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Essays on Short-Time Work and on Firm Labor Demand

Alice Lapeyre

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Thèse de doctorat



INSTITUT
POLYTECHNIQUE
DE PARIS



Essays on Short-Time Work and on Firm Labor Demand

Thèse de doctorat de l'Institut Polytechnique de Paris
préparée à École Nationale de la Statistique et de l'Administration
Économique

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Alice Lapeyre

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Summary

This thesis studies short-time work programs and firms' labor demand. The first two chapters study short-time work programs, which aim to preserve employment relationships by subsidizing labor hoarding. The first chapter provides a conceptual framework for determining the relative welfare costs and benefits of unemployment insurance, which insures workers against the cost of job loss, and short-time work (STW) programs, which subsidize temporary reductions in hours worked, insuring jobs against temporary shock. This framework is useful for joint optimal design of the two programs. The paper provides empirical evidence on the elements of the trade-off, and advocates for more research on STW programs. The second chapter does exactly this and studies thoroughly STW programs. It quantifies firm reporting and real economic responses to changes in economic incentives from STW in the context of France during the pandemic. These distortions, also known as moral hazard, weigh in the optimal design formula as welfare costs. The third chapter studies the decision of firms to employ in-house or to outsource the provision of services to firms. It explores the role of rent-sharing between the firm and its workers on employment decisions.

Résumé

Cette thèse étudie le dispositif d'activité partielle et la demande de travail des entreprises. Les deux premiers chapitres traitent de l'activité partielle, un dispositif qui cherche à limiter les licenciements et préserver les emplois lors de fluctuations économiques en subventionnant les réductions du temps de travail. Le premier chapitre fournit un cadre conceptuel pour déterminer les coûts et bénéfices relatifs de l'assurance chômage, qui assure les individus contre le coût de la perte d'emploi, par rapport à l'activité partielle, qui assure les emplois via la subvention de réductions du temps de travail. Ce cadre conceptuel permet de penser la calibration jointe optimale de ces deux dispositifs. Le papier illustre les différents éléments d'arbitrage par des travaux empiriques, et met en avant le besoin de travaux supplémentaires sur l'activité partielle. Le deuxième chapitre étudie en détail l'activité partielle. Il mesure les réponses comportementales des entreprises face aux changements d'incitations financières dans le dispositif d'activité partielle en France pendant la pandémie. Il étudie à la fois le comportement de report d'information et le comportement réel (recours au dispositif, ajustement de la demande de travail). Ces distorsions, également appelées aléa moral, pèsent négativement dans la formule de générosité optimale du dispositif. Le troisième chapitre examine la décision des entreprises d'employer en interne ou de sous-traiter les services aux entreprises. Il explore le rôle du partage de la rente entre une entreprise et ses salariés dans ses décisions d'emploi.

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Introduction Générale

L'Activité Partielle

En réponse au choc économique déclenché par le Covid-19, les gouvernements du monde entier ont étendu et mis en œuvre de nouveaux programmes de soutien aux entreprises et aux salariés. En Europe, pour atténuer les conséquences de la pandémie sur le marché du travail, l'accent a été mis sur le maintien en emplois via des programmes d'activité partielle. L'activité partielle – également connue sous le nom de chômage partiel — subventionne les réductions temporaires des heures travaillées. Lorsqu'une entreprise fait face à un choc négatif, elle peut temporairement réduire le nombre d'heures travaillées par ses employés. L'employeur rémunère les heures travaillées et l'activité partielle compense le salarié pour les heures non travaillées. Ainsi, l'emploi est préservé. L'activité partielle permet un ajustement sur la marge intensive — les heures — plutôt que sur la marge extensive — l'emploi. Les deux premiers chapitres de cette thèse étudient l'activité partielle.

Le premier chapitre fournit un cadre conceptuel pour déterminer les coûts et bénéfices relatifs de l'assurance chômage, qui assure les salariés contre le coût de la perte d'emploi, par rapport à l'activité partielle, qui assure les emplois. Il met en perspective (i) la valeur de l'assurance — les bénéfices associés à transférer de l'argent aux individus affectés par un choc négatif — avec (ii) l'externalité fiscale — le coût total du transfert en raison des réponses comportementales de l'assuré. Il incorpore également l'interactions entre les inefficacités pré-existantes sur le marché du travail et les ajustements d'équilibre. Ce cadre est utile pour définir la calibration optimale jointe de ces deux programmes. Le papier mobilise des preuves empiriques sur les différents éléments d'arbitrage.

Le second chapitre se concentre sur l'externalité fiscale associée à l'activité partielle, qui pèse négativement sur la générosité du programme. Bien que des éléments empiriques issus de la crise de 2008 suggèrent que l'activité partielle permet de préserver les emplois, il existe peu d'éléments sur l'effet de la générosité de l'activité partielle sur le comportement de ses bénéficiaires — l'externalité fiscale. En réduisant le coût des heures chômées, l'activité partielle peut distordre le comportement des employeurs. Ils peuvent être incités à réduire excessivement les heures non-travaillées, car ils n'internalisent pas complètement le coût du dispositif — un problème appelé aléa moral. Cela est particulièrement pertinent dans le contexte récent

du Covid-19, où le coût de l'activité partielle a principalement été supporté par les Etats. Une façon d'atténuer ce problème d'aléa moral est d'augmenter le niveau de contribution de l'employeur au dispositif. Il est ainsi crucial de comprendre comment l'utilisation de l'activité partielle réagit à son coût. Ce chapitre fournit une évaluation complète des effets du coût de l'activité partielle sur le comportement des employeurs — sur la façon dont ils reportent l'information aux autorités publiques et sur leur utilisation du programme.

La Demande de Travail des Entreprises

Les Chapitres 1 et 2 étudient l'effet de politiques publiques relatives au marché du travail — l'assurance chômage et l'activité partielle — sur la demande de travail des entreprises. Le Chapitre 1 présente de façon exhaustive les façons dont l'assurance chômage et l'activité partielle peuvent affecter la demande de travail des entreprises. Soit via un effet direct sur le comportement — l'externalité fiscale (Chapitre 1 et 2) — soit via leur interaction avec des inefficacités préexistantes sur le marché du travail (Chapitre 1).

Le Chapitre 3 étudie la demande de travail des entreprises en se concentrant sur la décision d'employer en interne ou de sous-traiter la prestation de services aux entreprises. La sous-traitance locale est devenue pratique courante. Les entreprises se concentrent de plus en plus sur leurs activités principales, laissant d'autres tâches à des prestataires de services spécialisés. Malgré l'ampleur du phénomène, il n'existe pas de diagnostic clair sur la prévalence et l'évolution de la sous-traitance des services aux entreprises en France. La sous-traitance affecte à la fois les salariés et les entreprises. Pour les salariés, être embauché par un prestataire de services plutôt qu'en interne se traduit souvent par une perte de revenus. Pour les entreprises, il est nécessaire de mieux comprendre leur motivation à sous-traiter et l'impact de la sous-traitance sur leur structure organisationnelle. Ce papier aborde les questions suivantes : Comment la sous-traitance locale a-t-elle évolué au cours des vingt dernières années ? Quels sont les effets sur les revenus des salariés externalisés ? Qu'est-ce qui motive les entreprises à sous-traiter ?

Chapitre 1 - Devrions-Nous Assurer les Salariés ou les Emplois lors de Récessions ? (avec Giulia Giupponi et Camille Landais) ¹

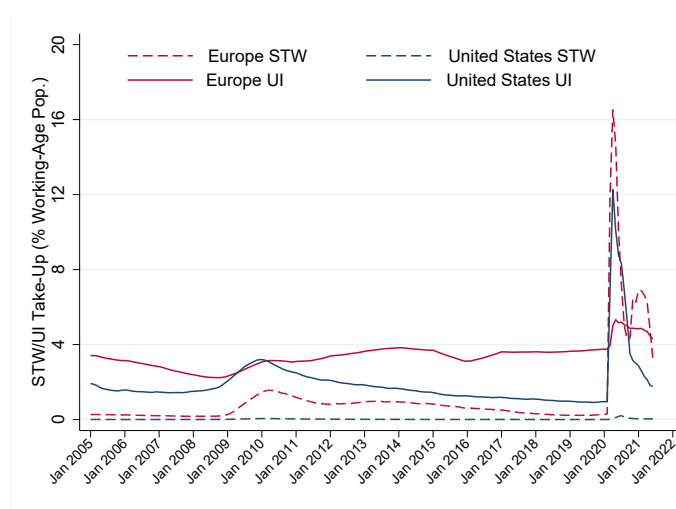
Les réponses politiques relatives au marché du travail face à la pandémie de Covid-19 ont été diamétralement opposées des deux côtés de l'Atlantique. Alors que les États-Unis ont agressivement étendu la générosité de l'assurance chômage, l'Europe a fortement subventionné

1. Ce résumé s'appuie sur un exercice de diffusion pour VoxEU.

les réductions d'heures travaillées et le chômage partiel par le biais de programmes d'activité partielle ou de dispositifs similaires. Les États-Unis ont-ils eu raison de protéger les individus via l'assurance chômage? Ou auraient-ils dû utiliser davantage l'activité partielle, assurant les emplois comme en Europe? Ce chapitre offre un cadre pour déterminer les coûts et les bénéfices relatifs en termes de bien-être social de l'activité partielle et de l'assurance chômage pour assurer et stabiliser le marché du travail lors de récessions.

La Figure 1 illustre de manière frappante les stratégies polaires adoptées aux États-Unis et en Europe au début de la crise du Covid-19. Aux États-Unis, la proportion de la population en âge de travailler percevant des indemnités de chômage a grimpé de 2% à environ 12% en avril 2020 et, bien qu'elle ait diminué très rapidement par la suite, elle est restée plus élevée au début de 2021 qu'au pic de la crise de 2008. En Europe, au contraire, la hausse des bénéficiaires de l'assurance chômage a été très limitée, tandis que le recours à l'activité partielle a immédiatement explosé, avec plus de 16% de la population en âge de travailler affiliée à un programme de maintien en emploi en avril 2020.

FIGURE 1: RÉPONSES POLITIQUES EN MATIÈRE DE MARCHÉ DU TRAVAIL AUX RÉCESSIONS ÉCONOMIQUES AUX ÉTATS-UNIS ET EN EUROPE



Notes : La Figure illustre l'évolution du recours à l'activité partielle (*short-time work (STW)*, lignes pointillées) et à l'assurance chômage (*unemployment insurance (UI)*, lignes pleines) en Europe (en rouge) et aux États-Unis (en bleu). Le recours à l'assurance chômage et à l'activité partielle est calculé comme le ratio du nombre d'individus couverts par le programme, au cours d'un mois donné, en pourcentage de la population en âge de travailler. La série pour l'Europe est une moyenne des séries pour l'Allemagne, la France, l'Italie et le Royaume-Uni, pondérée par la population en âge de travailler.

Source : Calcul des auteurs basé sur les données de l'OCDE et de statistiques nationales.

Quelle stratégie offre l'utilisation la plus efficace des ressources publiques? Quelles seront les effets de ces deux options de politiques publiques sur la dynamique du marché du travail lors de la reprise économique? L'extension agressive de l'assurance chômage entraînera-elle une reprise sans emploi? Ou devrions-nous davantage nous inquiéter d'une réallocation plus lente due au recours massif à l'activité partielle?

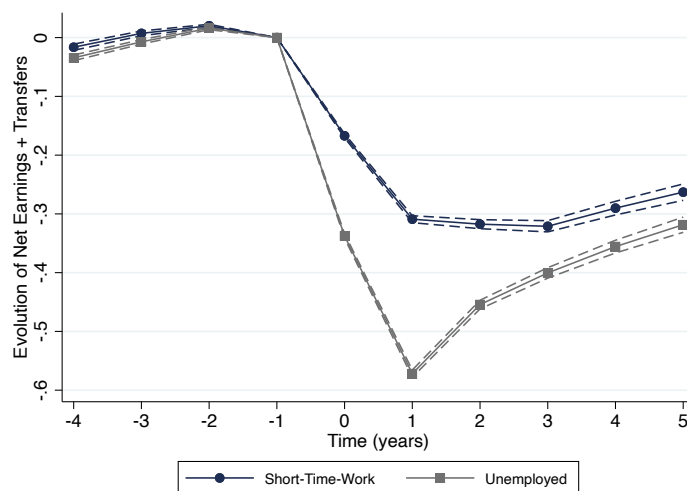
Assurance Chômage vs Activité Partielle Un point de départ utile pour répondre à ces questions est le cadre théorique standard en économie publique selon lequel le transfert optimal de prestations sociale équilibre (i) la valeur de l'assurance — c'est-à-dire, le bénéfice à transférer de l'argent aux individus affectés par un choc négatif — avec (ii) l'externalité fiscale — c'est-à-dire, le coût de transférer ces ressources en raison des réponses d'aléa moral de l'assuré. Mais cela ne capture pas tout. En affectant les comportements des salariés et des entreprises, l'assurance sociale interagit avec des inefficacités préexistantes sur le marché du travail et cause des ajustements d'équilibre. Parmi les sources d'inefficacité, trois méritent une attention particulière : les licenciements inefficaces, les inefficacités de recherche d'emploi, et les inefficacités de réallocation.

