

Should We Insure Workers or Jobs During Recessions?

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Abstract

What is the most efficient way to respond to recessions in the labor market? To this question, policymakers on both sides of the pond gave two diametrically opposed answers during the recent crisis. In the US, the focus was on insuring workers, by aggressively increasing the generosity of unemployment insurance. In Europe, to the contrary, policies were concentrated on saving job matches, with the massive use of labor hoarding subsidies through short-time work programs, on which so little is actually known. So who got it right? Should we insure workers or jobs during recessions? In this article, we show that far from being substitutes, unemployment insurance and short-time-work policies exhibit strong complementarities. They provide insurance to different types of workers, and against different types of shocks. Short-time-work can be an effective way to reduce socially costly layoffs against large temporary shocks but is less effective against more persistent shocks that require reallocation across firms and sectors. Overall, we conclude that short-time-work is an important and useful addition to the labor market policy-toolkit during recessions, which should be used alongside unemployment insurance.

Keywords: short-time work, unemployment insurance, employment, welfare.

JEL-codes: H20, J20, J65.

In the wake of the COVID crisis, labor market policy responses on both sides of the Atlantic have been immediate, absolutely unprecedented in scope—and also diametrically opposed in nature. To put it simply, the focus of the US labor market policy response was on insuring the income of workers against the cost of job losses. This was done by aggressively increasing the generosity of unemployment insurance. In Europe, the emphasis was on preserving the relationship between workers and firms, which translated into generous subsidies for hours reductions and temporary layoffs through short-time work or related schemes.

Panel A of Figure 1 gives a visual representation of these polar strategies. In the US, the fraction of the working age population on unemployment insurance benefits surged from about 2 to 12 percent in April 2020, and, although it declined very quickly after that, at the end of 2020 it was still higher than at the peak of the Great Recession of 2007-9. If we look at the weighted sum of the four largest European economies—Germany, the United Kingdom, France, and Italy — the increase in the number of unemployment insurance recipients was very limited, but take-up of short-time work skyrocketed, with more than 16 percent of the working age population enrolled in this type of scheme in April 2020. There was no such increase in short-time work take-up in the US economy, although more than 26 US states have operational work-sharing schemes similar to short-time work.

Some consequences of these opposite labor market strategies on non-employment rates are laid bare in Panel B. While the US economy experienced a spike in non-employment, and continued to see high rates of non-employment in late 2020, employment rates did not bulge in Europe despite the severity of the shock. Interestingly, the much larger cyclicity of the US labor market relative to that of European countries was already visible in past recessions, during which Europe already experimented, although to a much lower degree, with short-time work usage. Do US policymakers get it right by focusing their labor market policy response to recessions on insuring workers through unemployment insurance? Or should they use more short-time work, and focus more on preserving jobs, as in Europe?

Addressing these questions is complicated by the remarkably small attention devoted to short-time work, relative to the sprawling literature on unemployment insurance—an imbalance we hope to remedy.

Short-time work and unemployment insurance

Some institutional features

While most people are familiar with unemployment insurance policies, short-time work schemes are not as well-known. So how do they work in practice? What are the countries that use them and how long have they been in place for? How do they compare with unemployment insurance in terms of generosity, coverage, or eligibility? Let us start by clarifying a bit the institutional background.

Short-time work – also known as short-time compensation, work sharing or shared-work programs – is a subsidy for temporary reductions in the number of hours worked in firms experiencing temporary drops in demand or production. Short-time work programs allow employers facing temporary shocks to reduce their employees' hours instead of laying them off. The program provides a subsidy to employees put on reduced hours (i.e. put on short-time work) equivalent to a fraction of their lost earnings. Short-time work cushions the adverse effect of reductions in business activity on both firms and workers, averting the risk of layoffs and insuring workers against the cost of drops in hours worked. Unemployment insurance programs, instead, provide a temporary subsidy to laid-off workers who lost their job through no fault of their own. Hence, while both programs provide insurance against labor market shocks, short-time work programs insure job matches against temporary hours reductions, while unemployment insurance insures workers against job loss. We now provide a general description of the features of both programs.

Several European countries and US states have short-time work schemes in place.¹ Whilst different schemes are characterized by different requirements and generosity, they all share as common feature that the application process must be initiated by the employer. The latter must submit an application to the relevant administrative agency. If successful, the application grants a number of subsidized hours of short-time work that can be used by the firm. Workers' subsidies are computed as a percentage of the earnings lost due to hours not worked, typically up to a cap. The disbursement of the subsidy is usually advanced to the worker by the firm, who is subsequently reimbursed by the social security via lower contribution payments. In exceptional cases, the social security pays the subsidy directly to the worker. Short-time work schemes are usually funded through a combination of social insurance contributions – paid by eligible firms and workers – and an experience rating component, paid only by those firms and workers that benefit from the program.

Short-time work regulations can include *work-sharing requirements*, specifying a minimum and/or maximum hours reduction, a minimum number of employees or share of the workforce to be involved in the program, and how hours reductions should be distributed across the workforce. In the majority of countries, there is no maximum hours reduction per worker, meaning that short-time work can cover both partial and full hours reductions, i.e. down to zero hours worked. In the US, instead, work weeks must be reduced by at least 10 percent and no more than 60 percent to benefit from the program.

Eligibility requirements set the conditions under which employers or employees can take part to the scheme. For employers, the main requirement is proof of economic need, such as a reduction in business activity above a certain threshold. In some countries, access to

¹ At the time of writing, 25 states are operating active programs in the US (Arizona, Arkansas, California, Colorado, Connecticut, Florida, Iowa, Kansas, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, New Hampshire, New Jersey, New York, Ohio, Oregon, Pennsylvania, Rhode Island, Texas, Washington, and Wisconsin). Vermont ceased to operate its short-time work program on July 1, 2020.

the program is restricted to firms operating in certain sectors of the economy or with size above given thresholds. An agreement with union representatives can also be required. To be eligible for short-time work, workers are typically required to have been employed and contributing to social insurance for a minimum amount of time. Some short-time work schemes do not cover workers on temporary contracts.

Conditionality requirements for employers can include the prohibition of dismissals and the development of a recovery plan, while for workers training or job search requirements could be in place.²

Unemployment insurance provides temporary financial assistance to eligible unemployed workers who become unemployed through no fault of their own. To receive unemployment insurance, laid-off workers must file a claim with the relevant administrative agency. To be eligible, a worker is typically required to have worked for a minimum amount of time, and – in some cases – to have earnings above a certain threshold. Workers on fixed-term contracts are usually not covered by unemployment insurance once their contract expires. If eligible, the unemployed worker receives an unemployment benefit in cash for a given amount of time. Benefits are defined as a fraction of recent earnings, usually up to a cap, with a replacement rate that is in most cases lower than that of short-time work at zero hours (and the more so at partial hours). The disbursement of unemployment benefits is made directly to the worker by the social insurance, typically ensuring swift payments. To retain their benefits, unemployed workers may need to fulfil job-search and availability-to-work requirements – features aimed at ensuring that recipients do not become inactive.

Whilst in their purest form – as we have described them so far – short-time work and unemployment insurance are polar schemes insuring jobs on the one hand and workers on the other, in practice there exists a continuum of more nuanced labor market policies between those two extremes. Taking the US as an example, workers can qualify for unemployment insurance both when on permanent and temporary layoffs. Temporary unemployment – also called ‘recall’ unemployment – is a situation in which an employer lays-off a worker or a group of workers but plans to rehire them by a given date. In this circumstance, the worker is eligible for unemployment benefits and job search requirements are usually waived. Employers have also the option to put full-time employees who work less than full time during a pay period due to lack of work on partial unemployment insurance. In this case, workers are eligible for partial unemployment benefits, provided that they do not earn more than a maximum amount of labor income per week. Apart from this, eligibility conditions for partial unemployment insurance are usually identical to those for full unemployment insurance.

We can therefore think of there being a spectrum of policies offering different types of flexibility to employers: from short-time work for partial hours reductions offering only intensive margin flexibility, to short-time work at zero hours and partial unemployment

² For a comprehensive illustration of short-time work schemes in OECD countries, see [Hijzen and Venn \(2011\)](#).

offering both intensive and extensive margin flexibility, to recall unemployment offering only flexibility at the extensive margin. Besides differences in flexibility, the programs also insure different shocks and, consequently, are characterized by different types of moral hazard responses. On the one hand, programs that ensure intensive-margin adjustments tend to insure job matches, and trigger moral hazard responses on the employer side, who may have incentives to rely excessively on subsidized hours reductions. This is especially the case in contexts – like European countries – in which short-time work is only mildly experience rated. On the other hand, unemployment insurance schemes insure workers rather than jobs, and trigger moral hazard responses in the form of lower job search effort exerted by the unemployed.

It is worth noting that, whilst at first sight short-time work and partial or recall unemployment might seem to serve the same insurance needs, they are fundamentally different in how they affect employers' commitment to retain workers. The possibility to make take-up conditional on the prohibition of dismissal is a key advantage of short-time work programs compared to partial or recall unemployment. For these, it is hard to envisage a mechanism whereby firms are held onto their commitment to retain or recall workers, since such a commitment can neither be monitored nor enforced.

Short-time work and unemployment insurance during the COVID crisis

At the onset of the COVID crisis, the US responded to the sudden labor market freeze and historical surge in layoffs by aggressively extending the generosity of unemployment insurance. In particular, the Coronavirus Aid, Relief, and Economic Security (CARES) Act signed into law in March 2020 granted: (i) additional payments to everyone who qualified for unemployment benefits, (ii) an extension to individuals who would have otherwise exhausted their benefits, and (iii) eligibility to self-employed and gig-workers. Specifically, the CARES Act authorized Federal Pandemic Unemployment Compensation, in which unemployment benefits were increased by \$600 a week from March to July 2020. Moreover, the CARES Act was complemented by two additional stimulus packages in 2021 – the Consolidated Appropriations Act (January) and the American Rescue Plan (March) – both of which extended the unemployment insurance measures put in place by the CARES Act.

European countries, to the contrary, responded through short-time work or related schemes. In April 2020, the European Union announced that it would provide financial assistance for up to €100 billion to EU countries to develop or expand short-time work schemes.³ The majority of OECD countries had a short-time work program in place prior to the COVID crisis: *Activité Partielle* in France, *Kurzarbeit* in Germany, and *Cassa Integrazione Guadagni* in Italy. Several of those who did not have a scheme in place newly introduced it (e.g. Hungary and the UK), and most of those with existing short-time work schemes implemented measures to ensure rapid access to and wide take-up of the

³ For more details on the Support to mitigate Unemployment Risks in an Emergency (SURE) program, see https://ec.europa.eu/info/business-economy-euro/economic-and-fiscal-policy-coordination/financial-assistance-eu/funding-mechanisms-and-facilities/sure_en

program. Combinations of such measures have been necessary for short-time work schemes to work swiftly and effectively (Giupponi and Landais, 2020a). Online Appendix A provides an overview of measures that have been put in place during the COVID crisis to facilitate access to short-time work.⁴

Insurance vs moral hazard

Let us imagine that, in the midst of recession, we decide to increase the generosity of social insurance by \$1. Should this \$1 be put into more generous unemployment insurance or into more generous short-time work?

To approach the choice between unemployment insurance and short time work, our starting point is the standard trade-off that both policies have to solve between providing insurance to workers against labor market shocks and distorting the behaviors of firms and workers (Baily 1978; Chetty 2008). Indeed, the goal of both policies is to provide insurance against labor market shocks. For unemployment insurance, the shock is the cost of being unemployed. For short-time work, it is the cost of having to reduce working hours when a firm is hit by a negative shock.

Providing such insurance is socially desirable, as it transfers money to individuals who have lower income and consumption. But transferring \$1 to these individuals will cost more than \$1. This is because these policies also tend to distort behaviors, a problem often called moral hazard. Individuals will search less actively for a new job when they have unemployment insurance and will cash benefits for longer as a result. Or firms may reduce hours more than otherwise necessary if their workers receive short-time work benefits. From the perspective of the government, all these changes in behavior increase the cost of providing such insurance benefits. We say that moral hazard creates a fiscal externality on the government.

So what do we know about the respective moral hazard costs of unemployment insurance and short-time work schemes? And which program is better at providing insurance?

Willingness to pay for unemployment insurance vs. short-time work benefits

The value of any form of social insurance against labor market shocks depends on how workers value insurance (that is, the extent of their risk aversion) as well on whether workers have access to alternative means of consumption smoothing (self-insurance). Estimating this value poses challenges. Given that both unemployment insurance and short-time work are mandated by the government, one cannot simply look at a market price to measure workers' willingness-to-pay for insurance against labor market shocks.

In general, the research literature has devoted relatively little attention to this problem. The literature has mostly focused on measuring consumption dynamics around labor market shocks like job loss (for example, Gruber 1997). This approach usually finds

⁴ See also [Scarpetta et al. \(2020\)](#) for an overview of short-time work schemes during COVID in OECD countries.

significant but small consumption responses, which in turn translate into a moderate value of social insurance. Recent research using alternative revealed-preference methods (for example, [Hendren 2017](#); [Landais and Spinnewijn 2021](#)) suggests instead that the value of insurance against unemployment shocks is much larger than previously thought, but is also strongly heterogeneous across individuals.

For present purposes, the key question is how the insurance value of short-time work compares to that of unemployment insurance. The evidence on this point is limited. However, two elements indicate that the value of unemployment insurance may be somewhat larger than the value of short-time work.

First, recipients of short-time work and recipients of unemployment insurance are quite distinct populations. For example, Germany is a country where both generous unemployment insurance and short-time work are available. We exploit newly collected data starting in May 2020 from the High-frequency Online Personal Panel Survey (HOPP), a longitudinal survey launched by the German Institute for Employment Research ([Haas et al., 2021](#)). It shows unambiguously that during the COVID crisis, short-time work tended to protect mostly insiders, individuals with higher incomes, and better self-insurance options. Unemployment insurance, to the contrary, was mostly protecting the outsiders of the labor market, like younger individuals at the beginning of their career, or individuals with lower education and with fewer means to smooth household consumption (such as the presence of a working partner).⁵ As noted by [Cahuc and Carcillo \(2011\)](#), because short-time work tends to protect insiders, it is perhaps not surprising that it tends to be more prevalent in countries with strong employment protection regulations.

