170 SBG III* (Structural short-time working)	Bundesagentur für Arbeit	Monthly	Yes	Stock of participants	-
Hungary	ESF-financed short time working scheme	EC-OECD questionnaire	Annual	No	Average cumulative inflows of participants	Monthly inflows are calculated by dividing cumulative inflows by nine (the number of months from April 2009 to December 2009 during which this programme was operational). The average monthly stock is estimated assuming an average duration into this programme of six months.
Ireland	Systematic short time working	Central Statistics Office	Monthly	Yes	Stock of recipients of unemployment allowance under systematic short time working	-

Table A.1. **Sources and definitions of short-time work schemes data** *(Cont.)*

	Program	Source	Frequency	Breakdown by industry	Raw measure	Adjustments
Italy	*Cassa Integrazione Guadagni Ordinaria & Straordinaria* (Wage Compensation Fund)	Istituto Nazionale de Previdenza Sociale	Monthly	Yes	Stock of hours authorised	Thequarterlyy stock is estimated using the ratio of the total monthly hours authorised over the quarterly average hours worked by employee from Eurostat (QNA).
Japan	Employment Adjustment Subsidy	Ministry of health, Labour and Welfare	Monthly	No	Stock of participants	-
Korea	Employment Retention Subsidy Scheme	Ministry of Labor	Annual	No	Stock of participants	-
Luxembourg	*Indemnisation de chômage partiel* (Partial unemployment)	STATEC	Monthly	Yes	Stock of recipients of partial unemployment benefit	-
Netherlands	*Deeltijd WW* (partial unemployment benefits) and *Werktijdverkorting* (reduced working time benefits)	CBS	Monthly	Yes	Stock of employees involved	-
New Zealand	Job Support Scheme	EC-OECD questionnaire	Annual	No	Stock of participants	-
Norway	*Helt permitterte & Delvis permitterte* (Unemployment benefit for layoffs and temporary layoffs)	NAV	Monthly	No	Stock of participants	-
Poland	Guaranteed Employee Benefits Fund - for temporary work stoppage and reduced hours	Ministry of Labour and Social Policy	Annual	No	Average cumulative inflows of participants	Monthly inflows are calculated by dividing cumulative inflows by five (the number of months from August 2009 to December 2009 during which the programme was operational). The average monthly stock is estimated assuming an average duration into this programme of six months.
Portugal	*Suspensão ou redução temporaria da prestação de trabalho* (Temporary suspension or reduction of employment)	Eurostat	Monthly	No	Stock of participants	-
Slovak Republic	Support for maintenance of employment	Eurostat	Annual	No	Inflows of supported jobs	The monthly stock is estimated assuming an average duration into this programme of six months
Spain	*Prestaciones por desempleo parcial de nivel contributivo* (Partial unemployment benefit)	Ministero de trabajo e immigración	Annual	No	Inflows of recipients of partial unemployment benefit	The monthly stock is estimated assuming an average duration into this programme of six months
Switzerland	*Chômage partiel* (partial unemployment benefits)	SECO	Monthly	No	Stock of workers involved	-
Turkey	Short-time working	Ministry of Labour and Social Security	Annual	No	Stock of participants	-
United States	Short Time Compensation/Work Sharing (operating in 17 states with just over half of the US labour force)	EC-OECD questionnaire	Annual	No	Stock of participants	-

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