En résumé, la combinaison optimale d'activité partielle et d'assurance chômage est telle que, à la marge :

$$\begin{aligned} \text{Valeur Relative de l'Indemnité d'Assurance} &= \text{Externalité Fiscale Relative} \\ \text{Chômage vs d'Activité Partielle} &+ \text{Correction Relative des Externalités} \\ &\text{sur le Marché du Travail} \end{aligned}$$

Valeur Relative de l'Assurance La valeur de l'assurance dépend de (i) l'ampleur du choc, (ii) de si les individus disposent d'autres moyens de lisser leur consommation, et (iii) de la façon dont ils valorisent l'assurance. Les éléments empiriques suggèrent que la valeur de l'assurance de l'assurance chômage est supérieure à celle de l'activité partielle. Tout d'abord, l'activité partielle tend à protéger principalement les *insiders* du marché du travail, c'est-à-dire ceux ayant des revenus plus élevés et de meilleurs moyens de s'auto-assurer contre des chocs négatifs, comme la présence d'un conjoint en emploi dans le ménage ; l'assurance chômage, en revanche, protège principalement les *outsiders*, c'est-à-dire les jeunes, moins éduqués et ayant moins de moyens de lisser leur consommation. Deuxièmement, des travaux sur la crise de 2008 en Italie ([Giupponi and Landais \[2020\]](#)) montrent que l'assurance chômage assure des chocs de consommation (ou de revenus) de plus grande ampleur (Figure 2). La baisse de revenus et de transferts subie par un chômeurs lors de la perte d'emploi est bien plus sévère et persistante que celle d'un salarié placé en activité partielle. Ces deux éléments indiquent que la valeur de l'assurance chômage pourrait être supérieure à celle de l'activité partielle.

FIGURE 2: EVOLUTION DES REVENUS & TRANSFERTS SOCIAUX LORS DE LA PERTE D'EMPLOI & MISE EN ACTIVITÉ PARTIELLE LORS DE LA CRISE DE 2008



Notes : Cette Figure montre l'évolution des revenus et des transferts sociaux lors de la perte d'emploi (en gris) ou au début d'une période de d'activité partielle (en bleu). La perte d'emploi est associée à une baisse des ressources beaucoup plus drastique et beaucoup plus persistante que la mise en activité partielle, ce qui implique que la valeur marginale de l'assurance est probablement plus grande pour l'assurance chômage que pour l'activité partielle.

Source : [Giupponi and Landais \[2020\]](#) basé sur les données administratives de l'INPS sur l'ensemble des salariés et les paiements de la sécurité sociale dans le secteur privé en Italie.

Externalité Fiscale Relative Les externalités fiscales découlent des réponses comportementales des agents — ici les salariés et les entreprises — aux politiques publiques. L'étendue des réponses comportementales générées par l'assurance chômage est assez bien documentée. Nous savons, par exemple, que la durée du chômage et l'intensité de la recherche d'emploi sont très sensibles à la générosité de l'assurance chômage ([Schmieder et al. \[2016\]](#) ; [Marinescu et al. \[2020\]](#)).

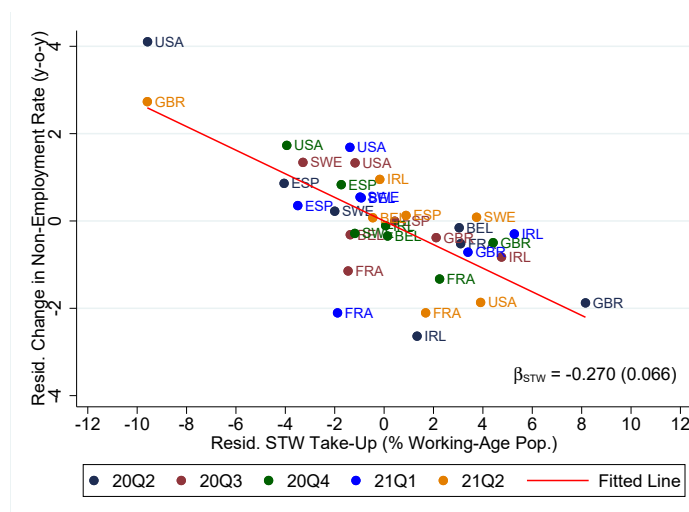
Les travaux empiriques issus de la crise de 2008 ([Giupponi and Landais \[2020\]](#) ; [Siegenthaler and Kopp \[2021\]](#)) suggèrent que les réponses comportementales à l'activité partielle sont limitées. Cependant, à cette époque, l'activité partielle était conditionnelle à des chocs bien définis pour prévenir l'aléa moral du côté des entreprises. Le développement massif des programmes d'activité partielle pendant la pandémie a potentiellement alimenté l'aléa moral.

En résumé, bien que l'assurance chômage offre une valeur d'assurance supérieure à celle de l'activité partielle, elle génère également une externalité fiscale plus importante. Considérons à présent les trois sources d'inefficacités avec lesquelles l'activité partielle et l'assurance chômage sont les plus susceptibles d'interagir.

Licenciements Inefficaces Face à des chocs de productivité, les entreprises et les salariés peuvent ne pas réussir à préserver de manière optimale des emplois productifs, créant ainsi

une sensibilité excessive des licenciements aux fluctuations économiques (e.g. [Hall and Lazear \[1984\]](#), [Jäger et al. \[forthcoming\]](#)). L'assurance sociale peut amplifier cette sensibilité excessive en subventionnant les licenciements (assurance chômage) ou, au contraire, la freiner en subventionnant la rétention de la main-d'œuvre (activité partielle).

FIGURE 3: RECOURS À L'ACTIVITÉ PARTIELLE ET NON-EMPLOI PENDANT LA CRISE DU COVID-19



Notes : La Figure illustre la corrélation entre la variation annuelle du taux de non-emploi trimestriel (axe des ordonnées) et le taux de recours à l'activité partielle (axe des abscisses) au niveau national, en contrôlant par le taux de recours aux allocations chômage et le nombre de cas de Covid-19. Le taux de recours à l'activité partielle est le rapport entre le nombre de personnes en activité partielle et la population en âge de travailler. Source : Calcul des auteurs basé sur des statistiques nationales et des données de l'OCDE et du Centre de ressources sur le coronavirus de l'Université Johns Hopkins.

La Figure 3 montre une corrélation négative robuste entre recours à l'activité partielle et non-emploi. Cela est cohérent avec des analyses sur la France et l'Italie lors de la Crise de 2008 ([Cahuc et al. \[2021\]](#), [Giupponi and Landais \[2020\]](#)) qui montrent que l'emploi réagit fortement à l'utilisation de l'activité partielle.

Inefficacité de la Recherche d'Emploi L'assurance sociale affecte la tension sur le recrutement d'équilibre en influençant à la fois l'effort de recherche des salariés et la demande de travail des entreprises. Les récessions sont généralement caractérisées par une baisse de la tension sur le marché du travail : il y a trop peu d'offres d'emploi par rapport au nombre de personnes à la recherche d'un emploi ([Michaillat \[2012\]](#)). En atténuant les courses contre-productives à l'emploi, désinciter à la recherche d'emploi peut améliorer le bien-être.

Les conséquences sur le bien-être dépendent de la direction et de l'ampleur avec lesquelles l'activité partielle et l'assurance chômage affectent la tension sur le marché du travail et si elle est initialement inefficacement élevée ou non. Cette récession se caractérise par un niveau de tension sur le marché du travail particulièrement élevé. La générosité de l'assurance sociale

(qu'il s'agisse de l'activité partielle ou de l'assurance chômage) a empêché la tension sur le marché du travail de devenir inefficacement faible comme lors des récessions précédentes.

Inefficacités de Réallocation Les récessions entraînent une réallocation importante des salariés, car les entreprises les moins productives réduisent leurs effectifs ou disparaissent, et les salariés se dirigent vers des emplois plus productifs ([Barrero et al. \[2021\]](#)). En réduisant les incitations à rechercher des emplois plus productifs, ou en maintenant en vie des emplois moins productifs, l'assurance chômage et l'activité partielle peuvent freiner la réallocation efficace des salariés sur le marché du travail.

Une question empirique est de savoir à quel point ces effets de réallocation sont importants. On en sait encore très peu sur l'effet de l'assurance chômage sur la réallocation. Pour l'activité partielle, des premiers éléments issus de la crise de 2008 en Italie suggèrent que, lorsque le choc est persistant, la sélection adverse des entreprises dans le programme peut affecter négativement la réallocation ([Giupponi and Landais \[2020\]](#)). Cependant, l'effet semble limité.

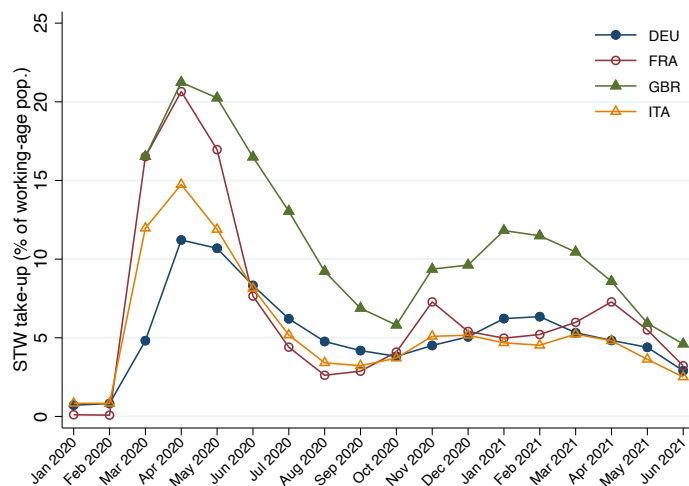
Conclusion Bien que les programmes d'activité partielle et leurs effets potentiels sur le bien-être étaient peu connus, cela n'a pas empêché les décideurs publics européens de les utiliser agressivement lors de la crise du Covid. Ils ont probablement pris la bonne décision. Dans les pays avec des programmes d'assurance chômage déjà généreux et/ou une forte protection de l'emploi, comme en Europe, l'activité partielle peut être un complément précieux à l'assurance chômage. La valeur de l'assurance fournie par ses transferts est nettement inférieure à celle de l'assurance chômage, mais l'aléa moral qu'elle implique semble plus limité. L'activité partielle permet d'atténuer les coûts sociaux créés par des licenciements "excessifs" lors de récessions. L'assurance sociale interagit de manière critique avec l'équilibre sur le marché du travail, avec des conséquences importantes pour la réallocation et l'efficacité. Sur ce point, il reste encore beaucoup de recherche à faire.

Chapter 2 - Aléa Moral des Entreprises dans l'Activité Partielle

Motivation Bien que les programmes d'activité partielle ne soient pas nouveaux en Europe, l'ampleur de leur utilisation lors du Covid-19 est sans précédent. Dans les pays ayant déjà des dispositifs d'activité partielle, ils ont été massivement étendus. En France, qui sera le contexte de cet article, alors que le programme ne couvrait jamais plus de 3% de la population en âge de travailler pendant la crise de 2008, il a grimpé à plus de 20% de la population en âge de travailler en avril 2020 (Figure 4). Dans les pays dépourvus de tels programmes, ils ont été mis en œuvre en urgence. Au Royaume-Uni, le programme a atteint des proportions similaires

à la France en avril 2020 malgré sa création en mars 2020. Le recours à l'activité partielle est resté élevé tout au long de 2020 et 2021.