Second, the value of insurance is a direct function not only of the availability of self-insurance options, but also of the size of the consumption (or income) shock experienced upon transitioning to the program. As shown in [Figure 2](#), short-time work clearly insures smaller shocks. The figure builds on administrative data from Germany ([Tilly and Niedermayer 2016](#)) and Italy during the Great Recession of 2007-09 ([Giupponi and Landais 2020b](#)), and compares, using an event study design, the evolution of total earnings plus transfers around the onset of an unemployment spell and a spell of short-time work. In both panels, we see that the drop in earnings and transfers is much more severe and persistent for the unemployed than for workers on short-time work. But we also see an interesting difference. In Germany, the earnings of workers who experienced a short-time work spell had fully recovered after three years (Panel A). In Italy, to the contrary, they were still 30 percent lower than the year before entering short-time work, and they were converging to the level of earnings of workers having experienced an unemployment shock instead (Panel B). The main explanation for this discrepancy is that the Italian recession was much more protracted, and the shock to firms was therefore much more persistent. This, in turn, reminds us that short-time work tends to insure against temporary shocks, but is less effective at insuring against persistent or permanent

⁵ For these results and additional details on the HOPP survey, see Online Appendix B.

shocks: if the shock persists, a firm will not hold onto its workers and will eventually lay them off.

The relative moral hazard costs of unemployment insurance and short-time work

The literature on the moral hazard costs of unemployment insurance is abundant (for example, see [Schmieder, von Wachter, and Bender, 2016](#)). A main conclusion is that the duration of unemployment spells is strongly responsive to the generosity of unemployment insurance. A smaller literature also investigates the impact of unemployment insurance generosity on the probability of entering an unemployment insurance program, and finds moderate responses. In general, there is less scope for moral hazard along the extensive margin of becoming unemployed (as opposed to the intensive margin of being unemployed for a longer time), as layoffs are well-defined and well-monitored events, and those who quit are quite restricted in their ability to access unemployment insurance in many countries.⁶ Overall, the consensus is that the fiscal externality of increasing the generosity of unemployment insurance is relatively large: the cost to the government of an additional \$1 of unemployment insurance ranges from \$1.50 to \$2.50.

Evidence on the moral hazard costs of short-time work is much more limited, but two elements suggest that these costs might be significant. First, while access to short-time work is generally made conditional on firms experiencing economic or financial distress, the definition of distress is not always very precise and can prove hard to enforce, leaving some room for manipulation. Second, short-time work subsidizes hours *reductions*, which requires an effective monitoring of hours actually worked by employees, a notoriously difficult task for government administrators. As a result, the massive extension across Europe during the COVID crisis of access to short-time work for small businesses, where the difficulty of monitoring hours can be even more acute, has generated fears of a surge in moral hazard.

The existing evidence on the moral hazard costs of short-time work comes almost exclusively from the Great Recession, but suggests, interestingly, that these costs are smaller than anticipated. In the context of Italy for instance, [Giupponi and Landais \(2020b\)](#) identify behavioral responses to short-time work using variation in eligibility rules across firms, and find that for every €1 transferred to a worker on short-time work during the Great Recession, the total cost to the government implied by behavioral responses was around €1.4. In the context of Switzerland, [Siegenthaler and Kopp \(2021\)](#) compared firms who were successful to firms who were unsuccessful in their short-time

⁶ Recent papers hint towards layoff date being responsive to discontinuities in eligibility or generosity of unemployment insurance, one potential explanation being workers and firms bargaining over the timing of the layoff – see for example [Khoury \(2021\)](#) for evidence on France, [Albanese et al. \(2020\)](#) for evidence on Italy.

work application during the Great Recession and find a negative mark-up: in other words, short-time work paid for itself.⁷

What can explain these relatively small (or even negative) fiscal externalities of short-time work, in contrast with the relatively large moral hazard cost of unemployment insurance? First, it seems that, at least during the Great Recession, there was not much manipulation in the reporting of hours worked.⁸ Second, it appears that the probability of an individual worker being put on short-time work did not respond significantly to the generosity of short-time work subsidies, at least not during the Great Recession. Figure 3 illustrates this point using a large discontinuity in the short-time work subsidy amount available to workers in Italy at a particular wage threshold. Panel A shows, using Italian administrative data, that the average short-time work subsidy increases by 12 percent at the wage threshold. Yet, there is no sign of discontinuity at the threshold in the probability that a worker is put on short-time work, conditional on being employed by a firm using it (Panel C), nor in the share of potential working hours spent on short-time work conditional on being on reduced hours (Panel E).⁹

Figure 3 also shows evidence of large moral hazard responses to unemployment insurance benefits in the same Italian context (Scrutinio, 2018). In Italy, potential unemployment benefit duration is entirely based on age at layoff: workers fired before turning 50 are eligible for 8 months of unemployment benefits, while workers fired after turning 50 can receive up to 12 months of benefits (Panel B).¹⁰ Panel D plots the density of layoffs by age in months and shows a sharp response to the increase in benefit duration at age 50, suggesting that workers manipulate their layoff date to obtain more generous benefits. Panel F shows that the average number of weeks on unemployment insurance – i.e. the intensity of utilization – increases sharply from 23 to 31 weeks at the threshold.¹¹

Rigidities or frictions to individual level bargaining within the firm may explain why short-time work take-up does not respond much to variation in the generosity of the

⁷ Evidence from Germany (Boeri and Bruecker, 2011) shows that, during the Great Recession, the utilization of short-time work was concentrated among large firms (hit by the trade collapse). The extension of short-time work schemes to smaller firms during the COVID crisis, as well as the much larger scale of utilization of the program, may limit the applicability of evidence on moral hazard from the Great Recession to the COVID one.

⁸ Using data on firm balance sheets, Giupponi and Landais (2020b) show that in firms taking up short-time work, value-added per worker fell significantly, and by about the same magnitude as hours per worker. This indicates that reduction in hours upon take-up of short-time work is in large part a real response, rather than a reporting response.

⁹ In Italy, the amount of short-time work subsidy received by the worker is equivalent to 80% of forgone earnings due to hours not worked, up to a cap established by law each year. For example, in 2021, workers with contractual monthly earnings above €2,159.48 can receive benefits up to €998.19. For those with contractual earnings above €2,159.48, the cap is €1,119.72.

¹⁰ The benefit amount is proportional to average wages earned in the 3 months before layoff up to a cap. Workers receive 60% of their average wage for the first 6 months, 50% for the following 2 months and 40% for the remaining 4 months, if still eligible.

¹¹ This evidence is taken from Scrutinio (2018).

subsidy at the individual level. These rigidities in turn can also rationalize why firms' behavior is generally much more responsive to a variation in the firm's rather than the worker's side of the job surplus (Jäger, Schoefer, and Zweimüller 2019). Firms appear to be responsive to how social insurance programs like unemployment insurance or short-time work is financed: for instance, if unemployment insurance is funded by experience-rated premia on firms (that is, firms where more workers claim unemployment insurance pay somewhat higher premia), this tends to significantly reduce layoffs. Time-series evidence also suggests that the take-up of short-time work by firms declines significantly with the tightening of short-time work's experience rating.

The last reason why the fiscal cost of short-time work appears limited, and probably the main reason for it, is that the fiscal cost of short-time work is of course endogenous to the generosity of unemployment insurance. If more generous short-time work prevents layoffs, these positive employment effects mechanically reduce the fiscal cost to the unemployment insurance system, as fewer workers end up collecting unemployment insurance. In turn, the more generous the unemployment insurance system relative to short-time work, the larger will such savings be for the government. This leads us to the central question: does short-time work effectively save jobs? If so, what are the welfare consequences?

Short-time work and job destruction

While both unemployment insurance and short-time work offer insurance against labor market shocks, they differ in one fundamental way. Short-time work seeks to preserve labor market matches by subsidizing jobs, rather than job-seekers. In other words, short-time work, contrary to unemployment insurance, aims at reducing job separations. It is therefore critical to establish to what extent short-time work effectively saves jobs. But moreover, the social welfare impact of saving jobs will depend on whether separations are *inefficiently* high in recessions to begin with. So let us first review the evidence on the employment effects of short-time work, before delving into the reasons why layoffs may be inefficient, and determining whether subsidizing labor hoarding may be socially desirable.

The employment effects of short-time work

To determine whether short-time work saves jobs, a natural place to start is to leverage the large variation in short-time work usage during the COVID crisis across countries. Figure 4 provides such a macro perspective, and shows the presence of a very robust negative correlation between the fraction of the working age population that took up short-time work and the evolution of the non-employment rate during the crisis. One additional worker enrolling in short-time work is correlated with .27 fewer workers being non-employed. This strong correlation between employment and short-time work usage echoes time-series and cross-country evidence from previous recessions (for

example, [Van Audenrode 1994](#); [Abraham and Houseman 1993](#); [Boeri and Bruecker 2011](#); [Hijzen and Venn 2011](#); [Cahuc and Carcillo 2011](#)).

However, going beyond such correlations is complicated, and direct causal evidence on the employment effects of short-time work is scant.¹² The issue lies in the lack of credibly exogenous sources of variation in short-time work treatment across firms – an issue that will become even more acute for the current recession, as most countries have purposefully extended short-time work access to every firm. This severely complicates identification, with no obvious method to control for the selection of firms into short-time work.

Three recent papers focusing on the Great Recession address these selection problems and provide credible evidence of a positive, strong and causal relationship between short-time work and employment. Looking at Swiss firms, [Siegenthaler and Kopp \(2021\)](#) compare firms whose short-time work application was granted to similar firms whose application was rejected. The unsuccessful establishments provide a valid counterfactual for the successful ones because approval practices across Swiss cantons are partly idiosyncratic. They find that short-time work prevented a large number of dismissals, and significantly reduced the incidence of long term unemployment.

Looking at French firms, [Cahuc, Kramarz, and Nevoux \(2021\)](#) use the proximity of a firm to other firms that used short-time work in the past as an instrumental variable for short-time work take-up during the Great Recession. As an alternative instrument, they use response-time variation in the administrative treatment of short-time work applications across French departments. They find large and significant employment effects of short-time work treatment.

Finally, looking at data from Italy, [Giupponi and Landais \(2020b\)](#) exploit plausibly exogenous variation in short-time work eligibility rules based on the interaction between industry and firm size. Their approach and main results are presented in Figure 5. The figure shows the evolution of the difference in short-time work take-up between eligible firms and similar counterfactual firms without access to short-time work, around the time of the Great Recession (blue diamonds). The evidence confirms that after the onset of the crisis, the take-up of short-time work among eligible firms surged quickly. The chart further reports the evolution of hours (red triangles) and total employment (purple circles) in eligible firms relative to counterfactual non-eligible firms. It demonstrates that short-time work had large and significant effects on firms' employment at both the intensive and extensive margin. Compared to counterfactual firms, firms treated by short-time work experienced a 40 percent reduction in hours worked per employee, which was met by an increase of similar magnitude in the number of headcount employees. Consistent with the findings of [Siegenthaler and Kopp \(2021\)](#) using Swiss

¹² Using firm survey and administrative data in Denmark at the onset of the COVID-19 pandemic, [Bennedsen et al. \(2021\)](#) compare actual furlough decision and counterfactual decisions in the absence of aid. They find that the policy was effective in preserving job matches at the beginning of the pandemic.

firms, further results show that the employment effects are mostly driven by a reduction in dismissals among firms that would otherwise experience mass layoffs. Interestingly, [Giupponi and Landais \(2020b\)](#) also find no effect of short-time work on the wages of incumbents, nor on the wages of new hires.

The welfare value of labor hoarding subsidies

Overall, short-time work does seem to preserve jobs. But why is that valuable? In other words, why are employment adjustments at the intensive margin (hours reduction) versus extensive margin (layoffs) not equivalent in terms of welfare?

Preserving job matches is valuable for at least three reasons. First, frictions in the labor market, as well as hiring and training costs make it costly for firms to replace workers and for workers to change jobs. Second, workers may accumulate human capital that is specific to their job, and separations risk destroying this valuable source of idiosyncratic productivity. Finally, unemployment often entails long-run scarring effects for workers (as discussed, for example, by [Sullivan and von Wachter, 2009](#)). As a consequence, we should observe significant *labor hoarding*: firms and workers should be willing to preserve matches when hit by negative shocks.

But in practice, the socially efficient level of labor hoarding may not be achieved. Liquidity constraints are probably the most obvious and prevalent reason: during a shock, a firm may lack the funds necessary to pay wages and retain its workers. [Giroud and Mueller \(2017\)](#) document that, during the Great Recession, US firms facing higher liquidity constraints, as proxied by pre-crisis levels of leverage, were, all else equal, more likely to reduce employment in response to a consumer demand shock. Of course, employers could try to negotiate temporary wage or hours adjustments with their employees to deal with such liquidity constraints. But bargaining costs and commitment issues may often make such renegotiation impractical. Therefore, wage and hours rigidities may interact with liquidity constraints to amplify the employment response to negative shocks ([Schoefer, 2016](#); [Jäger, Schoefer, and Zweimüller, 2019](#)). Finally, note that generous and imperfectly experience-rated unemployment insurance may also already distort workers' and firms' choices in favor of (socially inefficient) dismissals. As pointed out by [Braun and Brügemann \(2014\)](#), this interaction between short-time work and the pre-existing distortions caused by unemployment insurance is critical to the welfare analysis of short-time work.

If separations are indeed inefficiently high during recessions because of liquidity constraints and other bargaining frictions, subsidizing labor hoarding can be efficient. Indeed, evidence from [Giupponi and Landais \(2020b\)](#) regarding Italian firms strongly supports this idea. It shows that liquidity constrained firms, identified using various indicators from balance-sheet data, were much more likely to take up short-time work. Moreover the treatment effects of short-time work were much more positive for these firms. The number of jobs saved per subsidized hour was significantly larger for them, and so was the effect of short-time work on the probability that the firm survived.

In sum, the liquidity constraint channel seems critical in explaining the excess sensitivity of employment adjustments to productivity shocks, and supports the idea of having job match subsidies to correct for inefficiently high separations. Yet two important questions remain.