FIGURE 4: RECOURS À L'ACTIVITÉ PARTIELLE EN EUROPE DURANT LA CRISE DU COVID-19



Notes : Cette Figure illustre l'évolution du recours à l'activité partielle en Europe lors la crise du Covid-19. Le recours à l'activité partielle est calculé comme le rapport entre le nombre d'individus en activité partielle sur cours d'un mois donné et la population en âge de travailler (en %) pour chaque pays. Les données sur l'emploi proviennent de l'OCDE ; celles sur l'activité partielle de l'OCDE et de statistiques nationales.

La principale préoccupation est que, en modifiant les incitations économiques des agents, ces programmes engendreront des réponses comportementales. Plus précisément, dans le contexte d'expansions de politiques publiques avec une marge de manœuvre pour le report d'information, deux types de réponses comportementales peuvent survenir : (i) la fraude, due à la fausse déclaration, et (ii) les changements de comportements économiques réels ; conduisant tous les deux à un recours excessif au dispositif. Ces réponses comportementales pèseront en retour sur le coût de l'assurance, ce qui est crucial pour en calibrer la générosité.

Nous savons encore très peu de choses sur la façon dont l'activité partielle affecte le comportement des employeurs. Une crainte est que, en fournissant une assurance contre le coût de réduire les heures de travail, l'activité partielle affecte la demande de travail des employeurs. Ils peuvent être incités à mobiliser excessivement sur les réductions d'heures travaillées subventionnées, car ils n'internalisent pas pleinement le coût du dispositif — un problème appelé aléa moral. Cela est particulièrement pertinent dans le contexte du Covid-19, où les programmes d'activité partielle ont présenté un reste à charge limité. Un outil évident pour atténuer l'aléa moral est d'augmenter la contribution des employeurs au dispositif. Il est donc crucial de comprendre comment l'utilisation de l'activité partielle réagit à son coût.

Ce chapitre fournit une évaluation complète des effets du coût de l'activité partielle pour les

employeurs sur leur comportement de déclaration et leur utilisation du programme. Il caractérise également l'hétérogénéité dans la nature et l'ampleur des réponses comportementales entre entreprises. Étant donné que l'activité partielle est susceptible de rester un programme de premier plan dans de nombreux pays, et qu'il a suscité de l'intérêt dans les pays sans programmes similaires, répondre à ces questions est essentiel pour aider à calibrer le dispositif.

D'un point de vue empirique, les travaux évaluant les réponses comportementales des entreprises à la générosité de l'activité partielle sont rares. Il y a principalement trois raisons à cela : (1) un manque de sources crédibles de variation dans la générosité du programme pour identifier causalement les réponses, (2) un manque de données granulaires sur le recours à l'activité partielle, pour les estimer, et (3) un manque de cadre conceptuel pour quantifier l'ampleur de l'aléa moral. Cet article aborde ces défis.

Premièrement, le contexte français offre un ensemble de variations quasi-exogènes crédibles dans le coût du dispositif. Cet article exploite des discontinuités dans les contributions des employeurs à l'activité partielle selon les salariés — en fonction du salaire horaire brut —, au fil du temps — alors qu'une contribution proportionnelle des employeurs est progressivement mise en place —, et selon les secteurs — car le calendrier de sa mise en œuvre diffère selon le code de l'industrie. Cela permet d'identifier causalement la façon dont les entreprises répondent aux changements d'incitations économiques.

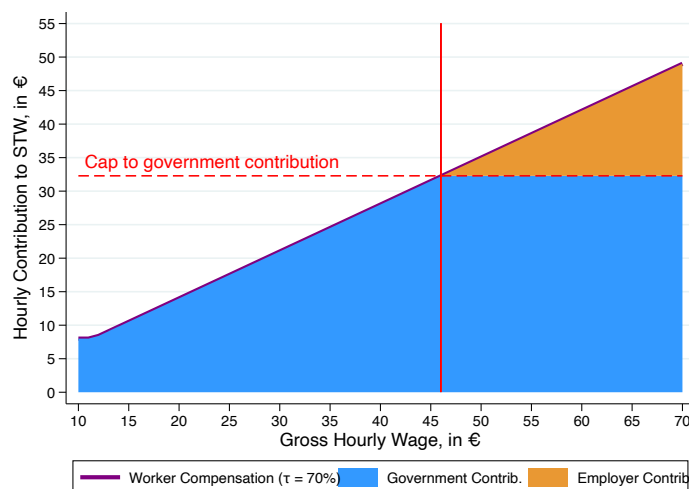
Deuxièmement, l'article s'appuie sur des données extrêmement détaillées sur le recours à l'activité partielle. En France, toutes les demandes d'activité partielle ont été centralisées sur une plateforme en ligne. Les données administratives françaises sur l'activité partielle sont exhaustives. Elles couvrent l'ensemble du processus d'indemnisation — des demandes initiales aux compensations finales. Le niveau de granularité est une autre caractéristique clé des données : elles sont disponibles pour chaque salarié et chaque employeur. De plus, les données sont disponibles à fréquence hebdomadaire. Cela est crucial pour déterminer l'effet de l'un des changements de politique exploités dans l'article et pour isoler des autres événements se produisant au cours du mois. Enfin, le recours à l'activité partielle peut être croisé avec les données d'emploi exhaustives, ainsi qu'avec toutes les données au niveau des établissements.

Enfin, en liant la littérature sur la demande de travail des entreprises avec la littérature en économie publique sur la conception optimale de l'assurance sociale, cet article propose une formule simple de l'externalité fiscale, dans l'esprit de [Baily \[1978\]](#) et [Chetty \[2006\]](#), et inspirée par [Giupponi and Landais \[2022\]](#). La particularité de l'activité partielle, par rapport à l'assurance chômage, est qu'ici l'agent est l'entreprise. Le modèle illustre l'effet de l'activité partielle sur la demande de travail à la marge intensive — compromis entre heures travaillées et heures chômées — et à la marge extensive — maintenir en emploi et utiliser l'activité partielle ou licencier. Une version augmentée du modèle intègre une marge de déclaration, conformément au contexte récent.

Méthode et Résultats Cet article montre que l'activité partielle est sujette à des réponses comportementales de deux types : (i) la fausse déclaration — utiliser l'opportunité du report d'information pour mal-reporter des informations clés pour déterminer la contribution de l'État et le coût pour l'employeur — et (ii) des réponses économiques réelles — ajustement du recours au programme ou de la demande de travail. Les exercices empiriques s'appuient sur deux sources de variations quasi-expérimentales dans le niveau de contribution de l'employeur à l'activité partielle. Grâce à la richesse des données, chaque source de variation peut être utilisée pour identifier les deux types de réponses.

Je m'appuie d'abord sur une discontinuité dans le coût de l'activité partielle pour l'employeur le long de la distribution des salaires en 2020 (Figure 5). L'indemnisation horaire d'un salarié en activité partielle correspond à 70% de son salaire horaire brut. L'État contribue jusqu'à un plafond nominal fixe. Au-delà de ce plafond, le coût supplémentaire est directement supporté par l'employeur. En pratique, l'indemnisation du salarié — et la contribution de l'État — est basée sur le salaire brut du salarié déclaré par l'employeur.

FIGURE 5: CONTRIBUTION DE L'ÉTAT ET DE L'EMPLOYEUR À L'ACTIVITÉ PARTIELLE EN 2020, SELON LE SALAIRE HORAIRE BRUT DU SALARIÉ

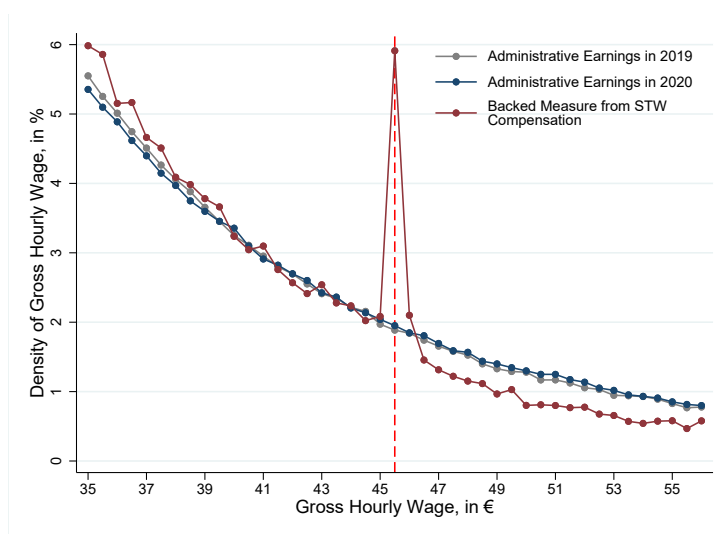


Notes : Cette Figure décompose la contribution de l'État (en bleu) et de l'employeur (en orange) à l'indemnisation horaire de l'activité partielle (axe des ordonnées) selon le salaire horaire brut du salarié (axe des abscisses) en 2020. L'indemnisation horaire du salarié correspond à la somme des deux. La Figure illustre la règle à laquelle tous les employeurs sont soumis jusqu'en juin 2020, et certaines employeurs au-delà. Il y a une discontinuité dans la contribution de l'employeur à 4,5 fois le salaire minimum (45,7€) — marquée par la ligne rouge verticale. À gauche de la ligne rouge, l'État prend en charge l'intégralité du coût de l'activité partielle et compense le salarié à hauteur de 70% de son salaire horaire brut. Au-delà de la ligne rouge, la contribution de l'État est plafonnée à 32€ (= $.7 \times 45,7€$) — marquée par la ligne verticale rouge pointillée. L'employeur prend le relais et couvre toute indemnisation supplémentaire. Pour chaque 1€ supplémentaire de salaire horaire brut, l'employeur verse 0,70 € d'indemnisation d'activité partielle au salarié.

Théoriquement, on pourrait s'attendre à trois types de réponses à cette discontinuité : (i) une baisse du recours à l'activité partielle au-delà de la discontinuité — en raison du coût marginal relatif plus élevé de l'activité partielle par rapport au travail, (ii) un ajustement des salaires horaires — via des re-négociations salariales, et (iii) un comportement de fausse déclaration — tirant parti de l'opportunité de reporter le salaire horaire brut du salarié.

Je dispose de tous les outils pour isoler et tester chacune de ces réponses. Je commence par tracer la densité des salariés en activité partielle en 2020 selon leurs revenus déclarés et identifie une masse de salariés avec des revenus horaires déclarés exactement à la discontinuité (Figure 7). Je compare cette densité reportée à la densité des salariés en activité partielle basée sur leurs revenus réels, information issue du même registre administratif. L'excès de masse est entièrement absent lorsque l'on utilise les revenus réels. Cela signifie que l'excès de masse correspond uniquement à de la fausse déclaration. Les employeurs faussent les salaires horaires bruts reportés de leurs salariés, se regroupant au niveau où la contribution de l'Etat est maximale et leur contribution minimale.

FIGURE 6: DENSITÉ DES SALARIÉS EN ACTIVITÉ PARTIELLE, SELON LA MESURE DU SALAIRE HORAIRE BRUT

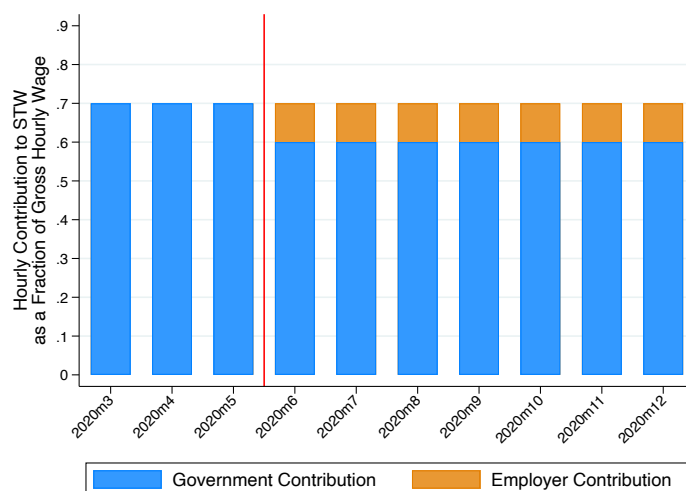


Notes : Cette Figure affiche la densité des salariés placés en activité partielle selon différentes mesures de salaire horaire brut. La courbe bleue (resp. grise) correspond au salaire horaire brut en 2020 (resp. 2019) issu des données d'emploi. La courbe rouge correspond au salaire horaire brut déclaré, basé sur l'indemnisation horaire d'activité partielle, dans ces mêmes données. La ligne rouge pointillée verticale marque la discontinuité dans la contribution de l'Etat. Au-delà de ce plafond, le coût supplémentaire est directement supporté par l'employeur. Pour chaque 1€ supplémentaire de salaire horaire brut, l'employeur verse 0,70 € d'indemnisation d'activité partielle au salarié. Alors que les densités mobilisant les salaires horaires en 2019 et 2020 sont presque indiscernables, la densité du salaire horaire brut déclaré présente une masse importante au niveau de la discontinuité dans la contribution de l'employeur. Les employeurs déclarent stratégiquement les salaires horaires pour maximiser la contribution de l'Etat et minimiser le coût qu'ils supportent.

Je tire parti d'une caractéristique unique des données : pour chaque salarié, j'observe à la fois le salaire déclaré et le salaire réel. Je replace les salariés déclarés à la discontinuité en fonction de leur salaires réels. Je trouve que le *bunching* n'est pas local. Les salariés déclarés à la discontinuité proviennent d'un large segment au-dessus de celle-ci, ce qui suggère que le coût perçu de l'évasion ne dépend pas de son ampleur.

Le deuxième ensemble d'exercices empiriques exploite une augmentation de la contribution des employeurs à l'activité partielle dans certaines industries mais pas dans d'autres. En juin 2020, le gouvernement a classé les secteurs d'activité en deux catégories — protégés et non-protégés.² À partir de juin 2020, les employeurs des secteurs non-protégés contribuent proportionnellement à l'activité partielle à hauteur de 10% du salaire horaire du salarié, tandis que ceux des secteurs protégés font toujours face à aucune contribution proportionnelle au programme (Figure 7). J'exploite cette hausse de la contribution pour certains employeurs pour estimer deux types de réponses : (i) les réponses en termes de déclaration et (ii) les réponses économiques réelles.

FIGURE 7: CONTRIBUTION DE L'ÉTAT ET DE L'EMPLOYEUR À L'ACTIVITÉ PARTIELLE EN 2020, DANS LES SECTEURS NON-PROTÉGÉS



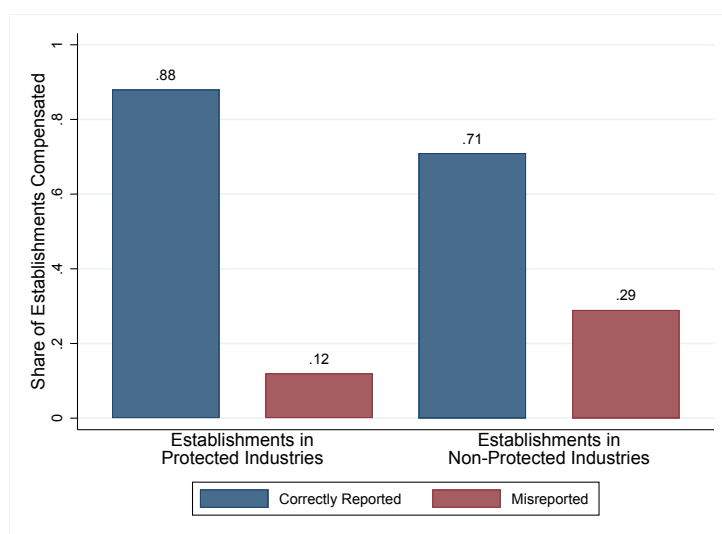
Notes : Cette Figure décompose l'indemnité d'activité partielle entre contribution de l'Etat (en bleu) et de l'employeur (en orange), exprimée en proportion du salaire horaire brut du salarié (axe des ordonnées), au fil du temps (axe des abscisses). L'indemnisation horaire du salarié correspond à la somme des deux, soit 70% de son salaire horaire brut. Cette Figure illustre le barème pour les secteurs non-protégés ; celui des secteurs protégés étant constant sur l'ensemble la période. Le changement de coût est marqué par la ligne rouge verticale. Avant juin 2020, l'Etat couvre toute l'indemnité. À partir de juin 2020, les employeurs des secteurs non-protégés contribuent à hauteur de 10% du salaire horaire du salarié.

Lors de la demande d'activité partielle, les employeurs déclarent eux-mêmes le régime auquel

2. Les secteurs protégés sont définis au niveau du code industrie à 5 chiffres. Ce sont les secteurs les plus affectés par la pandémie — directement ou via leurs partenaires commerciaux.

ils appartiennent — protégé ou non-protégé —, ce qui détermine alors leur contribution au programme. En comparant l'affectation au traitement — basée sur le code d'industrie de l'établissement — au traitement réel — basé sur le régime déclaré, je constate que les employeurs des secteurs non-protégés demandent l'activité partielle disproportionnellement plus sous un programme plus généreux que celui auquel ils sont éligibles (Figure 8). Ils faussent leur déclaration 3,5 fois plus souvent que dans les secteurs protégés. Cela se traduit par un excès de dépense de l'Etat de €60 millions sur cinq mois seulement.³

FIGURE 8: PART DES ENTREPRISES INDEMNISÉES SELON CHAQUE RÉGIME DE GÉNÉROSITÉ, PAR AFFECTATION



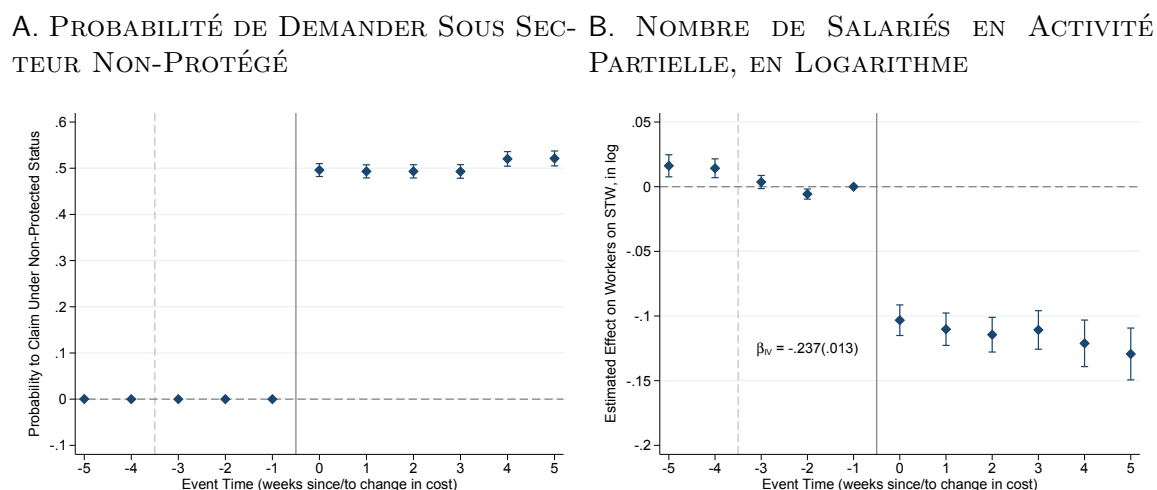
Notes : Cette Figure illustre le comportement de report d'information des établissements, selon leur statut de secteur protégé ou non-protégé. A partir de juin 2020, les établissements des secteurs non-protégés contribuent à hauteur de 10% du salaire horaire de leurs salariés, tandis que ceux des secteurs protégés ne contribuent pas de façon proportionnelle. Le statut protégé est défini par le code industrie de l'établissement mais est déclaré par l'employeur lors de sa demande de d'activité partielle. Les deux premières (resp. dernières) colonnes correspondent aux établissements des secteurs protégés (resp. non-protégés) indemnisés. Les colonnes bleues correspondent aux établissements indemnisés dans le régime assigné ; les rouges aux établissements indemnisés dans le mauvais régime. La colonne 2 correspond aux erreurs des établissements des secteurs protégés — i.e. ils reportent un régime moins généreux que celui auquel ils sont éligibles. Si les erreurs étaient aléatoires, elles devraient être de la même ampleur pour les deux groupes — i.e. les colonnes 2 et 4 devraient être égales. Cependant, ce n'est pas le cas. Les établissements des secteurs non-protégés reportent plus souvent un régime incorrect, plus généreux (colonne 4).

Enfin, j'étudie les réponses économiques réelles. J'utilise une méthode d'étude d'événements (*event study*) pour estimer l'évolution du recours à l'activité partielle suite à une augmentation du coût du programme pour l'employeur. En utilisant une méthode d'appariement statistique, je compare les établissements dans les secteurs non-protégés (traités) à ceux dans les secteurs protégés (contrôle) en termes d'utilisation du programme ainsi qu'en termes de niveaux

3. Le calcul correspond à la période de juin à octobre 2020, offrant un aperçu des dépenses excessives totales.

d'emploi. Les établissements assignés aux secteurs non-protégés réduisent relativement plus leur recours au dispositif — à la fois en termes de nombre de salariés en activité partielle et d'heures chômées — , tout en n'ajustant pas différemment leurs niveaux d'emploi. Pour compléter cette analyse, j'utilise une estimation par méthode des variables instrumentales, où j'instrumente le traitement réel par l'affectation au traitement. J'estime une réduction de la demande pour le programme de 22% (resp. 30%) en termes de salariés en activité partielle (resp. d'heures chômées) suite à une augmentation des contributions des employeurs de 0 à 10% du salaire horaire brut (Figure 22).

FIGURE 9: EVOLUTION DU RECOURS À L'ACTIVITÉ PARTIELLE SUITE À UNE HAUSSE DU COÛT POUR L'EMPLOYEUR



Notes : Cette Figure illustre la variation utilisée pour identifier l'effet causal du changement dans le coût du programme sur la demande de travail. Le Panel A correspond à la probabilité relative de demander l'activité partielle sous le régime non-protégé — celui affecté par la hausse du coût du programme. Il illustre la différence de probabilité de faire face à la hausse du coût du programme entre les établissements dans les secteurs non-protégés (assignés au traitement) et ceux dans les secteurs protégés (non assignés au traitement). Le Panel B caractérise l'ajustement de l'usage de l'activité partielle en réponse à l'augmentation de son coût. L'usage est défini ici comme le logarithme du nombre de salariés en activité partielle, conditionnellement à son utilisation au niveau de l'établissement. Le Panel B rapporte le coefficient estimé par méthode des variables instrumentales β_{IV} de l'effet d'une augmentation du coût du programme sur sa demande.

Contributions Bien qu'il y ait une littérature croissante sur les effets de l'activité partielle sur l'emploi, les travaux existants sont silencieux quant à l'étendue et à la nature de l'aléa moral qu'elle peut engendrer. Nous savons que l'activité partielle permet de préserver les emplois et que ses effets sont hétérogènes selon les entreprises (Giupponi and Landais [2022], Tilly and Niedermayer [2016], Cahuc et al. [2021], Meyer et al. [2017]). Cependant, nous savons très peu de choses sur la manière dont la générosité du programme affecte le comportement des

employeurs et donc comment le calibrer de manière optimale (Giupponi et al. [2022]). Cet article est le premier à documenter de manière extensive les réponses comportementales des employeurs à l'activité partielle. Les articles étudiant la crise de 2008 s'appuyaient sur des variations quasi-exogènes dans l'éligibilité (Giupponi and Landais [2022]) ou dans la rapidité de mise en œuvre du programme (Cahuc et al. [2021] et Siegenthaler and Kopp [2021]) pour identifier les effets de la participation au programme sur l'emploi et les performances des entreprises. Ici, l'approche est différente, car l'objectif est d'étudier comment l'évolution du coût du programme affecte l'utilisation du dispositif et, plus généralement, la demande de travail des entreprises.

Les travaux de recherche existants sur l'activité partielle proviennent presque exclusivement de la crise de 2008. Cet article étudie une période différente, marquée par un recours sans précédent et par une extension *ad hoc*. Les premiers travaux sur la pandémie se sont appuyés sur des modèles calibrés (Albertini et al. [2022], Birinci et al. [2020]), des comparaisons internationales (Giupponi et al. [2022], Lafuente and Ruland [2022]) ou des données d'enquête (Bennedsen et al. [2020]) pour contribuer en temps réel au débat public. Cet article est le premier à couvrir la période de la pandémie en s'appuyant sur des données administratives exhaustives au niveau des salariés et des établissements.