First, what is the exact welfare value of saving these jobs? The answer depends on the value of the surplus of the marginal job match saved: the larger the value of a match, the larger the positive welfare effect of preserving it. Unfortunately, this value is an object that is hard to fathom, let alone to precisely measure, and on which there is little consensus in the literature.

Second, why should short-time work be the only way to implement such subsidies? What about other policy instruments? A natural alternative instrument would be “recall” unemployment insurance, under which workers can return to their former employer after a spell on unemployment insurance, thus preserving the job match. But in practice, recall unemployment insurance entails much less commitment to preserving the job match. Furthermore, it does not have the flexibility to insure against partial reductions in hours, a flexibility which can prove effective in addressing financial constraints and in preserving employment. What about direct wage subsidies, or direct provision of liquidity with temporary loans, such as the Paycheck Protection Program in the US? If liquidity constraints are in fact the main underlying source of inefficiency, tools addressing these financial constraints directly may be more appropriate than short-time work.

But even with these alternatives in mind, two arguments tend to support short-time work. The option of short-time work offers expediency: it can almost immediately provide the funds necessary to cover a firm’s payroll. In contrast, dedicated loan programs, as demonstrated by the experience of the Paycheck Protection Program, can take more time to be activated, and for funds to actually reach firms. Short-time work also may offer superior targeting, because it channels liquidity to firms that are willing to reduce their hours, which tends to be an effective screening mechanism. In practice, short-time work selects firms effectively hit by negative shocks, as measured by revenues, labor productivity, or the predicted probability to engage in mass layoffs (Giupponi and Landais, 2020b; Siegenthaler and Kopp, 2021). This screening property makes short-time work more effective than non-targeted wage subsidies, that can end up subsidizing a lot of non-marginal matches.

Reallocation in the labor market

Recessions are times of intense reallocation between workers and firms (Foster and Haltiwanger 2016). They are also usually characterized by slackness in the labor market: many workers are searching for jobs while firms demand less labor and post fewer vacancies.

Both short-time work and unemployment insurance affect workers’ search effort and firms’ labor demand. To assess the social desirability of both programs, we must

therefore also factor in how they impact labor market reallocation. We start by focusing on the effect of both social insurance schemes on the overall tightness of the labor market. We then delve into the impact of both policies on the optimal sorting of workers into firms in the labor market.

Social insurance and the tightness of the labor market

Reallocation in the labor market occurs as workers search for new jobs, and firms hire new workers. When there are a lot of workers searching for jobs, it is easy for firms to hire new workers: the labor market is “slack”, which is good for firms, but bad for workers. When, to the contrary, there are a lot of vacancies but few workers searching for jobs, the labor market is “tight”.

Unemployment insurance and short-time work affect at the same time the aggregate search effort of workers, and the incentives for firms to hire new workers: their overall effect on the tightness of the labor market is therefore *a priori* ambiguous. If generous unemployment insurance increases wages or if short-time work strongly reduces the need for new hires, more generous social insurance might strongly reduce the number of vacancies posted by firms, and make the labor market even more slack in recessions, delaying recovery. To the contrary, if labor demand is rigid during recessions and the labor market exhibits job rationing, workers searching for jobs find themselves in a rat race. In such contexts, reducing search effort through more generous unemployment insurance or short-time work can benefit workers by increasing the tightness of the labor market (Landais, Michaillat, and Saez 2018b).

So what do the data tell us about the overall effect of unemployment insurance and short-time work on equilibrium tightness? As a starter, we can again exploit the large variation in short-time work and unemployment insurance usage across countries and over time during the recent crisis. For this purpose, we built consistent measures of job-filling probabilities, using the ratio of hires to vacancies. These measures are direct proxies of the slackness of the market: the tighter the market, the harder it is for firms to hire workers, and the lower the job-filling probability as a result. We then correlate the change in job-filling probabilities with the change in short-time work and in unemployment insurance take-up across countries and across quarters during the current recession. Results, as reported in Figure 6, show that short-time work (Panel A) and unemployment insurance (Panel B) both seem negatively correlated with job-filling probabilities (or equivalently positively correlated with labor market tightness) in a recession, which is consistent with the presence of significant job rationing in downturns. The evidence suggests that increasing the generosity of short-time work or unemployment insurance in a recession can be effective ways of alleviating the search inefficiencies created by rat-race externalities.

This cross-country evidence is corroborated by a stream of recent papers, that identify the impact of social insurance on search externalities and equilibrium tightness using quasi-experimental designs. Lalive, Landais, and Zweimuller (2015) exploit a massive expansion in the generosity of unemployment insurance to a large subgroup of workers

in Austria and show that non-eligible workers have significantly higher job finding rates, lower unemployment durations, and lower risk of long-term unemployment as a result. [Marinescu \(2017\)](#) uses job board data and exploits quasi-random variation in unemployment insurance expansions across US states during the Great Recession: she finds that unemployment insurance reduced search effort significantly, but did not affect job vacancies, so that tightness went up significantly as a result. [Marinescu, Skandalis, and Zhao \(2020\)](#) and [Marinescu, Skandalis, and Zhao \(2021\)](#) exploit variation in unemployment insurance across US labor markets stemming from the CARES Act and the Federal Pandemic Unemployment Compensation (FPUC). Using granular data from the online job platform Glassdoor, they show in both cases that increases in unemployment insurance generosity significantly increased labor market tightness. Finally, using exogenous variation across local labor markets in Italy in their exposure to short-time work, [Giupponi and Landais \(2020b\)](#) find that greater access to short-time work decreases the job finding probability in the labor market, but that the magnitude of the effect is small. Overall, these results confirm that both unemployment insurance and short-time work increase tightness during downturns, and the effect seems to be more pronounced for unemployment insurance.

Of course, the welfare consequences of increasing tightness depend on whether tightness is inefficiently low or high in recessions. Historically, labor markets tend to be very slack during downturns. [Michaillat and Saez \(2021\)](#) offer a general characterization as well as a measure of the efficient level of tightness in the US. They find that the labor market has been particularly inefficiently slack during past recessions. The intuition is that the social cost of unemployment is very large relative to firms' recruiting costs during downturns. Pushing tightness up and increasing the job-finding probability of workers is then socially desirable: the reduction in the social cost of unemployment greatly outweighs the increased costs of recruiting for firms.

However, evidence from the current crisis suggests that this time *is* different. Looking at the long run evolution of the average vacancy-filling probability in the US, it is striking to see that it has remained at a historic low during the crisis. Overall, this recession seems unique: it is a tight recession in the labor market.¹³

Can this sustained level of tightness actually be explained by the large expansion of unemployment insurance generosity and coverage in the US at the onset of the COVID crisis? Would the situation be different if US policymakers had resorted more to short-time work, which seems to put less upward pressure on tightness? When we consider comparable data for European countries, we find that they have also experienced what appears to be tight labor markets during the pandemic recession, which suggests that the mix of social insurance policies used during the COVID crisis is probably not responsible.

¹³ For more information on labor market tightness during the pandemic, including figures showing the hires-to-vacancies ratio for the US and various European economies, see Online Appendix D. In the US data, the brief surge in the second quarter of 2020 can be entirely explained by early recalls from unemployment.

But this implies that there is probably no need to push tightness further up going forward. And exploring the factors behind this uniquely high level of tightness during a slump is important to guide the policy response during the recovery.

Slowing down reallocation across firms and sectors

Recessions trigger shocks that are asymmetric across firms and sectors. As a result, significant reallocation usually follows in the labor market: workers move away from firms persistently hit by bad shocks and towards more productive job matches, a movement which enhances aggregate efficiency. In recent months, concerns have emerged again on the impact that higher social insurance might have on the pace of this sectoral and firm reallocation (for example, [Barrero et al. 2021](#)).

Both unemployment insurance and short-time work have the potential to hinder reallocation, although the mechanism by which they do so differs. In theory, unemployment insurance is a general brake to aggregate reallocation: by lowering the search effort of the unemployed, it can slow the pace at which workers who have been dismissed from lower productivity jobs may move to more productive matches. Short-time work is a specific brake to sectoral/firm reallocation: it discourages workers in firms/sectors that are hit by productivity shocks from reallocating to other firms/sectors, by keeping them in their jobs. How problematic that is for aggregate productivity depends on whether the shock is temporary or permanent: if the shock is permanent, then short-time work may subsidize persistently unproductive matches and hinder reallocation towards more productive job matches.

How serious are these negative reallocation effects of unemployment insurance and short-time work in practice? Regarding unemployment insurance, we know surprisingly little on its overall impact on reallocation and aggregate efficiency in the labor market. For short-time work, evidence from [Giupponi and Landais \(2020b\)](#) on Italian firms sheds some interesting light on its impact on reallocation. It finds that short-time work tends to subsidize persistently low productivity matches, as low productivity firms tend to over-select into short-time work. Italian firms that were already below the median of labor productivity before the onset of the recession were twice as likely to select into short-time work during the Great Recession, and the employment effects of short-time work are also significantly lower for these low productivity firms. Furthermore, exploiting variation across local labor markets, they show that (exogenously) higher exposure to short-time work is significantly and negatively correlated with the employment growth of high productivity firms. In other words, high productivity firms have a harder time growing in a local labor market where low productivity firms have more access to short-time work. While this clearly supports the idea that short-time work slows down reallocation, the magnitude of the estimated effects remains small. However, the level of take-up of short-time work was also much smaller during the Great Recession than in the current crisis, and one cannot exclude that short-time work may have much stronger negative effects on reallocation in the current recovery.

Further externalities

Besides inefficient separations and reallocation frictions, it is worth pointing to a few further externalities with which short-time work and unemployment insurance may interact: aggregate demand externalities, fairness, and health.

A usual argument in favor of generous social insurance during recessions relates to their fiscal multiplier effects: unemployment insurance and short-time work transfer money to individuals who tend to have higher than average marginal propensities to consume. These high marginal propensities to consume, in turn, may help trigger positive aggregate demand externalities in a slump. A small literature has tried to embed social insurance into New Keynesian models to quantify the size of these multiplier effects (for example, [McKay and Reis 2016](#); [Michaillat and Saez 2019](#); [Guerrieri et al. 2020](#); [Kekre forthcoming](#)). How large are these fiscal multiplier effects? Which program commands the larger fiscal multipliers: short-time work or unemployment insurance?

Unemployment insurance, as explained above, tends to insure individuals experiencing larger shocks, and with lower means to smooth consumption: this suggests that unemployment insurance recipients are likely to have larger marginal propensities to consume. But short-time work, by preserving employment and improving expectations regarding future employment and income, may reduce the need for precautionary savings, and thus raise marginal propensities to consume compared to unemployment insurance.

The marginal propensities to consume of recipients of unemployment insurance are large, and significantly larger than those of employed people. Comparing the same individuals over time in Sweden, [Landais and Spinnewijn \(2021\)](#) find that the marginal propensity to consume is around 25 percent higher when unemployed than employed. But much less is known on the marginal propensities to consume of individuals on short-time work. We looked at the data from the German High-Frequency Online Personal Panel Survey (HOPP) mentioned earlier, and elicited marginal propensities to consume following the approach of [Jappelli and Pistaferri \(2014\)](#). We find that the marginal propensities to consume of German short-time work recipients was slightly larger than that of employed workers, but smaller than that of unemployment insurance recipients.¹⁴

However, moderate differences in marginal propensities to consume between unemployment insurance and short-time work recipients are unlikely to translate into sizeable differences in aggregate demand externalities between these two policies, because the fraction of the labor force receiving unemployment insurance or short-time work is small relative to the size of the employed population. For that reason, simulations,

¹⁴ For details and additional discussion, see Online Appendix Table B1.

such as in [McKay and Reis \(2016\)](#), suggest that, quantitatively, the stabilization effects of these forms of social insurance are small and second-order.¹⁵

Fairness appears to be an important institutional tenet in European labor markets ([Saez, Matsaganis, and Tsakloglou 2012](#); [Goldschmidt and Schmieder 2017](#); [Saez, Schoefer, and Seim 2019](#)). Fairness concerns suggest that short-time work may prove a more equitable way to insure against labor market fluctuations. If firms avoid layoffs and instead reduce hours of work per worker, the costs of recessions are less concentrated on a small number of workers who suffer large losses in income and other job-related benefits. Interestingly, this argument is often mentioned in the policy debate in countries with strong short-time work programs.

Finally, in the current pandemic, the ability granted by short-time work to flexibly reduce hours of work, and keep workers away from the workplace may have had positive health externalities by reducing the spread of the virus.

Conclusion

While very little was known about short-time work schemes and their potential welfare effects, this did not prevent European policymakers to aggressively resort to them during the COVID crisis. The evidence gathered in this paper, and summarized in [Table 1](#), shows they probably did the right thing. The value of insurance provided by short-time work transfers is clearly lower than that of unemployment insurance benefits, but the moral hazard they entail seems more limited than for unemployment insurance, especially when experience-rating of social insurance is limited. Importantly, recent evidence confirms that short-time work can be an efficient and expedient way to attenuate the social costs created by “excess” layoffs in recessions.

But while the policy debate has tended to oppose short-time work and unemployment insurance, this paper has revealed two important points. First, the frontier between unemployment insurance and partial unemployment or short-time work policies can often be quite tenuous. In other words, in certain circumstances, unemployment insurance schemes can be made to mimic the functioning of short-time work or furlough schemes by maintaining important ties between the unemployed and their employers.

Second, far from being substitutes, these two types of policies exhibit strong complementarities. Unemployment insurance and short-time work do not insure the same types of workers, nor the same labor market risks. They do not distort the same margins of behaviors. There are important fiscal spillovers between the two programs, as more generous short-time work reduces the risk of layoffs. Their effects on

¹⁵ For social insurance to have large multiplier effects, it would need to have a strong effect of the consumption behavior of the large population of the employed as well. But in practice, the precautionary savings channel (by which employed individuals save less when they have access to more generous social insurance against labor market shocks) seems too small to sustain large aggregate demand externalities.

reallocation in the labor market are also complementary. Short-time work is an efficient policy to deal with temporary shocks, while unemployment insurance can take care of shocks that end up being more persistent. In countries with already generous unemployment insurance and/or strong employment protection, like European countries, strong cyclical short-time work programs are therefore a valuable complement to unemployment insurance as a policy response to recessions. And, in general, having both programs is a great way to handle any type of recessions in the labor market. In other words, we should insure workers **and** jobs during recessions.

But this paper has also emphasized that social insurance critically interacts with equilibrium in the labor market, and this has important consequences for reallocation and efficiency. On this front, much more research needs to be done. As the current crisis seems to be unique in maintaining high tightness in the labor market, a better understanding of how unemployment insurance and short-time work affect reallocation will be key to determine the optimal policy path for the recovery. Attention should in particular be devoted to determining how unemployment insurance and short-time work should be coordinated with other instruments such as hiring subsidies, in order to boost labor demand and prevent reallocation issues.

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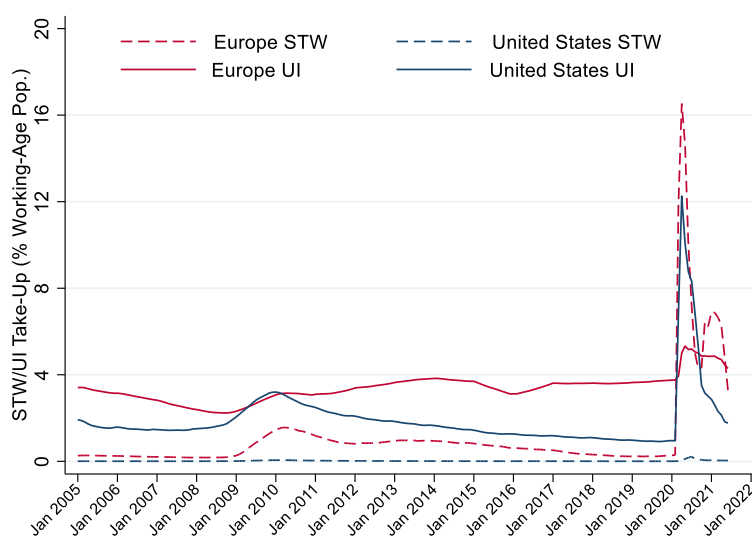
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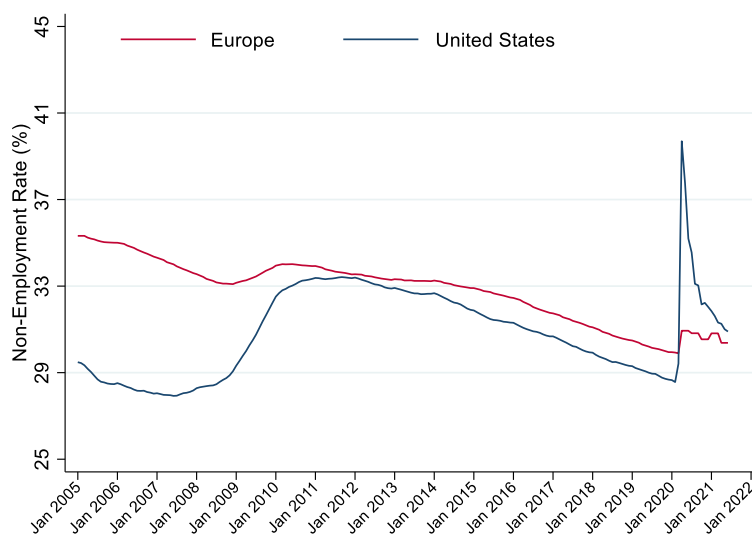
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Figure 1: LABOR MARKET POLICY RESPONSES TO RECESSIONS & NON-EMPLOYMENT RATES IN THE US AND EUROPE

A. Unemployment Insurance & Short-Time Work Take-Up

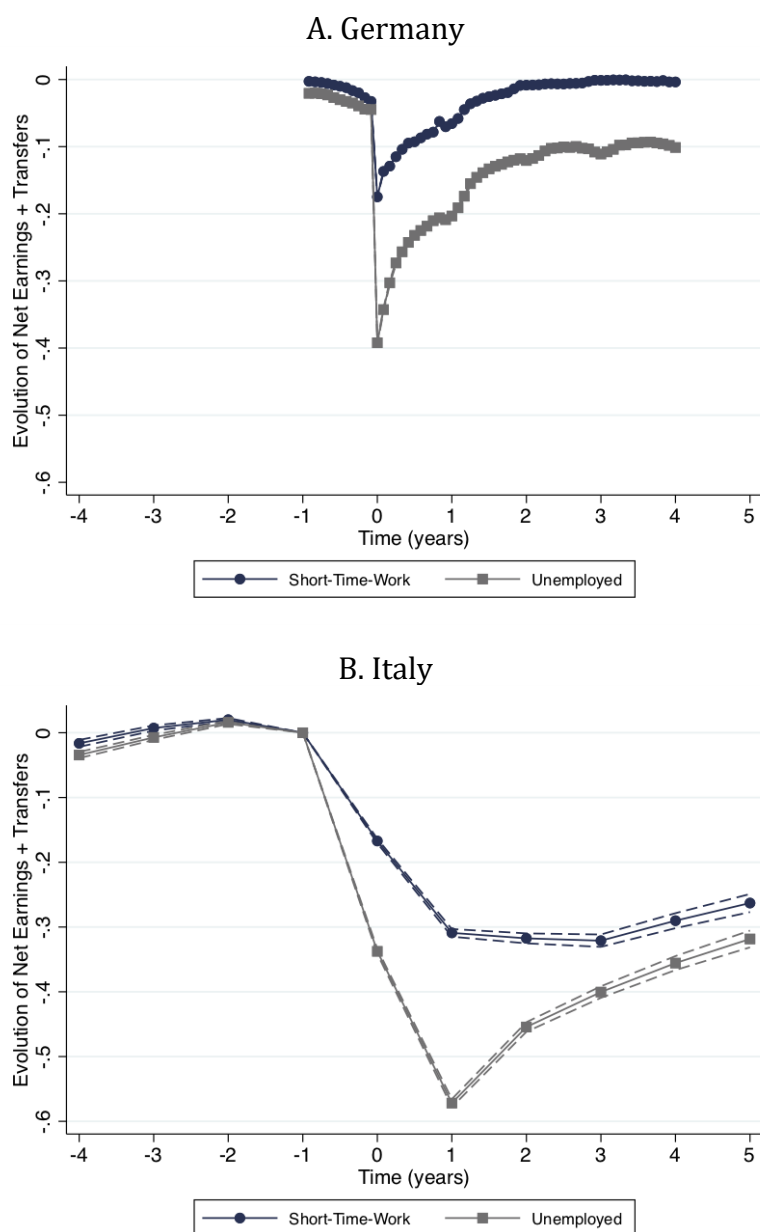


B. Non-Employment Rate



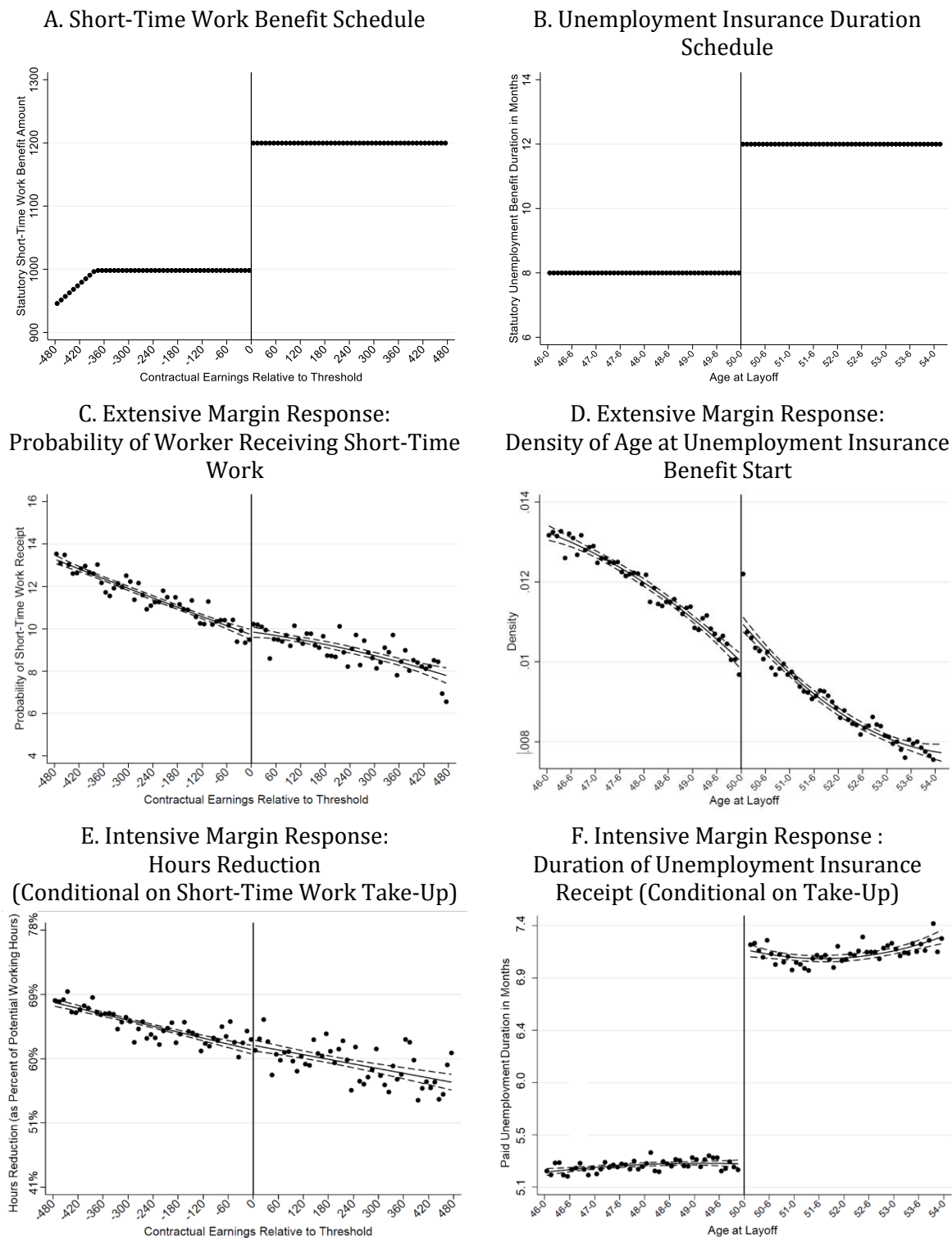
Notes: Panel A reports the evolution of short-time work (dashed lines) and unemployment insurance (solid lines) take-up in Europe (red lines) and the US (blue lines), each computed as the ratio of the number of individuals in the program in a given month, as a percent of the quarterly working age population. The series for Europe is a weighted average of the series for Germany, France, Italy, and the United Kingdom, weighted by the working age population. Panel B reports the evolution of the non-employment rate—that is, one minus the employment rate (and thus including both the unemployed and those out of the labor force). In both panels, the plotted series are moving averages of the raw series over the period up to June 2021. The moving average is based on twelve lagged terms, one forward term and uniform weights. Data on employment come from OECD. Data on short-time work and unemployment insurance take-up come from the OECD and national statistics. See Online Appendix C for details on data sources and the construction of short-time work/unemployment insurance take-up.

Figure 2: EVOLUTION OF EARNINGS & TRANSFERS AROUND THE EVENTS OF JOB LOSS & SHORT-TIME WORK DURING THE GREAT RECESSION



Notes: The Figure reports the evolution of earnings and transfers around job loss (in grey) or around the start of a short-time work spell (in blue). It shows that job loss is associated with a much larger and much more persistent drop in resources than short-time work, implying that the marginal insurance value is likely greater for unemployment insurance than for short-time work. Panel A reproduces estimates from [Tilly and Niedermayer \(2016\)](#) which uses German administrative data from the Institute for Employment Research (IAB). It corresponds to a weighted average of the effect of short-time work and unemployment insurance on income by tenure category using as weights their share in the population. Panel B reproduces estimates from [Giupponi and Landais \(2020b\)](#) and uses administrative data from INPS on the universe of employer-employee matches and social security payments in the private sector in Italy.

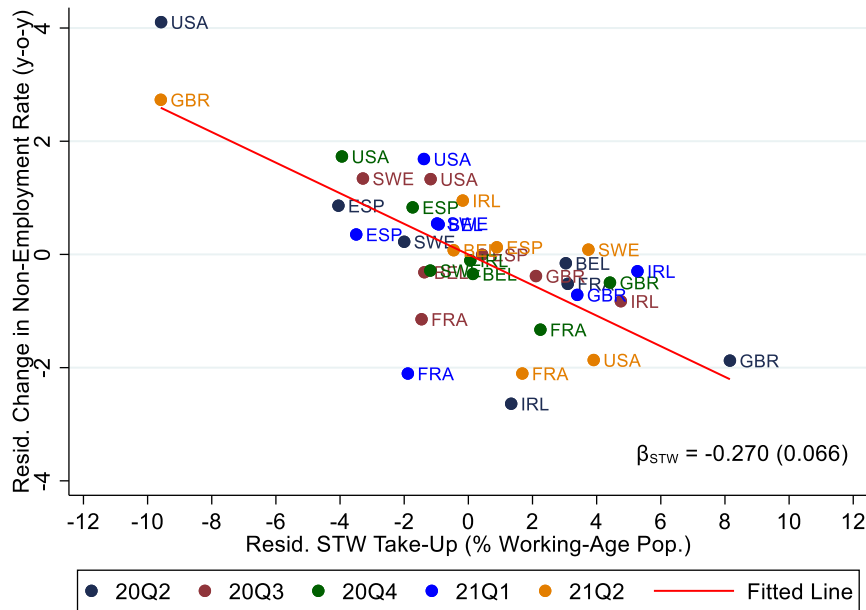
Figure 3: SHORT-TIME WORK VS UNEMPLOYMENT INSURANCE GENEROSITY AND TAKE-UP



Notes: The figure reports a set of regression-discontinuity graphs to illustrate the relationship between short-time work/unemployment insurance generosity and take-up. Left-hand side panels report evidence on short-time work, right-hand side ones on unemployment insurance and are based on [Scrutinio \(2018\)](#). Panel A shows the short-time work benefit schedule as a function of a wage threshold. The benefit amount is based on a 70% hour reduction and 2021 short-time work cap parameters. Panel C reports the probability for a worker to be put on short-time work in a given year (pooling years 2011-2014), conditional on being employed in a firm that uses short-time work in that year. Panel E reports the average