Enfin, cet article contribue à la littérature sur le report d'information et l'évasion. Les employeurs déclarent de nombreuses informations lorsqu'ils demandent l'activité partielle. Les informations déclarées influencent le niveau de contribution de l'Etat ainsi que l'indemnisation des salariés. Ce chapitre fournit une évaluation exhaustive des distorsions résultant du report d'information, en exploitant un contexte unique pour démêler les réponses réelles des réponses de déclaration. J'observe à la fois les informations déclarées et les informations réelles. C'est unique par rapport à la littérature sur qui repose habituellement sur des hypothèses de forme fonctionnelle pour définir le contrefactuel (Saez [2010], Chetty et al. [2011]).

Chapitre 3 - Employés en Interne ou Sous-Traités : Quelle Situation pour les Salariés dans les Services ?

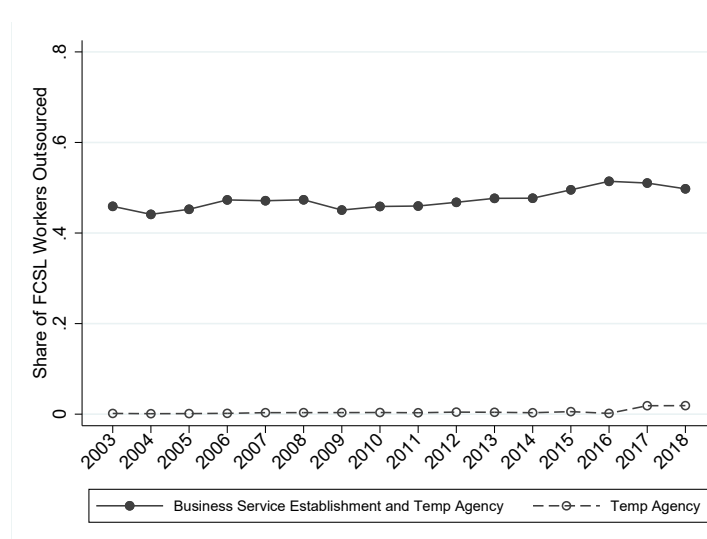
La sous-traitance locale est devenue pratique courante. Les entreprises se concentrent de plus en plus sur leurs activités principales, laissant d'autres tâches à des prestataires de services spécialisés. Malgré l'ampleur du phénomène, il n'existe pas de diagnostic clair de la prévalence et de l'évolution de la sous-traitance locale des services aux entreprises en France. La sous-traitance locale affecte à la fois les salariés et les entreprises. Pour les salariés, être embauché par un prestataire de services plutôt qu'en interne se traduit souvent par une perte de salaire. Pour les entreprises, il est crucial de mieux comprendre leurs motivations à externaliser et l'impact de l'externalisation locale sur leur structure organisationnelle.

Cet article aborde les questions suivantes : Comment la sous-traitance locale a-t-elle évolué au cours des vingt dernières années ? Quel sont les effets sur les salaires des salariés externalisés ? Qu'est-ce qui pousse les entreprises à sous-traiter ?

Méthode et Résultats Cet article étudie l'incidence et les effets de la sous-traitance locale en utilisant des données exhaustives d'emploi pour la France sur près de deux décennies (2002-2018).

Tout d'abord, je documente la prévalence de la sous-traitance locale en France, en évaluant dans quelle mesure les salariés des services sont encore employés en interne ou par des prestataires de services. Pour cela, je me concentre sur les services de restauration, de nettoyage, de sécurité et de logistique — ci-après dénommés FCSL (acronyme anglais).

FIGURE 10: PART OF DES SALARIÉS FCSL EMPLOYÉS DANS DES ÉTABLISSEMENTS DE SERVICES OU AGENCES D'INTÉRIM



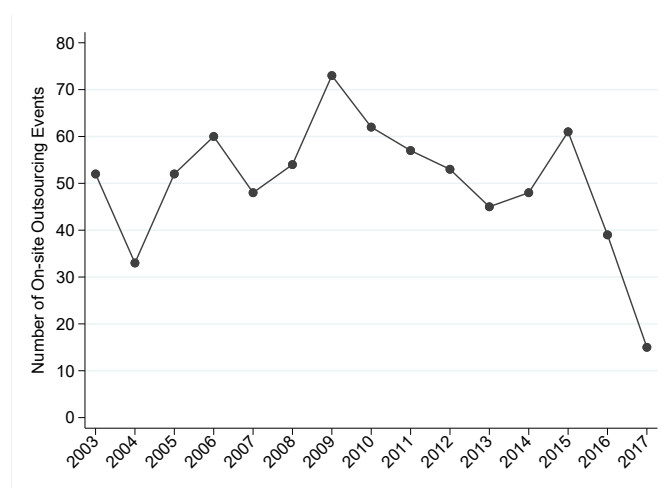
Notes : Cette Figure présente l'évolution de la part des salariés dans les métiers de restauration, de nettoyage, de sécurité et de logistique employés dans des établissements de services aux entreprises ou agences d'intérim rapportée à l'emploi total dans ces professions. La ligne continue comprend à la fois les établissements de services et agence d'intérim, tandis que la ligne pointillée isole les agences d'intérim. L'échantillon est restreint aux salariés à temps plein et aux établissements de plus d'un salarié. Cette Figure donne une idée du niveau général de sous-traitance dans ces professions. Le niveau de sous-traitance est assez élevé au début de la période (46%). La sous-traitance croît lentement au cours de la période et atteint 50% des salariés FCSL en 2018. Enfin, les agences d'intérim représentent une infime fraction (moins de 2%) de l'emploi dans ces professions.

Une proportion significative des salariés FCSL est employé par des entreprises de services aux entreprises ou des agences d'intérim (Figure 10). La proportion de salariés sous-traités localement augmente progressivement au cours de la période étudiée, bien qu'elle soit déjà élevée en 2002 (près de 50%). Cette croissance est principalement tirée par les établissements de

taille moyenne — ceux comptant entre 10 et 249 employés. Le niveau de sous-traitance locale est plus élevé en France qu'en Allemagne. En miroir, je documente qu'une part considérable d'établissements non-axés sur les services aux entreprises n'emploient plus de salariés dans les professions FCSL, même s'ils bénéficient probablement encore de tels services.

Deuxièmement, j'étudie les événements de sous-traitance. Cette section s'appuie sur [Goldschmidt and Schmieder \[2017\]](#), qui identifie les événements de sous-traitance locale basés sur les flux de salariés. Ces événements correspondent à des situations où un groupe de salariés, autrefois employés en interne, est à présent employé par un prestataire de services ou une agence d'intérim, tout en continuant probablement à fournir le même service pour leur ancien employeur. J'utilise des données exhaustives d'emploi pour suivre les flux de salariés entre établissements. Je capture 752 événements de sous-traitance au cours de la période (Figure 11). J'évalue la définition des événements de sous-traitance locale et propose des amendements.

FIGURE 11: NOMBRE D'ÉVÉNEMENTS DE SOUS-TRAITANCE LOCALE

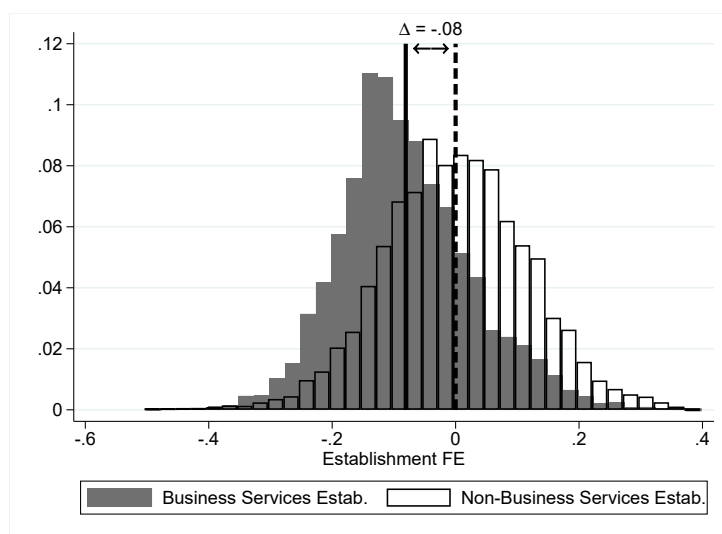


Notes : Cette Figure présente le nombre annuel d'événements de sous-traitance en local dans l'échantillon principal. Les événements de sous-traitance sont définis selon [Goldschmidt and Schmieder \[2017\]](#). Ils correspondent à un flux conjoint d'au moins 10 salariés quittant un grand établissement (50 employés ou plus) pour rejoindre une entreprise de services ou une agence d'intérim. Le nombre d'événements de sous-traitance varie au fil du temps et tourne en moyenne autour de 12 événements par an.

En tirant parti d'une caractéristique unique des données françaises — l'information sur la filiation des établissements aux entreprises —, je documente qu'une grande fraction de ces événements (25%) se produit au sein d'une même entreprise, ce qui laisse entrevoir un remaniement des frontières de l'entreprise. Cela soutient l'idée que la sous-traitance est un moyen pour les entreprises de modifier les frontières de leurs établissements et d'exclure certains salariés de la rente au niveau établissement. J'utilise ces événements, combinés à une autre façon d'identifier des événements de sous-traitance, et les corrèle avec les caractéristiques des entreprises pour explorer les raisons de la sous-traitance.

Troisièmement, j'étudie l'effet de la sous-traitance sur les revenus. Je récupère la différence moyenne de revenus entre les salariés FCSL employés en interne et ceux sous-traités. En moyenne, les salariés FCSL sous-traités gagnent 15% de moins que leurs homologues employés en interne. Par la suite, je réalise une décomposition des salaires à la [Abowd et al. \[1999\]](#), décomposant les différences de salaires en primes salariales lié à l'établissement et au salarié (effets fixes AKM). J'estime à nouveau une pénalité systématique de la sous-traitance en termes de salaires (Figure 12).

FIGURE 12: PREMIUM DE SALAIRE LIÉ À L'ÉTABLISSEMENT (EFFET AKM) POUR LES SALARIÉS FCSL EMPLOYÉS EN INTERNE ET SOUS-TRAITÉS

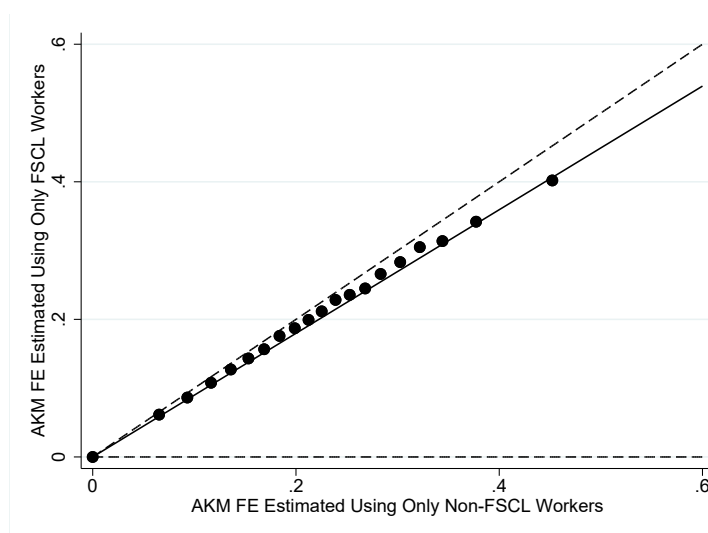


Notes : Cette Figure présente un histogramme des effets d'établissement estimés selon le modèle AKM pour les salariés FCSL. La distribution des effets d'établissement AKM est tracée séparément pour les salariés employés en interne (en clair) et ceux sous-traités dans un établissement de services aux entreprises (en gris foncé). Les agences d'intérim sont exclues de l'échantillon. Les valeurs sont centrées autour de l'effet d'établissement moyen pour les salariés FCSL employés en interne. La distribution des effets fixes établissements pour les salariés employés dans les établissements de services aux entreprises est décalée vers la gauche par rapport à celle des salariés employés en interne, indiquant que les salariés sous-traités bénéficient de premium de salaires plus faibles. La ligne verticale en pointillé marque le premium de salaire moyen dans les établissements de services par rapport à la moyenne des établissements qui emploient en interne (ligne pointillée, centrée sur 0). La différence moyenne entre les deux groupes (Δ) est de -0,08 et est statistiquement significative. Les observations sont pondérées par le nombre de salariés sur lesquels l'effet fixe établissement a été estimé.