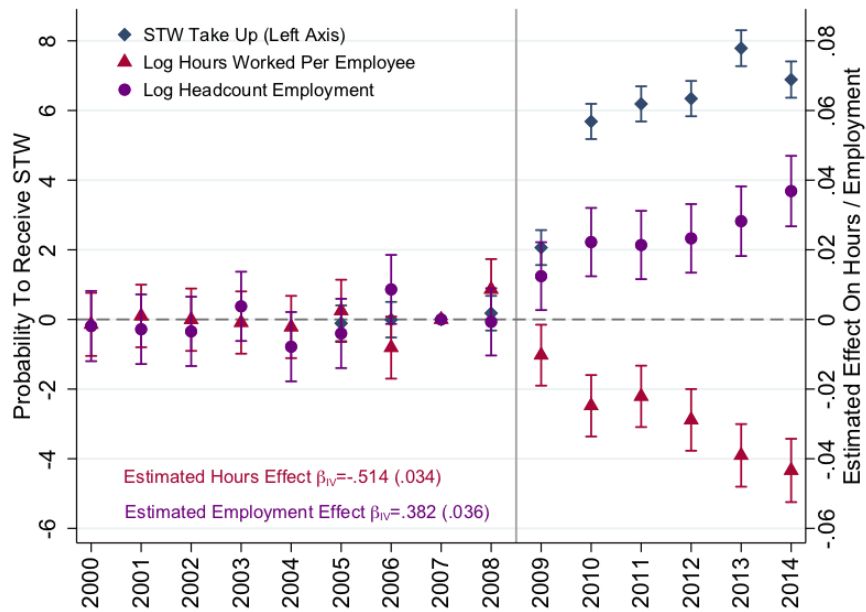
number of hours a worker spends on short-time work per month (as a percent of total potential working hours), conditional on being on short-time work in that month. Panel B plots unemployment insurance potential benefit duration as a function of a worker's age at layoff. Panel D reports the density of layoffs by age at layoff. Panel F shows the average duration of unemployment insurance in months, conditional on unemployment insurance take-up. Panels C-F are based on Italian Social Security data.

Figure 4: SHORT-TIME WORK USAGE & NON-EMPLOYMENT DURING THE COVID CRISIS: CROSS-COUNTRY EVIDENCE



Notes: The figure reports a scatter plot of the relationship between the year-on-year change in the quarterly non-employment rate and in the rate of short-time work take-up at the country level. Data are not seasonally adjusted. To remove the seasonal component, we take the year-on-year change - i.e. for a given year-quarter $YYQX$, we apply the following transformation to the data: $\tilde{x}_{YYQX} = x_{YYQX} - x_{(YY-1)QX}$. Short-time work take-up is computed as the ratio of the number of individuals in the program over the working age population. For short-time work take-up in 2020 we take the variable in level as take-up was close to 0 in 2019. Outcomes are residualized against year-quarter fixed effects, the year-on-year change in the number of COVID cases (linear and quadratic), and in unemployment insurance take-up. The red line represents the linear fit. The figure reports the slope coefficient and associated standard error (in parenthesis), clustered at the country level. Data on employment come from OECD. Data on short-time work and unemployment insurance take-up come from the OECD and national statistics (OECD, forthcoming). Data on COVID cases come from the Johns Hopkins Coronavirus Resource Center. See Online Appendix C for details on data sources and the construction of short-time work/unemployment insurance take-up.

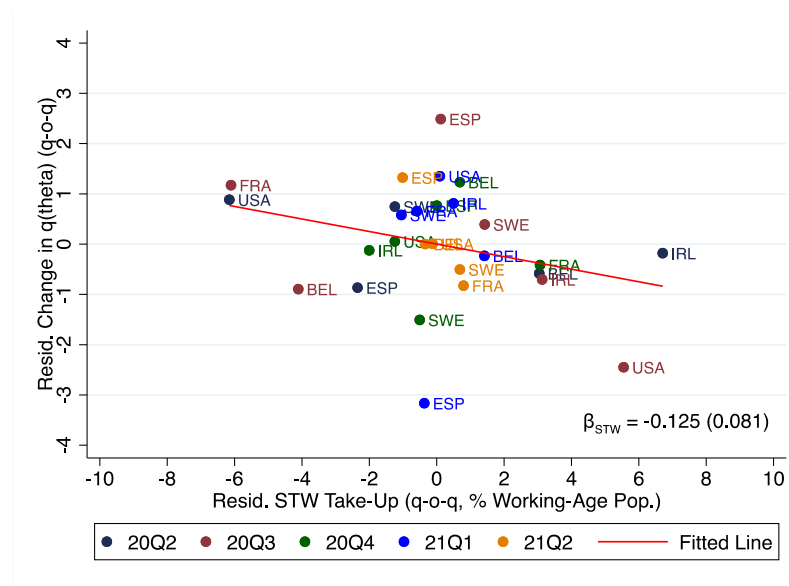
Figure 5: EMPLOYMENT EFFECTS OF SHORT-TIME WORK IN ITALY: EVIDENCE FROM QUASI-RANDOM ELIGIBILITY VARIATION ACROSS FIRMS



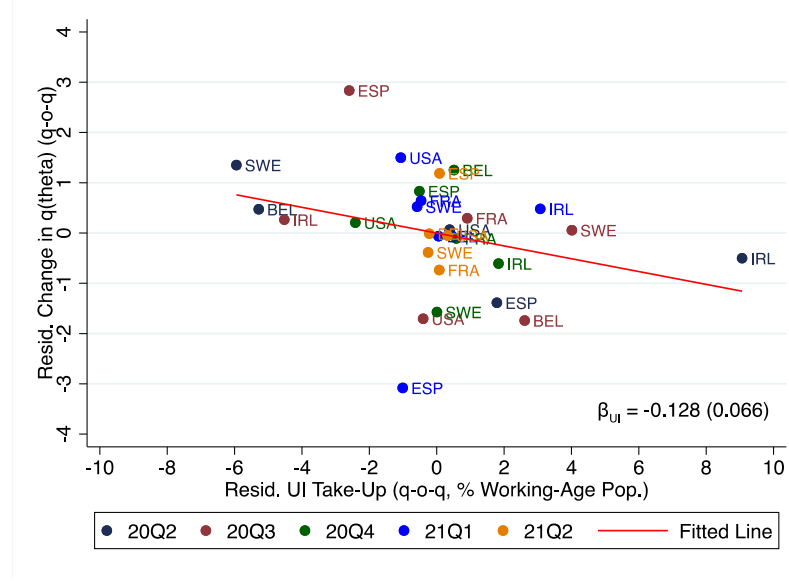
Notes: The figure reproduces estimates from [Giupponi and Landais \(2020b\)](#) on the effect of short-time work eligibility on the probability of short-time work take-up, the log of hours worked per employee and the log of employment headcount at the firm level. The graph reports the estimated coefficients and associated confidence intervals (capped vertical bars) from a reduced-form regression of the outcome of interest on an indicator of short-time work-eligibility at the firm level interacted with year dummies. All results are relative to 2007. The graph also reports the IV coefficient (and standard errors in parenthesis) of the effect of short-time work take-up on log hours worked per employee and log employment headcount.

Figure 6: CROSS-COUNTRY CORRELATION BETWEEN JOB-FILLING PROBABILITY AND TAKE-UP OF SHORT-TIME WORK AND UNEMPLOYMENT INSURANCE

A. Job-Filling Probability and Short-Time Work Take-Up



B. Job-Filling Probability and Unemployment Insurance Take-Up



Notes: The figure shows how short-time work and unemployment insurance take-up during the COVID crisis correlate with tightness in the labor market. We use the vacancy-filling probability $q(\theta)$ as a proxy for labor market tightness. The higher the vacancy-filling probability, the easier it is for firms to hire workers when opening a vacancy, and the slacker the labor market as a result. Both panels report scatter plots of the relationship between the quarter-on-quarter change in $q(\theta)$ and in the rate of short-time work / unemployment insurance take-up at the country level. Data are not seasonally adjusted. To remove the seasonal component, we take the quarter-on-quarter change - i.e. for a given year-quarter $YYQX$, we apply the following transformation to the data: $\tilde{x}_{YYQX} = x_{YYQX} - x_{YYQ(X-1)}$. Short-time work and unemployment insurance take-up are computed as the ratio of the number of individuals in the program over the working age population. Outcomes are residualized against year-quarter fixed effects, the quarter-on-quarter change in the number of COVID cases (linear and quadratic), and in the take-up of the other policy instrument. The red line represents the linear fit. The figure reports the slope coefficient and associated standard error (in parenthesis), clustered at the country level. Data for European countries come from the

Job Vacancy Statistics and Labor Force Survey and from the Job Openings and Labor Turnover Survey for the US. For European countries, hires are proxied by recent job starters - i.e. individuals who reported having started their employment in the last three months before the interview. Job openings are restricted to the private sector. Data on short-time work and unemployment insurance take-up come from the OECD and national statistics (OECD, forthcoming). Data on COVID cases come from the Johns Hopkins Coronavirus Resource Center. See Online Appendix C for details on data sources and the construction of short-time work/unemployment insurance take-up.

Table 1: THE WELFARE EFFECTS OF INSURING WORKERS VERSUS JOBS: A SUMMARY OF THE EVIDENCE

	Value of Transfer	Moral Hazard / Fiscal Externality	Correction of Other Inefficiencies		
			Excess Layoff	Tightness Extern.	Reallocation
Short-Time Work	+	+/-	++	?	-
Unemployment Insurance	++	--	?	+	?

Notes: The table provides our own summary evaluation of the empirical literature evaluating features of short-time work and unemployment insurance programs that map onto those key elements of welfare analysis. For discussion of the underlying studies, see the text of the paper. The symbols reported in the table refer to the magnitude of the welfare effect for each feature, as per the following legend: (+ +) Large positive, (+) Positive, (+/-) Both positive and negative, (-) Negative, (- -) Large negative, (?) No evidence.

Should We Insure Workers or Jobs During Recessions? Online Appendix

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A Short-Time Work Programs during the COVID Crisis

The majority of OECD countries had a short-time work program in place prior to the COVID crisis. At the onset of the crisis, several of those who did not have a scheme in place newly introduced it (e.g. Hungary and the United Kingdom), and most of those with existing short-time work schemes implemented measures to ensure rapid access to and wide take-up of the program. Such measures broadly consisted in (i) easing access, (ii) extending coverage, and (iii) increasing generosity. Combinations of such measures have been necessary for short-time work schemes to work swiftly and effectively [[Giupponi and Landais, 2020a](#)].

To facilitate access, several countries have streamlined the application and authorization phases. For example, countries such as Belgium, the Czech Republic, France, Italy, and Spain allowed firms to apply by simply invoking the health crisis as motive (rather than having to provide proof of economic need). Restrictions to minimum and maximum reductions in working time have also been eased. For example, before COVID, German firms could apply for short-time work only if at least 30% of their workforce would be subject to a reduction in hours. This threshold has been lowered to 10%. In the UK, the newly introduced Coronavirus Job Retention Scheme initially granted the subsidy for hours not worked only for employees with 100% hours reductions. From July 1, 2020 reduction of hours below 100% started to be subsidized.

Coverage has been extended both on the firm side and on the worker side. Italy, where short-time work eligibility was traditionally limited to firms with more than 15 employees and operating in certain sectors of the economy (mainly manufacturing and construction), extended the scheme to all sectors and firm sizes. On the worker side, eligibility has been extended to workers on temporary or non-standard work arrangements, and in some cases even the self-employed. Finally, many countries have increased the generosity of the program through higher replacement rates, lower costs to the firm and longer program durations.

Online Appendix Table [A1](#) provides an overview of short-time work-related measures that have been adopted in selected European countries and the US in response to the pandemic shock. See [Scarpetta et al. \[2020\]](#) for a more detailed discussion.

Table A1: SHORT-TIME WORK MEASURES ADOPTED DURING COVID IN SELECTED OECD COUNTRIES

Country (Program)	Facilitating Access	Extending Coverage	Increasing Generosity
France (<i>Activité Partielle</i>)	<p>Firms can invoke the health crisis as a "force majeure" to use short-time work.</p> <p>Firms can apply retroactively.</p> <p>Authorizations are deemed granted in the absence of response from the Ministry of Labor within two working days.</p>	All employees with a contract (whether permanent or temporary) are eligible.	<p>The maximum duration of the scheme is extended from 6 to 12 months.</p> <p>The subsidy is 70% of gross wage, subject to a cap.</p> <p>Most employers do not bear any cost for hours not worked.</p>
Germany (<i>Kurzarbeit</i>)	Firms can apply if 10% of their workforce is subject to reduction of hours, compared to 30% before.	The subsidy, which normally covers permanent and temporary contracts, and apprentices, is extended to agency workers.	<p>The reimbursement rate of social insurance contributions paid by the employer for hours not worked increases from 50% to 100%.</p> <p>The statutory replacement rate for lost earnings is raised to 70% from the fourth month and 80% from the seventh month onwards (respectively, 77% and 87% for those with children).</p> <p>Restrictions on taking another job while on short-time work are lifted.</p>
Italy (<i>Cassa Integrazione Guadagni</i>)	<p>Firms of any size and from all sectors can apply.</p> <p>Firms are no longer required to provide evidence of economic need and can simply declare that they have been negatively affected by the COVID crisis.</p>		Employers do not bear any cost for hours not worked.