Enfin, j'examine le rôle du partage des rentes dans la décision de sous-traiter. J'évalue si l'exclusion du partage de la valeur ajoutée motive les entreprises à sous-traiter les services de FCSL, ne conservant que les compétences de base sur la fiche de paie. En utilisant une décomposition AKM, je documente que : (i) les salariés FCSL bénéficient d'un premium de salaire lié à l'établissement similaire à leurs homologues non-FCSL, lorsqu'ils sont employés dans le même établissement, ce qui suggère un partage de la valeur (Figure 13); (ii) les établissements qui sous-traitent — c'est-à-dire ceux n'ayant aucun salarié FCSL sur leur fiche

de paie — présentent des premia de salaires plus élevés que ceux qui ne sous-traitent pas. J'estime une corrélation positive entre la probabilité de sous-traiter et plusieurs mesures du premium de salaire lié à l'établissement, soutenant davantage ce mécanisme d'exclusion du partage de la valeur.

FIGURE 13: PREMIUM DE SALAIRE LIÉ À L'ÉTABLISSEMENT (EFFET AKM) POUR LES SALARIÉS FCSL ET NON-FCSL, AU SEIN DES MÊMES ÉTABLISSEMENTS



Notes : Cette Figure est un nuage de points groupés des effets établissement AKM estimés séparément pour les salariés FCSL (axe des ordonnées) et non-FCSL (axe des abscisses). L'échantillon est restreint aux établissements comptant plus de 50 employés et employant les deux types de salariés. Chaque point correspond à 1/20 des observations. Je normalise les deux effets AKM dans le vingtile inférieur à 0. Il existe une corrélation positive entre le premium de salaire estimé pour les salariés FCSL et non-FCSL au sein des établissements.

Contributions. Il existe une littérature croissante sur la sous-traitance en France. [Bilal and Lhuillier \[2022\]](#) étudient les effets de la sous-traitance locale sur le bien-être, en mettant en perspective son impact sur les salaires des individus sous-traités avec les effets sur la productivité agrégée. [Bergeaud et al. \[2024\]](#) examinent le rôle du changement technologique sur la sous-traitance, en utilisant l'expansion du haut débit comme choc exogène pour identifier la sous-traitance et son effet sur les revenus. Les deux articles utilisent des mesures directes de dépenses de sous-traitance des entreprises utilisatrices (respectivement, une enquête auprès des entreprises et des transactions des entreprises à forte rotation d'emploi). Cet article s'appuie sur des données exhaustives au niveau des établissements, permettant un diagnostic plus complet et capturant les ajustements internes (et entre établissements). Dans le contexte américain, [Dorn et al. \[2018\]](#) s'interrogent si les crises économiques entraînent davantage de sous-traitance et trouvent peu de preuves en ce sens pendant la crise de 2008.

Cet article s'appuie largement sur [Goldschmidt and Schmieder \[2017\]](#), qui examine la sous-traitance locale en Allemagne, entre 1975 et 2009. Ils constatent que les entreprises se tournent

de plus en plus vers la sous-traitance et établissent une relation causale entre sous-traitance et augmentation des inégalités de salaires en Allemagne. Peu de répliques existent dans d'autres contextes. [Dorn et al. \[2018\]](#) répliquent l'analyse pour les États-Unis, en élargissant les professions considérées. Il existe une tentative de réplique pour le contexte suédois, qui joue autour de la définition des événements de sous-traitance locale ([Wartin \[2019\]](#)). Je réplique leurs analyses principales, en adaptant le cadre au contexte français.

Ce papier touche à la littérature sur le partage de la valeur ajoutée et de son exclusion. À cet égard, il est étroitement lié aux travaux de [Drenik et al. \[2023\]](#) sur les salariés des agences d'intérim. Je réplique certaines de leurs analyses, en fournissant un contexte pour les salariés FCSL et non-FCSL. La sous-traitance permet d'exclure les salariés de politiques salariales spécifiques aux établissements et de d'autres avantages, tels que la retraite ou l'assurance santé ([Houseman et al. \[2003\]](#)).

L'étude des décisions de sous-traitance des entreprises est étroitement liée à la littérature sur l'économie des organisations ([Gibbons and Roberts \[2012\]](#)). Suite à l'article fondateur de [Coase \[1937\]](#) et l'impulsion des années 1970, l'économie des organisations a interrogé la raison d'être des entreprises, la nature des tâches réalisées au sein des frontières de l'entreprise et l'impact de la structure organisationnelle sur la performance de l'entreprise.⁴ Les entreprises citent diverses raisons pour sous-traiter une partie de leur main-d'œuvre, y compris la possibilité de s'ajuster aux fluctuations économiques ([Abraham and Taylor \[1996\]](#)), la réduction de la complexité managériale, la perception de l'équité et les économies sur les coûts de main-d'œuvre ([Houseman \[2001b\]](#)). Le contexte légal influence également les activités des entreprises (e.g. [Coase \[1988\]](#), [Autor \[2003\]](#)). En France, [Perraudin et al. \[2006\]](#) montre que les établissements ont tendance à sous-traiter davantage en dessous du seuil de 50 employés, au-delà duquel la représentation des salariés devient obligatoire. Je trouve une corrélation positive entre des conventions collectives généreuses et la probabilité de sous-traiter. De plus, j'observe que de nombreux événements de sous-traitance se produisent entre établissements d'une même entreprise, soulignant l'importance des frontières des établissements.

La sous-traitance locale des services FCSL aux entreprises est un phénomène plus ancien en France qu'en Allemagne. Je met en avant la façon dont les frontières des établissements et des entreprises changent autour de ces événements de sous-traitance. Je considère l'exclusion du partage de la valeur comme une motivation possible pour la sous-traitance.

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General Introduction

Short-Time Work Programs

In response to the economic shock triggered by COVID-19, governments across the world extended and newly implemented support programs for firms and individuals. In Europe, to mitigate the labor market consequences of the pandemic, the focus was on preserving employment relationships through short-time work (STW) programs. STW programs — also known as short-time compensation, or work-sharing programs — subsidize temporary reductions in hours worked. When faced with a negative shock, a firm can temporarily reduce the number of hours worked by its employees. The employer pays for the hours worked and STW compensates the worker for the hours not worked. In this way, the employment relationship is preserved. STW allows for adjustments on the intensive – the hours — margin rather than on the extensive – the employment — margin. The first two chapters study STW programs.

Chapter 1 provides a conceptual framework for determining the relative welfare costs and benefits of unemployment insurance (UI), which insures workers against the cost of job loss, and short-time work (STW) programs, insuring jobs against temporary shock. It puts into perspective the relative (i) insurance value – i.e. the benefit of transferring money to individuals who have been hit by a negative shock – with the relative (ii) fiscal externality – i.e. the cost of transferring those resources due to moral hazard responses by the insured. It also incorporates interactions between pre-existing inefficiencies and equilibrium adjustments. This conceptual framework is useful for joint optimal design of the two programs. The paper provides empirical evidence on the elements of the trade-off.

Chapter 2 focuses on the fiscal externality part of the trade-off, which weighs against a more generous program. While empirical evidence from the Great Recession suggests that STW is effective at preserving jobs, we still know very little about how the design of the program affects employer behavior. One concern is that, by providing insurance against the cost of having to reduce working hours, STW will distort employer behavior. Employers may have an incentive to rely excessively on subsidized hours reductions as they do not fully internalize the cost of the program — a problem called moral hazard. This is likely to be particularly relevant in the context of the pandemic, where STW programs exhibited limited experience rating.

An obvious tool to mitigate moral hazard is to increase employer contribution to STW. It is therefore crucial to understand how STW utilization responds to the cost of the program. This chapter provides a comprehensive assessment of the effects of employer's STW costs on misreporting and STW utilization.

Firm Labor Demand

Chapter 1 and Chapter 2 study the effect of labor market policies — unemployment insurance and short-time work – on firm labor demand. Chapter 1 provides an exhaustive assessment of the ways UI and STW can affect firm labor demand. Either through their direct effect on behavior – i.e. the fiscal externality (Chapter 1 and 2) – or through interactions between equilibrium adjustments and labor market inefficiencies (Chapter 1).

Chapter 3 studies firm labor demand focusing on the decision of firms to employ in-house or to outsource the provision of services to firms. Domestic outsourcing has become a prevalent practice. Firms are increasingly focusing on their core activities, leaving other tasks to specialized service providers. Despite the magnitude of the phenomenon, there is no clear diagnosis of the prevalence and evolution of domestic outsourcing of services to firms for France. Domestic outsourcing affects both workers and firms. For workers, being hired by a service contractor rather than in-house often translates into wage loss and reduced amenities. For firms, we need better insight into their motivation to outsource and the impact of domestic outsourcing on their organizational structure. This paper addresses the following questions : How did domestic outsourcing evolve over the last twenty years? What is the effect of domestic outsourcing on the wages of outsourced workers? What drives firms to outsource?

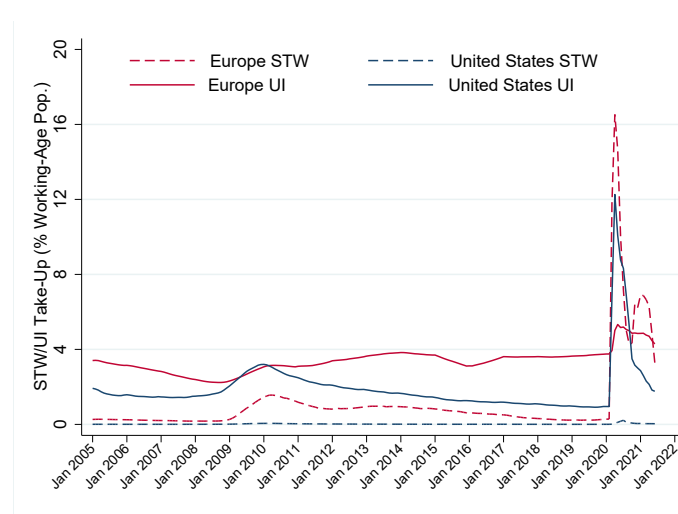
Chapter 1 - Should We Insure Workers or Jobs During Recessions? (with Giulia Giupponi and Camille Landais)⁵

Labour market policy responses to the COVID-19 pandemic have been diametrically opposed in nature on the two sides of the pond. While the US aggressively extended unemployment insurance (UI) generosity, Europe heavily subsidised hour reductions and temporary layoffs through short-time-work (STW) or similar schemes. Did the US get it right by insuring workers through UI? Or should they have used more STW, insuring jobs like in Europe, instead? This chapter illustrates a framework to determine the relative welfare costs and benefits of STW and UI in providing insurance and labour market stabilisation during economic downturns.

5. This summary draws on a dissemination exercise for VoxEU.

Figure 14 vividly paints the polar strategies adopted by the US and Europe at the onset of the COVID-19 crisis. In the US, the fraction of the working age population on UI surged from about 2% to 12% in April 2020, and – although it declined very rapidly after that – it remained higher at the beginning of 2021 than at the peak of the Great Recession. In Europe, to the contrary, the increase in UI recipients was very limited, while STW take-up immediately sky-rocketed, with more than 16% of the working-age population enrolled in a job retention scheme as of April 2020.

FIGURE 14: LABOUR MARKET POLICY RESPONSES TO RECESSIONS IN THE UNITED STATES AND EUROPE



Notes : This Figure reports the evolution of STW (dashed lines) and UI (solid lines) take-up in Europe (red lines) and the United States (blue lines). STW and UI take-up are 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. Source : Authors' computation based on data from OECD and national statistics.

Which strategy offers the most efficient use of social insurance resources? And what are the consequences of these two policy options for labour-market dynamics during the recovery? Will aggressive UI extensions lead to jobless recoveries? Or should we worry more about slower reallocation due to massive STW take-up?