Country (Program Name)	Facilitating Access	Extending Coverage	Increasing Generosity
Italy (<i>Cassa Integrazione Guadagni</i>) cont.	Applications can be filed retroactively up to four months after the reduction in hours.		
United Kingdom (Coronavirus Job Retention Scheme)	<p>The scheme was announced on March 20, 2020, and was initially intended to run between March 1, 2020 and May 31, 2020. However, it was subsequently extended on various rounds.</p> <p>Initially, the subsidy was only granted for employees with 100% hours reductions. From July 1, 2020 hours reductions under 100% are also subsidized.</p>	The scheme is open to all UK employers and employees.	<p>Employees on short-time work are entitled to no less than 80% of their usual monthly wage for unworked hours, up to a cap of £2,500 a month.</p> <p>Employers can apply for a grant that covers short-time work employees' usual monthly wage costs for unworked hours, up to a cap of £2,500 per month up to 30 June 2021. From July 1, 2021 the level of the grant will be reduced.</p> <p>Employers are responsible for employer national insurance contributions and minimum automatic enrolment employer pension contributions.</p>
United States (Short-Time Compensation)	Under the CARES Act, the federal government provides up to \$100 million in grants to states to implement, improve and promote short-time work programs.		<p>Under the CARES Act, states that have short-time work compensation programs can have short-time work benefits 100% federally financed for up to 26 weeks through the end of 2020.</p> <p>For states without existing programs, the federal government temporarily finances 50% of short-time work benefits and up to 100% of additional administrative expenses incurred through the implementation of the program.</p>

Country (Program Name)	Facilitating Access	Extending Coverage	Increasing Generosity
US (Short-Time Compensation) cont.			Employees that are covered by a short-time work program receive, in addition to their short-time work benefit, the additional Federal Pandemic Unemployment Compensation (FPUC) \$600 weekly payment.

Source: [Scarpetta et al. \[2020\]](#).

B Evidence on the Value of Insurance: Short-Time Work vs Unemployment Insurance

The relative value of short-time work vs unemployment insurance can be inferred from the relative magnitude of the marginal utility of consumption of individuals on short-time work and on unemployment insurance. Whilst we do not have direct measures of consumption for the two groups, we can gain insight on their relative marginal utility by looking at the characteristics of individuals who end up being on short-time work or unemployed.

To this end, we exploit newly collected data from the High-Frequency Online Personal Panel Survey (HOPP), a longitudinal survey launched by the German Institute for Employment Research. The HOPP survey is based on a random sample of individuals drawn from the administrative data of the Federal Employment Agency in Germany.¹ The survey started in May 2020 with the goal of assessing the evolution of individual socio-economic conditions in Germany during the COVID pandemic. At the time of writing, seven waves of the survey have been conducted since May 2020, at monthly frequency between May and August 2020, and every two months between September 2020 and February 2021. See [Haas et al. \[2021\]](#) for more details on the survey design. Online Appendix Table B1 reports the sample average of a set of individual characteristics for workers that are employed (though not on short-time work) in column (1), on short-time work in column (2) and unemployed in column (3). Columns (4)-(6) report the p-value of the test of difference in means between employed and on short-time work in column (4), employed and unemployed in column (5), and on short-time work and unemployed in column (6).

By comparing the demographic characteristics of individuals in the three labor market statuses, we observe that individuals on short-time work and unemployment are significantly less likely to be female (approximately 43% are women as compared to 51 among those employed). The age composition of those employed and on short-time work is not too dissimilar, while the unemployed tend to be significantly over-represented among the youngest (aged 18-34) and oldest (aged 55+) age categories. Being in those age groups tends to be associated with fewer sources of insurance in the face of labor market shocks (e.g. formal insurance, savings or a partner for those aged 18 to 34, and labor market opportunities for those over 55 years-old), as compared to prime-age individuals.

Unemployed individuals are the least likely to have a partner, and – if they have one – the most likely to have their partner not working. Those on short-time work tend to

¹The administrative records cover all labor market participants except civil servants and the self-employed.

be more similar to those employed along those two dimensions, but are nonetheless significantly less likely to have a partner. Similar patterns emerge if we consider total monthly household income in the three groups. This evidence suggests that – absent formal insurance – the unemployed, and to a lesser extent, those on short-time work would not have access to self-insurance through either an added worker effect (i.e. their partner’s labor supply) or savings.

Differences in demographic characteristics indicate that there is sorting into short-time work and unemployment with respect to dimensions that are associated with the ability to cushion labor market shocks through one’s own means. As such, the unemployed appear to be more likely to have higher marginal utilities, and hence higher values of insurance, than those on short-time work, who – in turn – have higher marginal utilities than those employed. This suggests that both short-time work and unemployment insurance have insurance value, though this is likely larger for unemployment insurance. This conjecture is further corroborated by evidence on the marginal propensity to consume of the three groups. When asked what fraction of a lump-sum equivalent to their household monthly income they would spend within a month of receiving it, those employed answer 32%, those on short-time work 33% and those unemployed 39%. Finally, there is substantial variation in life satisfaction (measured on a scale from 1 to 10) across the three groups.

The value of insurance is a direct function not only of the availability of self-insurance options, but also of the size of the consumption (or income) shock experienced upon transitioning to the bad state. The HOPP data offer some insight on the relative drop in household income and hours worked (a proxy of an individual’s earnings capacity) between the employed and the short-time work/unemployed states. We evaluate the change in household income bracket and the change in hours worked among individuals who transition from employment to short-time work (E to S) and from employment to unemployment (E to U) over subsequent waves.² Transitioning from employment to unemployment is associated with a household income bracket change of 0.16, which is approximately equivalent to €150 per month. No change is associated with transitioning from employment to short-time work.³ The drop in hours is approximately 31 hours per week for E-to-U transitions, substantially larger than the 7 hour drop associated with E-to-S transitions.⁴

²There is a total of 218 individuals transitioning from employment to short-time work, and 49 from employment to unemployment.

³The difference between the E-to-S and E-to-U change is statistically significant at 5%.

⁴The difference between the E-to-S and E-to-U change is statistically significant at 0.1%.

Table B1: CHARACTERISTICS OF WORKERS IN EMPLOYMENT, SHORT-TIME WORK AND UNEMPLOYMENT

	Employed	Short-Time Work	Unemployed	P-value of difference		
	(1)	(2)	(3)	E-S (4)	E-U (5)	S-U (6)
Female	0.512	0.426	0.428	0.000	0.000	0.923
Age 18-34	0.223	0.211	0.245	0.199	0.079	0.024
Age 35-54	0.511	0.520	0.355	0.438	0.000	0.000
Age 55+	0.266	0.269	0.400	0.743	0.000	0.000
University degree (incl. applied)	0.453	0.323	0.301	0.000	0.000	0.198
Has partner	0.711	0.684	0.490	0.006	0.000	0.000
Partner not working	0.168	0.168	0.343	0.997	0.000	0.000
Monthly household income	4,246	3,637	2,107	0.000	0.000	0.000
MPC	0.323	0.334	0.389	0.041	0.000	0.000
Life satisfaction (scale 1-10)	8.036	7.572	6.409	0.000	0.000	0.000
Obs.	21,475	2,291	1,080			

Notes: The table reports the sample average of a set of individual characteristics for workers that are employed and not on short-time work in column (1), on short-time work in column (2) and unemployed in column (3). Columns (4)-(6) report the p-value of the difference in means between employed and on short-time work in column (4), employed and unemployed in column (5), and on short-time work and unemployed in column (6). In the underlying survey data, monthly household income is recorded in bins. From the binned data, we estimate the mean and standard deviation for each group of individuals using a robust Pareto midpoint estimator [Von Hippel et al., 2017]. The table is based on waves 3-7 of the HOPP panel survey [Haas et al., 2021]. Questions on life satisfaction have not been included in wave 6 of the survey, hence the statistics for this variable are based on waves 3-5 and 7 (the number of observations being 16,802, 1,897 and 867, respectively).

C Data

C.1 Data on Short-Time Work

We collect administrative data on the number of workers on short-time work at the monthly level for the period from January 2005 to December 2019 for France, Germany, Italy and the US. Data are sourced from national administrative authorities and statistical agencies. Data for France come from the French Ministry of Labor,⁵ for Germany from the German Federal Employment Agency,⁶ for Italy from the Social Security Administration,⁷ and for the US from the Department of Labor.⁸ For the period from January to June 2021, monthly data on short-time work have been provided by the OECD Directorate for Employment, Labour and Social Affairs [OECD, [Forthcoming](#)]. The OECD data cover 32 of the 37 members of the OECD: Austria, Australia, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Korea, Latvia, Lithuania, the Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, the UK and the US.

For France, data on short-time work start from January 2008, when the program was introduced, and are not available between January 2017 and February 2020, due to a break in the series. Prior to 2020, Italian data on short-time work usage are recorded in terms of authorized hours of short-time work rather than employees on short-time work. In order to obtain an estimate of the number of individuals on short-time work, we assume – based on estimates in [Giupponi and Landais \[2020b\]](#) – that 90% of authorized hours are used and that, while on short-time work, work hours are 35% of usual hours (assumed to be 40 per week).

C.2 Data on Unemployment Insurance

We collect administrative data on the number of individuals on unemployment insurance at the monthly level for the period from January 2005 to December 2019 for Germany, France, Italy, the UK and the US. Data are sourced from national administrative authorities and statistical agencies. Data for France come from the French Ministry of Labor, for Germany from the German Federal Employment Agency, for Italy from the Social Security Administration, for the UK from the Office for National Statistics,⁹ and

⁵<https://dares.travail-emploi.gouv.fr>

⁶<https://statistik.arbeitsagentur.de>

⁷<https://www.inps.it>

⁸<https://oui.doleta.gov>

⁹<https://www.nomisweb.co.uk>

for the US from the Department of Labor. For the period from January to June 2021, monthly data on unemployment insurance are sourced from the OECD Social Benefit Recipients Database.¹⁰ The OECD data cover 14 countries: Belgium, Chile, Denmark, France, Germany, Ireland, Italy, Korea, Poland, Spain, Sweden, Switzerland, the UK and the US. For our measure of unemployment insurance take-up, we consider only contributory unemployment insurance schemes for job-seekers among those reported in the OECD data.

For Italy, data on unemployment insurance is missing before January 2011, when the main unemployment insurance programs were introduced, and between February and December 2015, due to a break in the series.

C.3 Data on Employment

Quarterly data on employment and the working age population are sourced from OECD Statistics.¹¹

C.4 Measures of Short-Time Work and Unemployment Insurance Take-Up

In this subsection, we provide a detailed illustration of the series reported in Panels A and B of Figure 1. Panel A reports the evolution of short-time work (dashed lines) and unemployment insurance (solid lines) take-up in Europe (red lines) and the US (blue lines). Short-time work and unemployment insurance take-up are computed as the number of individuals in the program in a given month as a percentage of the quarterly working age population. The series for Europe are a weighted average of the series for Germany, France, Italy and the UK, weighted by the working age population. Data sources are described in detail in Online Appendix C.1 and Online Appendix C.2. For France, data on short-time work start from January 2008, when the program was introduced, and are not available between January 2017 and February 2020, due to a break in the series. For Italy, data on unemployment insurance is missing before January 2011, when the main unemployment insurance programs were introduced, and between February and December 2015, due to a break in the series. For the UK, data on short-time work start in March 2020, when the program started. We assume that take-up is zero for the months in which data is missing.

Panel B reports the evolution of the non-employment rate, i.e. one minus the employment rate (employed people as a percentage of the working age population). Quar-

¹⁰<https://www.oecd.org/social/social-benefit-recipients-database.htm>

¹¹<https://stats.oecd.org>

terly data on the employment to population ratio are sourced from OECD (see Online Appendix C.3).

In both panels, the plotted series are moving averages of the raw series over the period up to June 2021. The moving average is based on twelve lagged terms, one forward term and uniform weights.

C.5 Vacancies

We use surveys at the establishment level to retrieve information on vacancy postings. For the US, we use the Job Openings and Labor Turnover Survey (JOLTS) from the US Bureau of Labor Statistics (BLS).¹² This survey is conducted on a monthly basis on a sample of 16,000 establishments. For European countries, we use data from the Job Vacancy Statistics (JVS) provided by Eurostat.¹³ It covers all enterprises with one or more employees in each member state except in France where only units with 10 employees or more are surveyed. Both surveys rely on the same definition. A vacancy (Eurostat) or job opening (JOLTS) has to satisfy three requirements: (i) a paid post that is newly created, unoccupied, or about to become vacant, (ii) for which the employer is taking active steps to find a suitable candidate from outside the enterprise concerned, and (iii) which the employer intends to fill either immediately or within a specific period of time.¹⁴

C.6 Hires

For hires, we use an establishment survey for the US and a population survey for European countries. For the US, we use again JOLTS. Hires correspond to all additions to the payroll during the reference month.¹⁵ For European countries, information on hires is not available from an establishment survey. Instead, to retrieve information on hires, we turn to a population survey – the Labor Force Survey (LFS). Each month, individuals have to declare whether they are in employment and, if so, since when. Eurostat uses this information to retrieve the number of recent job starters. These correspond to individuals who report having started their employment in the last three

¹²Data for the US are at monthly frequency and have been aggregated at quarterly frequency, by taking the sum of monthly values over the quarter.

¹³Surveys are conducted at the country level following guidelines defined at the European level. There are minor variations in terms of coverage across countries. However, as we plot time series or deviations with respect to a reference level, what matters most is consistency within countries over time.

¹⁴For more details on the definition in the JOLTS see <https://www.bls.gov/news.release/jolts.tn.htm>, and in the JVS https://ec.europa.eu/eurostat/cache/metadata/en/jvs_esms.htm.

¹⁵See <https://www.bls.gov/news.release/jolts.tn.htm> for more details on the definition.

months before the interview. Information on recent job starters is available for individuals aged 20 to 64 years old. The main downside of this proxy is that it allows at most one job transition per individual per quarter.

Recalls in the US. The definition of hires in JOLTS incorporates both newly hired and rehired employees.¹⁶ Recalls are situations in which individuals have been recalled to their previous job after a temporary interruption of their contract. Using empirical work from Hall and Kudlyak [2021], we produce a series of hires which excludes recalls. We document that most hires following the pandemic were in fact recalls. That is there has been little to no reallocation. To do so, we start from the series of Hall and Kudlyak [2021]. They work on micro-data from the Current Population Survey. For each individual, they have information on whether an unemployed worker considers herself as being on temporary layoff or not. Workers are considered on temporary layoff if they expect to return within six months to their previous employer or have been provided with a specific recall date. Otherwise, if they fulfil the job search criteria, they are considered unemployed. From this, they distinguish two types of unemployed workers: the recall unemployed – job losers on temporary layoff – and the jobless unemployed – all other unemployed workers. They derive the work-finding-rate of recall and jobless unemployed, that is the rate at which the unemployed transition into employment from one month to the next. Using this information, we estimate the number of recalls using the number of recall unemployed (*recall*) times their job-finding rate (f_{recall}). Then, starting from total hires, we subtract inferred recalls to retrieve our series of hires without recalls. That is: $hires_{without\ recalls} = hires - recall \times f_{recall}$.