Welfare Trade-Offs of STW Vs UI A useful starting point to answer these questions is the standard public finance framework in which the optimal social insurance transfer balances out (i) insurance value – i.e. the benefit of transferring money to individuals who have been hit by a negative shock – with (ii) fiscal externality – i.e. the cost of transferring those resources due to moral hazard responses by the insured. But this is not the whole story. By affecting workers' and firms' behaviours, social insurance interacts with pre-existing labour market inefficiencies. When determining the optimal generosity of social insurance, it is therefore necessary to also account for interactions between pre-existing inefficiencies and equilibrium

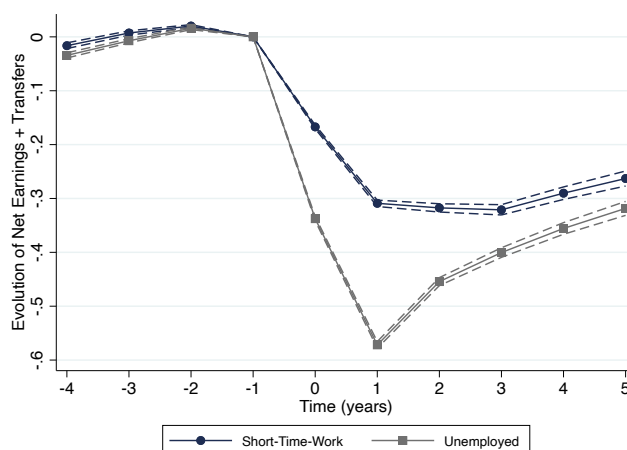
adjustments. Among the important labour market inefficiencies that social insurance may interact with during recessions, three deserve particular attention : inefficient separations, search inefficiencies, and inefficient reallocation.

To sum up, the optimal STW/UI mix is such that, at the margin :

$$\begin{aligned} \text{Relative Value of UI vs STW Transfer} &= \text{Relative Fiscal Externality} \\ &+ \text{Relative Correction of LM Externalities} \end{aligned}$$

Relative Insurance Value The value of insurance depends on (i) the magnitude of the shock, (ii) whether workers have other means of consumption smoothing, and (iii) how they value insurance. Evidence suggests that the insurance value of UI is larger than that of STW. First, STW tends to protect mostly insiders of the labour market, i.e. people with higher income and better means of self-insurance such as the presence of a working partner in the household ; UI instead protects mostly outsiders, i.e. younger individuals, with lower education and fewer means of consumption smoothing. Second, and relatedly, empirical evidence from the Great Recession in Italy ([Giupponi and Landais \[2020\]](#)) shows that UI insures against consumption (or income) shocks of different magnitudes (Figure 15). The drop in earnings and transfers experienced by the unemployed upon layoff is much more severe and persistent than that of workers on STW. These two elements indicate that the value of UI may be somewhat larger than the value of STW.

FIGURE 15: EVOLUTION OF EARNINGS & TRANSFERS AROUND THE EVENTS OF JOB LOSS & STW DURING THE GREAT RECESSION



Notes : This Figure reports the evolution of earnings and transfers around job loss (in grey) or around the start of a STW spell (in blue). It shows that job loss is associated with a much larger and much more persistent drop in resources than STW, implying that the marginal insurance value is likely greater for UI than for STW. Source : [Giupponi and Landais \[2020\]](#) based on administrative data from INPS on the universe of employer-employee matches and social security payments in the private sector in Italy..

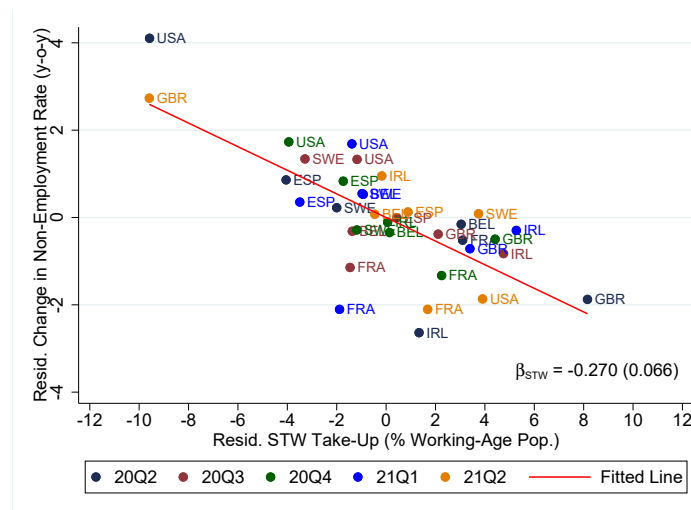
Relative Fiscal Externality Fiscal externalities stem from the behavioural responses of agents – here workers and firms – to public policies. The extent to which UI generates behavioural responses is fairly well documented. We know for example that the duration of unemployment spells and job search intensity are very sensitive to UI generosity (Schmieder et al. [2016]; Marinescu et al. [2020]).

Evidence from the Great Recession (Giupponi and Landais [2020]; Siegenthaler and Kopp [2021]) tends to suggest that behavioural responses to STW are limited. However, back then, STW was conditional on well-defined shocks to prevent moral hazard on the firm side. The massive extension of STW schemes during the pandemic potentially fuelled moral hazard.

To sum up, while UI offers more insurance value than STW, it tends to exhibit larger fiscal externalities. Let us now consider the three sources of inefficiencies STW and UI are likely to interact with the most.

Inefficient Separations In the face of productivity shocks, firms and workers may fail to optimally preserve productive job matches, creating an excess sensitivity of separations to labour market fluctuations (e.g. Hall and Lazear [1984], Jäger et al. [forthcoming]). Social insurance may amplify this excess sensitivity by subsidising separations (UI) or, to the contrary, hamper it by subsidising labour hoarding (STW).

FIGURE 16: STW USAGE AND NON-EMPLOYMENT DURING THE COVID-19 CRISIS : CROSS-COUNTRY EVIDENCE



Notes : This Figure reports a scatter plot of the relationship between the year-on-year change in the quarterly non-employment rate and the rate of STW take-up at the country level, conditional on UI take-up and the number of COVID-19 cases. STW take-up is computed as the ratio of the number of individuals in the program over the working age population. Source : Authors' computation based on data from OECD, national statistics and the Johns Hopkins Coronavirus Resource Centre.

Figure 16 documents a very robust negative correlation between STW take-up and the evolution of the non-employment rate. Evidence at the country-level from the Great Recession (Cahuc et al. [2021]; Giupponi and Landais [2020]) suggests that employment strongly responds to STW usage and employment effects are larger for firms with liquidity constraints.

Search Inefficiencies Social insurance affects equilibrium tightness by affecting workers' search effort and firms' labour demand. Recessions are generally times of slack in the labour market, meaning that there are too few job openings relative to the number of individuals searching for jobs (e.g. Michaillat [2012]). By alleviating counterproductive rat-races for jobs, disincentivising job search may therefore be welfare enhancing.

Welfare consequences depend on the direction and magnitude in which STW/UI affect tightness and on how inefficiently tight or slack the labour market is to begin with. We document that this recession is characterised by a particularly high level of tightness, and that this may be directly related to the generosity of social insurance during the COVID-19 crisis. In other words, generous social insurance (be it STW or UI) prevented the labour market from becoming inefficiently slack as in previous recessions.

Reallocation Inefficiencies There is significant reallocation of workers during recessions, as less productive firms downsize or disappear, and workers move towards more productive job matches (Barrero et al. [2021]). By reducing incentives to search for more productive job matches, or by keeping alive less productive matches, UI and STW may delay the efficient reallocation of workers in the labour market.

One empirical question is how serious these reallocation effects are in practice. There is little knowledge about the reallocation effects of UI. For STW, evidence from the Great Recession in Italy suggests that when the shock is persistent, the negative selection of firms into the program can have negative reallocation effects (Giupponi and Landais [2020]). However, their magnitude appears to be small.

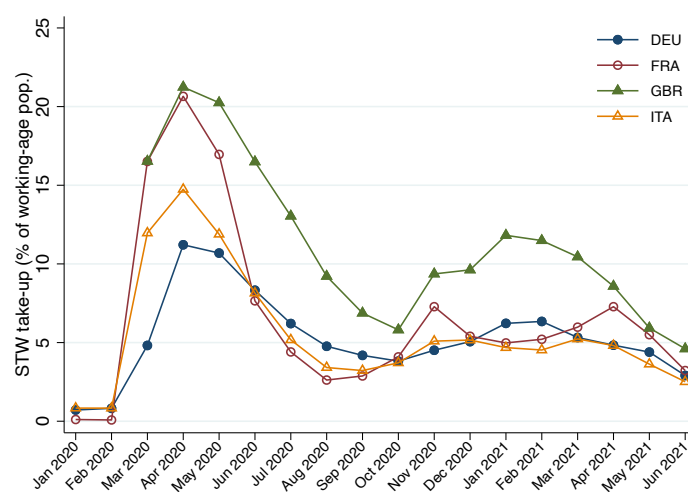
Conclusion While very little was known about STW schemes and their potential welfare effects, this did not prevent European policymakers to aggressively resort to them during the COVID crisis. The evidence gathered in this chapter, shows they probably did the right thing. In countries with already generous UI and/or strong employment protection, like Europe, strong cyclical STW programs can be an extremely valuable complement to UI to respond to recessions. The value of insurance provided by their transfers is clearly lower than that of UI benefits, but the moral hazard they entail seems more limited. Importantly, recent evidence confirms that STW can also be an efficient way to attenuate the social costs created by "excess" layoffs in recessions. 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.

Chapter 2 - Firm Moral Hazard in Short-Time Work

Motivation While STW programs were not new in Europe, the extent to which they have been used in the pandemic is unprecedented. In countries with pre-existing STW schemes, these programs were massively extended. In France, which will be the context of the paper, while the program never covered more than 3 percent of the working age population during the Great Recession, it skyrocketed to more than 20 percent of the working age population in April 2020 (Figure 17). In countries with no such programs, they were implemented in an emergency. In the United Kingdom, the program reached magnitudes similar to those in France in April 2020 despite having been created just at the end of March 2020. STW take-up remained at high levels throughout 2020 and 2021.

FIGURE 17: SHORT-TIME WORK USAGE IN EUROPE DURING THE PANDEMIC



Notes : This figure reports the evolution of STW take-up in European countries during the pandemic. STW take-up is computed as the ratio of the number of individuals in the program in a given month, as a percent of the quarterly age population. Data on employment comes from OECD. Data on STW and UI take-up comes from the OECD and national statistics.

One main concern is that by changing economic incentives for agents, these programs will generate behavioral responses. More precisely, in the context of policy expansions with room for reporting, two types of behavioral responses can arise : (i) fraud due to misreporting and (ii) changes in real economic behavior, both leading to an excessive use of the programs. These behavioral responses will in turn weigh on the cost of providing insurance which matters for optimal design.

We still know very little about how the design of the program affects employer behavior. One concern is that, by providing insurance against the cost of having to reduce working hours, STW will distort employer behavior. Employers may have an incentive to rely excessively on subsidized hours reductions as they do not fully internalize the cost of the program — a problem called moral hazard. This is likely to be particularly relevant in the context of the pandemic, where STW programs exhibited limited experience rating. An obvious tool to mitigate moral hazard is to increase employer contribution to STW. It is therefore crucial to understand how STW utilization responds to the cost of the program.

This chapter provides a comprehensive assessment of the effects of employer's STW costs on misreporting and STW utilization. It also characterizes heterogeneity in the nature and size of responses across firms. Given that STW is likely to remain part of the policy toolkit in many countries, and that it spurred interest in countries with no such program, shedding light on these questions is key for optimal policy design.

From an empirical perspective, assessments of firm behavioral responses to the design of STW are scarce. There are three main reasons for this : (1) a lack of credible sources of variation in the design of the program to causally identify these responses, (2) a lack of granular micro-data on STW claims to estimate them, and (3) a lack of a conceptual framework to quantify the extent of moral hazard. This paper addresses these challenges.

First, the French setting offers a set of credible quasi-exogenous variation in the cost of the program. This paper leverages discontinuities in employer contributions to STW across workers — depending on their gross hourly wage —, over time — as some proportional employer contribution is phased in —, and across industries — as the timing of the phase-in differs by industry code. This allows to causally identify how firms respond to changes in economic incentives.

Second, the paper relies on extraordinarily granular and in-time data on STW. In France, all claiming procedures were centralized through an online platform. French administrative data on STW claims and compensations is exhaustive. There is information on the entire application process, from initial claims to actual compensations. The level of granularity is another key feature of the data, with information being available both at the worker and at the employer level. Additionally, information is available at weekly frequency. This is key to pin down the effect of one of the policy changes exploited in the paper and isolate it from other events occurring within a month. Lastly, information on STW take-up can be matched with exhaustive employer-employee data as well as any establishment-level data.