C.7 Measure of Tightness

Labor market tightness is an indicator of the state of the labor market. It is defined as the ratio of search effort by firms to that of the unemployed. It captures how the demand and the supply side of the labor market compare. The number of job openings is used as a proxy for search effort on the firm side. The supply side is usually decomposed into the number of unemployed workers times the effort they exert in looking for a job. Labor market tightness (θ) is thus defined as $\theta = v/e \cdot u$, with v the number of vacancies, u the number of unemployed workers and e their search effort. The standard intuition is that in recessions there are more unemployed workers and less job openings so labor market tightness decreases, while in booms there are less unemployed workers and more job openings so labor market tightness is higher, making it more difficult for firms to hire workers.

¹⁶For more details, see the JOLTS documentation: <https://www.bls.gov/news.release/jolts.tn.htm>.

In this paper, we provide a measure directly related to tightness. We define $q(\theta)$ as the ratio of hires to vacancies.¹⁷ It corresponds to the probability to fill a vacancy per unit of time. This captures the outcome of search rather than the process. Variations in $q(\theta)$ should account for variations in θ . Indeed, if tightness increases – e.g. there is more search effort on the firm side *ceteris paribus* – then it should be the case that the vacancy-filling probability decreases. Thus, variations in $q(\theta)$ should be negatively correlated with tightness (θ). The following section looks specifically at the evolution of $q(\theta)$ over the very recent period – from 2019 onwards – in the US and a selected set of European countries.

C.8 Data on COVID Cases

Data on COVID cases are sourced from the Johns Hopkins Coronavirus Resource Center, a continuously updated source of COVID data. The data are available at the country level and daily frequency since February 22, 2020. We aggregate the data at the quarterly level summing up daily new cases.

¹⁷Data on hires and vacancies for the US are at monthly frequency. For $q(\theta)$, we aggregate the data at quarterly frequency by computing the average of monthly values over the quarter.

D Labor Market Tightness and the Effect of Public Policies

This section provides empirical evidence on the state of the labor market in the US and several European countries in the recent period. It puts labor market tightness into perspective with the recourse to short-time work and unemployment insurance.

D.1 Evolution of Labor Market Tightness during the COVID Crisis

As a first step, we document the evolution of the state of the labor market during the COVID crisis on both sides of the Atlantic. We look at variations in our proxy $q(\theta)$ over time within country and decompose them into variations in the number of hires and of vacancies. Formally, this relies on the following mathematical decomposition: $dq(\theta) = dh - dv$. Online Appendix Figures D1 and D2 plot the evolution of the number of hires (in blue), vacancy postings (in red) and the ratio of the two (in green) over time at the country level. Each variable is divided by its 2019Q4 level – the last full pre-pandemic quarter. As such, the series can be interpreted as deviations with respect to pre-pandemic levels.

Findings for European Countries. Online Appendix Figure D1 displays the three series for a selected set of European countries.¹⁸ For all them, pre-pandemic levels do not deviate significantly from one suggesting little variations, while the COVID crisis – marked by a red vertical line – causes adjustments of hires and vacancies. In Belgium, France, Ireland and Spain, the ratio of hires to vacancies $q(\theta)$ decreases sharply between the last quarter of 2019 and the second quarter of 2020, when the pandemic first hit. From the decomposition, it is clear that the drop is mainly driven by hires decreasing more than vacancies. However, by the third quarter of 2020 hires and vacancies are more or less back to pre-pandemic levels. Two notable exceptions are Sweden and the UK. In these countries, hires decrease less than vacancy postings, causing $q(\theta)$ to increase.

Findings for the US. Online Appendix Figure D2 displays the same three series – hires, vacancies, and the ratio of the two – for the raw series (left panel) and for the adjusted series without recalls (right panel). The left panel of Online Appendix Figure D2 suggests a large 50% increase in hires compared to pre-pandemic levels, which contrasts sharply with the 25% decrease in vacancy postings. The right panel of Online Appendix Figure D2 plots the series of hires without recalls. In 2020, the dynamics is drastically different. It resembles much more the one in European countries, where

¹⁸The selection is based on data availability. These countries correspond to those for which we have information on hires, vacancies, and short-time work and unemployment insurance take-up.

hires have decreased more than vacancy postings and $q(\theta)$ has decreased. At the beginning of 2021, the recall channel seems to be less strong. Those who have been recalled to their jobs were recalled in the six months following the pandemic (see [Hall and Kudlyak \[2021\]](#) for results on the dynamics of recalls in the US). Moreover, by the end of 2020, the number of vacancy postings was beyond its pre-pandemic level.

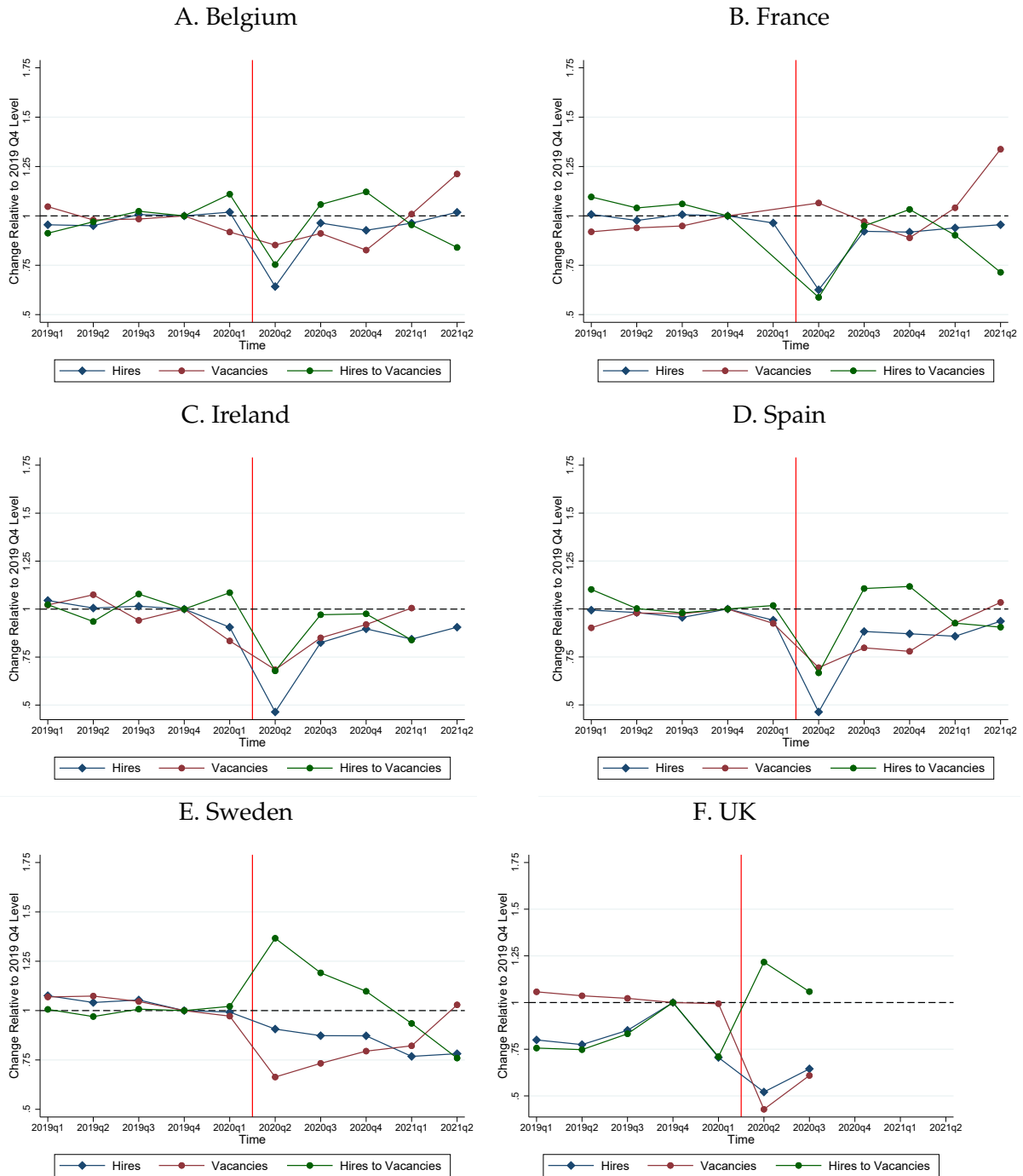
Online Appendix Figure [D3](#) shows the evolution of $q(\theta)$ for the US from 2001 onwards. The blue line corresponds to the times series of $q(\theta)$ using raw JOLTS data.¹⁹ The red line is obtained using our adjusted series of hires, i.e. hires without recalls.²⁰ Both series evolve hand in hand until 2020, with little discrepancy between the two. This holds true regardless of the business cycle. On the contrary, following the COVID pandemic, the ratio of hires to vacancies diverges drastically depending on whether we incorporate recalls or not. Indeed, it increases a lot for the unadjusted series (in blue), suggesting a surge in hires with respect to vacancy postings, and reaches level close to that in the aftermath of the 2008 crisis (1.65). To the contrary, for the series without recalls (in red), the ratio falls to an unprecedented 0.2. This divergence of the two series occurs mostly during the first few months of the pandemic, when mobility in the US labor market stalled, with very few new hires and massive recalls. In November 2020, the two series reach similar levels – although very low (0.8) – and seem to be back on the same trend. This suggests that recalls were a key adjustment mechanism at the onset of the pandemic, in line with the findings of [Hall and Kudlyak \[2021\]](#).

Cross-Country Comparison. Online Appendix Figure [D4](#) stacks all the time series of $q(\theta)$ together. For the US, we plot the raw series (solid line) and the adjusted series (dashed line). The contrast in the evolution of the state of the labor market on both sides of the Atlantic is striking. In the US, the main adjustment mechanism seem to have been unemployment and recalls while in Europe there has been relatively fewer hires than vacancies compared to 2019Q4. These adjustment channels ought to be put into perspective with public policy decisions.

¹⁹The series corresponds to the ratio of seasonally adjusted data for hires and vacancies.

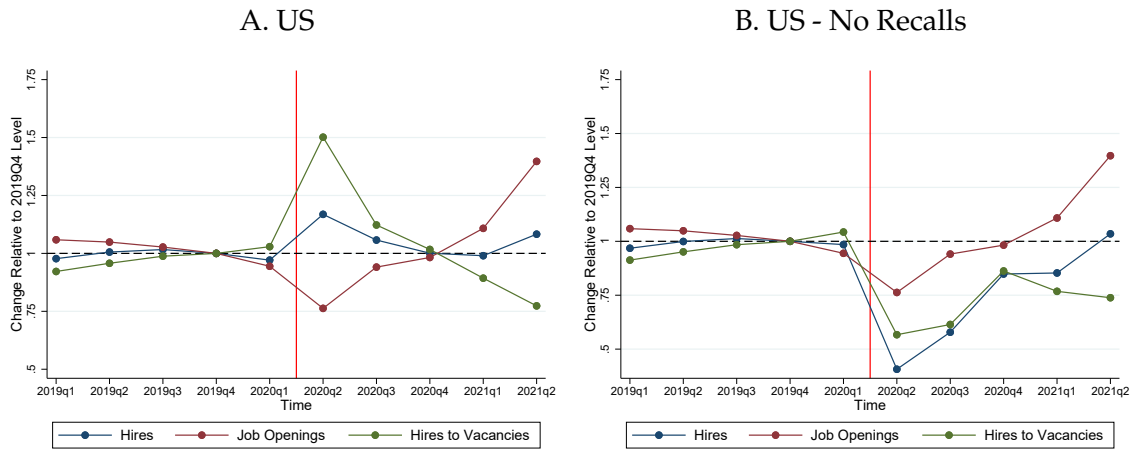
²⁰See Online Appendix [C.6](#) for more details.

Figure D1: CHANGE IN HIRES, VACANCIES, AND $q(\theta)$ RELATIVE TO 2019Q4



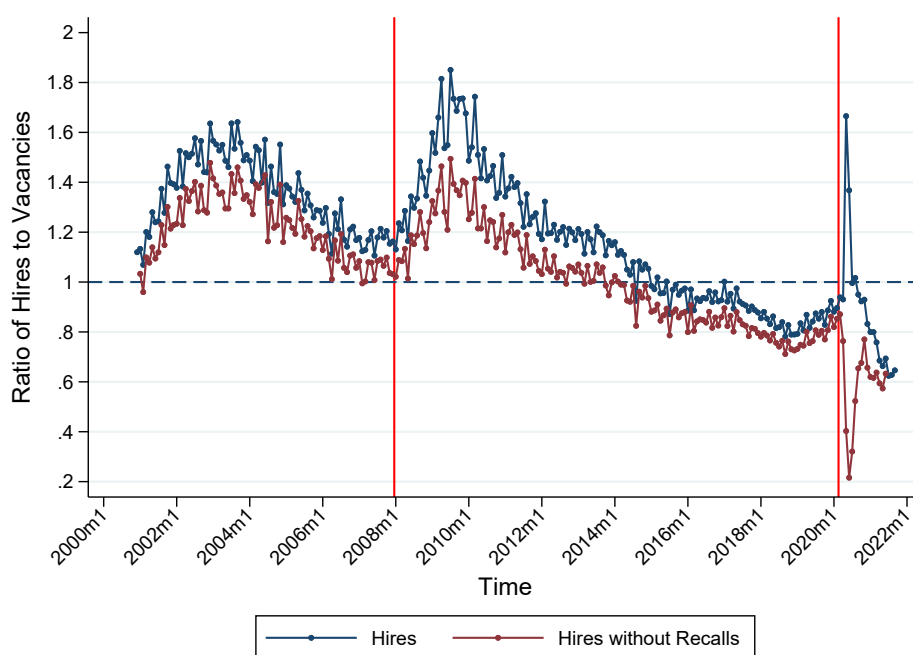
Notes: Data for European countries come from the Job Vacancy Statistics and Labor Force Survey, and for the US from the Job Openings and Labor Turnover Survey. $q(\theta)$ corresponds to the ratio of hires to vacancies. For European countries, hires are proxied by recent job starters – i.e. individuals who reported having started their employment in the three months before the interview. Job openings are restricted to the private sector. Data are seasonally adjusted. Each variable is divided by its pre-pandemic level, i.e. the last quarter of 2019. That is, we apply the following transformation: $\tilde{x}_t = x_t/x_{2019Q4}$. The red line corresponds to the outbreak of the COVID crisis, that is the end of the first quarter of 2020.

Figure D2: CHANGE IN HIRES, VACANCIES, AND $q(\theta)$ RELATIVE TO 2019Q4



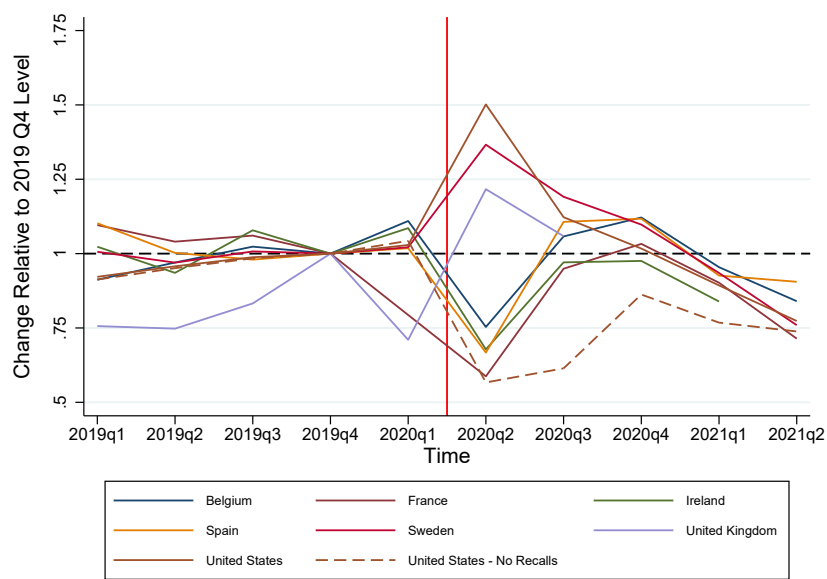
Notes: Data for European countries come from the Job Vacancy Statistics and Labor Force Survey, and for the US from the Job Openings and Labor Turnover Survey. $q(\theta)$ corresponds to the ratio of hires to vacancies. For European countries, hires are proxied by recent job starters – i.e. individuals who reported having started their employment in the three months before the interview. Job openings are restricted to the private sector. For the US, two series are available depending on whether recalls are included in hires (solid line) or not (dashed line). See Online Appendix C.6 for more details. Data are seasonally adjusted. Each variable is divided by its pre-pandemic level, i.e. the last quarter of 2019. That is, we apply the following transformation: $\tilde{x}_t = x_t / x_{2019Q4}$. The red line corresponds to the outbreak of the COVID crisis, that is the end of the first quarter of 2020.

Figure D3: EVOLUTION OF $q(\theta)$ OVER TIME IN THE US



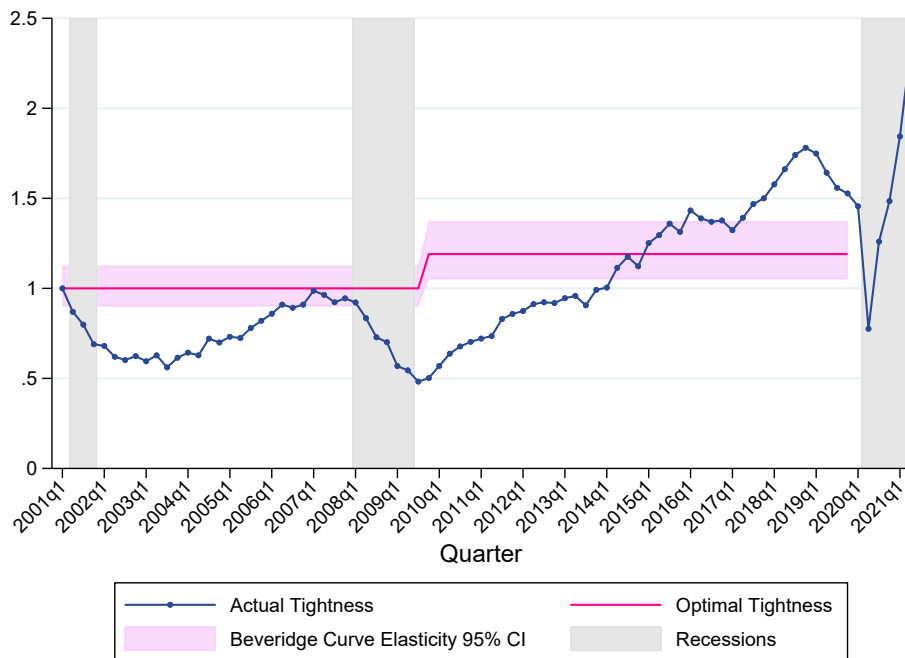
Notes: Data for hires and vacancies come from the Job Openings and Labor Turnover Survey. $q(\theta)$ corresponds to the ratio of hires to vacancies. Two series are available depending on whether recalls are included in hires (blue line) or not (red line). Recalls are situations in which individuals have been recalled to their previous jobs after a temporary interruption of their contract. Recalls are estimated using series from [Hall and Kudlyak \[2021\]](#). See Online Appendix C.6 for more details. Data are seasonally adjusted. The red lines correspond to the onset of the Great Recession and to the outbreak of the COVID crisis, respectively December 2007 and March 2020.

Figure D4: CHANGE IN $q(\theta)$ RELATIVE TO 2019Q4 ACROSS COUNTRIES



Notes: Data for European countries come from the Job Vacancy Statistics and Labor Force Survey, and for the US from the Job Openings and Labor Turnover Survey. $q(\theta)$ corresponds to the ratio of hires to vacancies. For European countries, hires are proxied by recent job starters – i.e. individuals who reported having started their employment in the three months before the interview. Job openings are restricted to the private sector. For the US, two series are available depending on whether recalls are included in hires (solid line) or not (dashed line). See Online Appendix C.6 for more details. Data are seasonally adjusted. Each variable is divided by its pre-pandemic level, i.e. the last quarter of 2019. That is, we apply the following transformation: $\tilde{x}_t = x_t / x_{2019Q4}$. The red line corresponds to the outbreak of the COVID crisis, that is the end of the first quarter of 2020.

Figure D5: EVOLUTION OF TIGHTNESS OVER TIME IN THE US & OPTIMAL TIGHTNESS ESTIMATES FROM [MICHAILLAT AND SAEZ \[2021\]](#).



Notes: Data for hires and vacancies come from the Job Openings and Labor Turnover Survey. $q(\theta)$ corresponds to the ratio of hires to vacancies and reproduces our baseline estimate with recalls from Figure D3. Estimates of optimal tightness come from Figure 6 in [Michaillat and Saez \[2021\]](#).

D.2 Labor Market Tightness and Public Policies

Public policies affect labor market tightness through their impact on vacancy postings, the number of unemployed and their search intensity. For example, there is a large strand of literature looking at the impact of more generous unemployment insurance on individuals' search effort. A recent paper by [Landais et al. \[2018\]](#) shows that this has in turn general equilibrium effects on how tight the labor market is. The literature on the impact of short-time work on search effort and tightness is scarcer. In this section, we correlate changes in the vacancy-filling probability with changes in the recourse to unemployment insurance and short-time work. This has the advantage of incorporating both policy instruments.

Online Appendix Figure [D6](#) plots the correlation between changes in $q(\theta)$ and in short-time work take-up (Panel A) or unemployment insurance take-up (Panel B).²¹ Outcomes are residualized to account for the effect of time, the intensity of the pandemic (proxied by the number of COVID cases) and the intensity in the recourse to the other policy instrument.

More specifically, we first difference all variables at the quarter-on-quarter level, i.e. using the following transformation: $\tilde{x}_t = x_t - x_{t-1}$. Then, we residualize both outcomes – $q(\theta)$ and short-time work/unemployment insurance take-up – on year-quarter fixed effects, the quarter-on-quarter change in the number of COVID cases (quadratic), and in the take-up of the other policy instrument. For example, when correlating $q(\theta)$ with short-time work take-up, we run the following linear regressions:

$$\tilde{y}_{t,i} = \gamma_1 \widetilde{UI}_{i,t} + \gamma_2 \widetilde{cases}_{i,t} + \gamma_3 \widetilde{cases}_{i,t}^2 + \tilde{\alpha}_t + \tilde{\xi}_{i,t}$$

where y corresponds to $q(\theta)$ or short-time work take-up, i indicates the country, t the quarter and α_t a set of quarter fixed effects. Having run the above regression using $q(\theta)$ and short-time work take-up as outcomes in turn, we then retrieve the predicted residuals for both outcomes, as $\tilde{\xi}_{t,i} = \tilde{y}_{t,i} - \hat{\tilde{y}}_{t,i}$. These residuals correspond to the dots in Online Appendix Figure [D6](#). The red line corresponds to the linear fit of a regression of $q(\theta)$ on short-time work take-up and the set of controls. That is:

$$\widetilde{q(\theta)}_{t,i} = \beta_{STW} \widetilde{STW}_{i,t} + \beta_{UI} \widetilde{UI}_{i,t} + \beta_1 \widetilde{cases}_{i,t} + \beta_2 \widetilde{cases}_{i,t}^2 + \tilde{\delta}_t + \tilde{\epsilon}_{i,t}$$

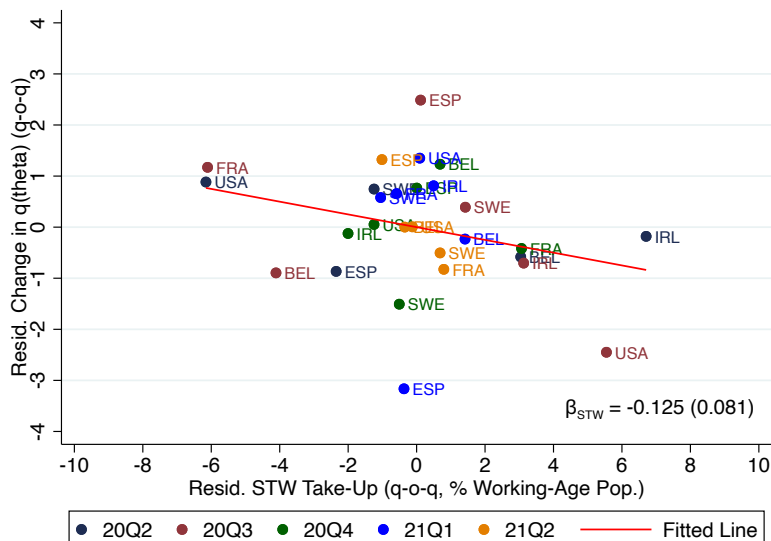
Both relationships between changes in $q(\theta)$ and short-time work/unemployment insurance take-up are negative, although not significant. Whilst these relationships do not have a causal interpretation, they provide evidence of a negative correlation be-

²¹For more information on the definition of short-time work and unemployment insurance take-up data see Online Appendix [C.1](#) and [C.2](#).

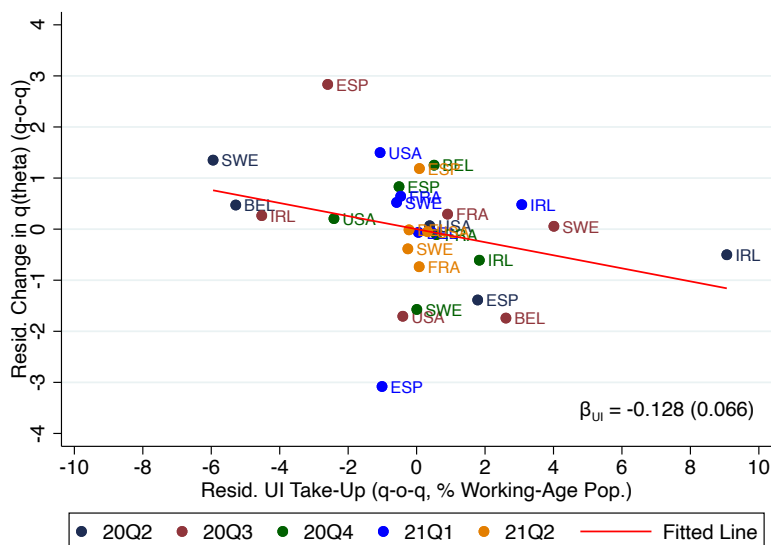
tween short-time work/unemployment insurance take-up and $q(\theta)$, and hence of a positive one between short-time work/unemployment insurance take-up and tightness (θ).

Figure D6: CROSS-COUNTRY SCATTER PLOTS OF $q(\theta)$ AND SHORT-TIME WORK/UNEMPLOYMENT INSURANCE TAKE-UP

A. $q(\theta)$ vs Short-Time Work Take-Up



B. $q(\theta)$ vs Unemployment Insurance Take-Up



Notes: The figure reports a scatter plot of the relationship between the quarter-on-quarter change in $q(\theta)$ and the rate of short-time work/unemployment insurance take-up at the country level. Data are not seasonally adjusted. To remove the seasonal component, we take the quarter-on-quarter change – i.e. for a given quarter t , we apply the following transformation to the data: $\hat{x}_t = x_t - x_{t-1}$. Short-time work and unemployment insurance take-up are computed as the ratio of the number of individuals in the program over the working age population. Outcomes are residualized against year-quarter fixed effects, the quarter-on-quarter change in the number of COVID cases (quadratic), and in the take-up of the other policy instrument. The red line represents the linear fit. The figure reports the slope coefficient and associated standard error (in parenthesis), clustered at the country level. Data for European countries come from the Job Vacancy Statistics and Labor Force Survey, and for the US from the Job Openings and Labor Turnover Survey. For European countries, hires are proxied by recent job starters – i.e. individuals who reported having started their employment in the three months before the interview. Job openings are restricted to the private sector. Data on short-time work and unemployment insurance take-up come from the OECD and national statistics. Data on COVID cases come from the Johns Hopkins Coronavirus Resource Center. Short-time work and unemployment insurance take-up are computed as the ratio of the number of individuals in the program over the working age population.

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