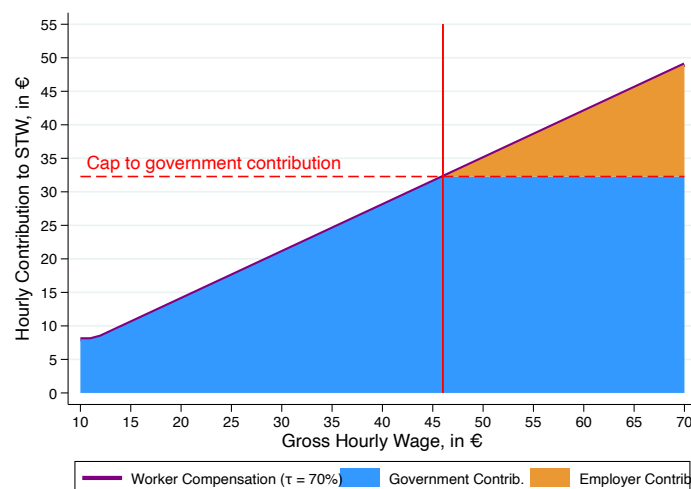
Finally, by bridging the labor literature of firm labor demand with the public economics literature on optimal design of social insurance, this paper develops a conceptual framework delivering a simple formula of the fiscal externality, in the spirit of [Bailey \[1978\]](#) and [Chetty](#)

[2006] and inspired by Giupponi and Landais [2022]. The peculiarity of short-time work, compared to unemployment insurance, is that here the agent is the firm. For the firm problem, the model illustrates the effect of STW on labor demand both on the intensive margin — trade-off between hours worked and hours of STW — and on the extensive margin — decision to maintain the worker into her job and use STW or separate from the worker. An augmented version of the model incorporates a reporting margin, which fits the recent context.

Method and Findings This paper shows that STW is prone to behavioral responses of two sorts (i) misreporting — use of the opportunity to misreport of information relevant for the level of government contribution and the cost to employer — and (ii) real economic responses — changes in usage of the program or labor demand. The empirical exercises rely on two sources of quasi-experimental variation in employer contributions to STW. Thanks to the richness of the data, each source of variation can be used to identify both types of responses.

I first rely on a kink in the employer's cost schedule along the wage distribution in 2020 (Figure 18). Worker's hourly STW compensation corresponds 70% of her gross hourly wage. The government contributes up to a fixed nominal cap. Above the cap, the remainder of the cost is borne directly by the employer. In practice, STW compensation — and the ensuing government contribution — is based on the reported wage of the worker by her employer.

FIGURE 18: GOVERNMENT AND EMPLOYER CONTRIBUTION TO SHORT-TIME WORK IN 2020, BY WORKER GROSS HOURLY WAGE

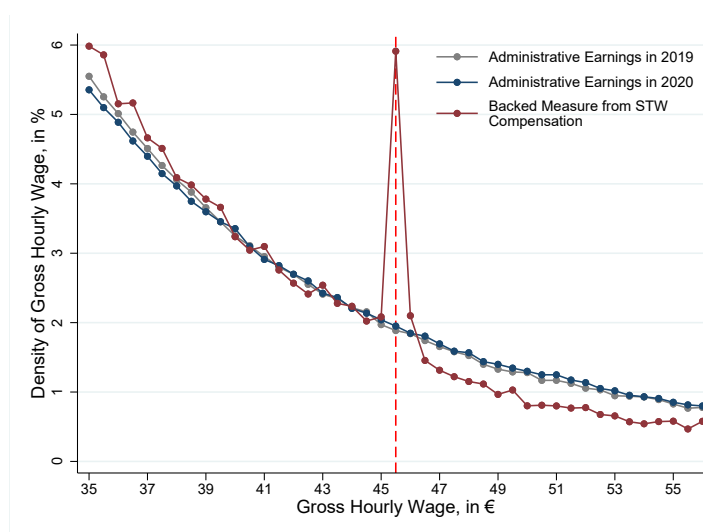


Notes : This figure plots government (in blue) and employer (in orange) contribution to hourly STW compensation (y-axis) as a function of worker's gross hourly wage (x-axis) as per 2020. Worker hourly compensation corresponds to the sum of the two. The figure illustrates the schedule to which all firms were subject up to June 2020 and some firms beyond. There is a discontinuity in employer contribution at 4.5 minimum wage (45.7€) — marked by the vertical red line. To the left of the red line, the government bears the entire cost of STW. Beyond the red line, government contribution is capped at 32€ ($= .7 \times 45.7\text{€}$) — marked by the red dashed line. The employer takes over and bears all additional STW compensation. For every additional 1€ of gross hourly wage, the employer pays .70€ of STW compensation to the worker.

Theoretically, one could expect three types of responses to the existence of this kink in employer contributions : (i) reduced take-up above the kink — due to higher relative marginal cost of STW relative to work, (ii) an adjustment of hourly wages to incentives — through re-bargaining, and (iii) an evasion response — leveraging the opportunity to misreport the worker's gross hourly wage.

I start by plotting the density of workers on STW in 2020 based on their reported earnings and find a large mass of workers with reported hourly earnings exactly at the kink. I benchmark this density against the density of workers on STW based on actual earnings in the same administrative record. Interestingly, the bunching response is entirely absent in the administrative data, revealing substantial reporting responses. Employers misreport their workers' gross hourly wage, bunching at the wage level where the government contribution is maximal and their contributions minimal.

FIGURE 19: DENSITIES OF GROSS HOURLY WAGE MEASURES IN EMPLOYMENT AND STW CLAIMS DATA, AMONG STW TAKERS



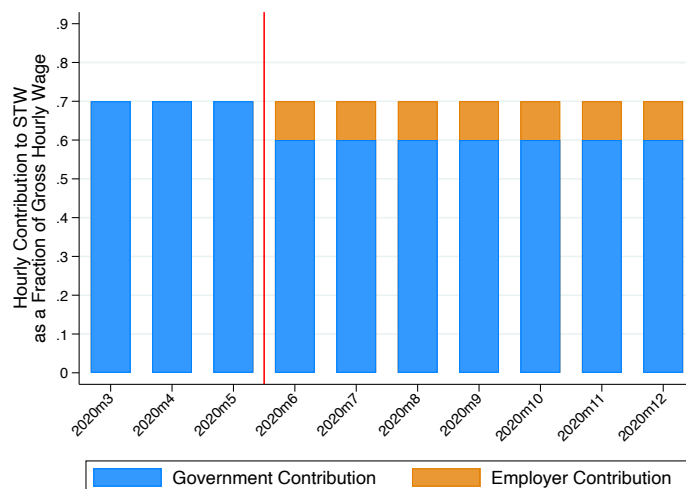
Notes : This figure displays the densities of gross hourly wage measures. The blue (resp. gray) curve corresponds to gross hourly wage in 2020 (resp. 2019) as per the employment data. The red curve corresponds to reported gross hourly wage based on short-time work hourly compensation in the same data. The red dashed line marks the discontinuity in government contribution. Beyond this line, government contribution is capped and employers cover all additional short-time work compensation. For every additional 1€ of gross hourly wage, employers pay .70€ of short-time work compensation to the worker. While the densities for hourly wage in 2019 and 2020 are almost indistinguishable, the density of reported gross hourly wage exhibits a large spike at the discontinuity in employer contribution. This is indicative of bunching as a response to changes in incentives.

I leverage a unique feature of the data : for each worker, I observe both reported information and true information in administrative records. I locate workers reported at the kink along the true wage distribution. I find that bunching is not local. Workers reported at the kink come from over a large segment above the kink, suggesting that the perceived cost of evasion is not sensitive to the size of evasion.

The second set of empirical exercises exploits a policy change which increased employer contributions to the scheme in some industries but not others. In June 2020, the government issued a categorization of industries into protected industries — *secteurs protégés* — and non-protected industries — *secteurs non-protégés* — defined at the 5-digit industry level.⁶ From June 2020, employers in non-protected industries contribute proportionally to STW for 10% of the worker hourly wage, while employers in protected industries still face no proportional contribution to the scheme (see Figure 20). I leverage the phasing in of employer contributions to estimate two types of responses : (i) reporting responses and (ii) real economic responses.

6. Protected industries are industries most affected by the pandemic — directly or through their trade partners.

FIGURE 20: GOVERNMENT AND EMPLOYER CONTRIBUTION TO STW, FOR NON-PROTECTED INDUSTRIES

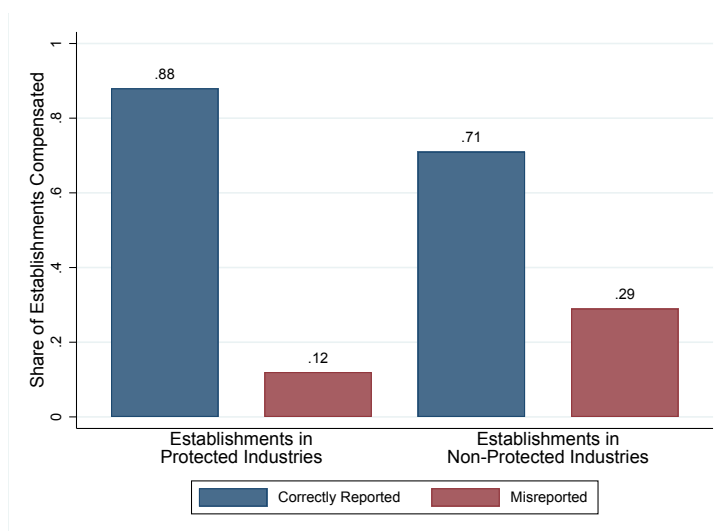


Notes : This figure plots government (in blue) and employer (in orange) contribution to hourly STW compensation as a function of worker's gross hourly wage (y-axis) over time (x-axis). Worker hourly compensation corresponds to the sum of the two. For every additional 1€ of gross hourly wage, the employer pays .70€ of STW compensation to the worker. This figure illustrates the schedule to which firms in non-protected industries are subject, while firms in protected industries face a constant schedule over the entire period. The policy change is marked by the vertical red line. Prior to June 2020, the government covers the entire cost of the program (70% of her gross hourly wage). From June 2020, employers in non-protected industries contribute by 10% of the worker's hourly wage.

Upon claiming STW, employers self-report the regime they belong to — protected or non-protected — which then determines their contribution to the scheme. Comparing assignment to treatment — based on establishment industry code — to actual treatment — based on reported regime, I document that employers in non-protected industries claim disproportionately more under a more generous program than they are eligible to (see Figure 21). They misreport 3.5 times more their hours than employers in protected industries, translating into an excess spending by the government of €60 million over just five months.⁷

7. This is estimated for the period of June to October 2020, a snapshot of total excess spending.

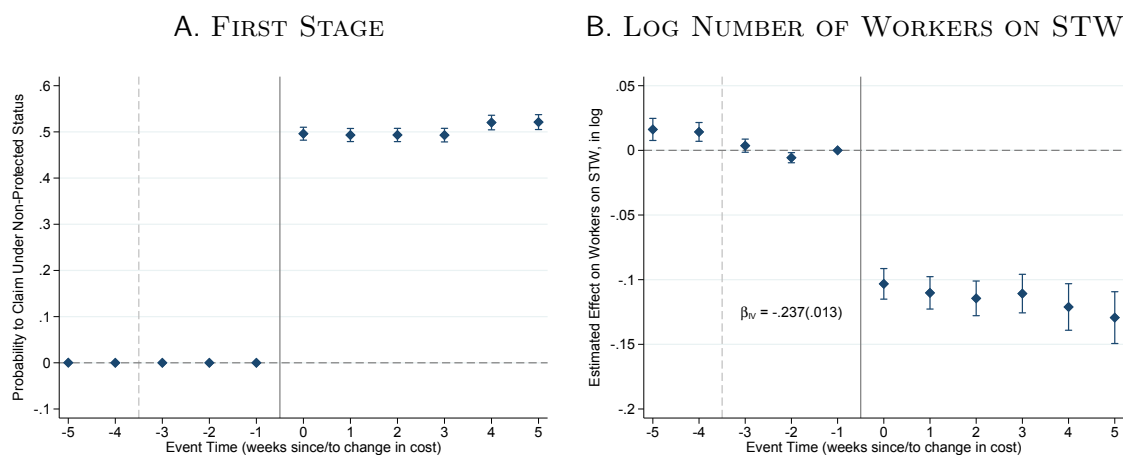
FIGURE 21: SHARE OF FIRMS COMPENSATED UNDER EACH GENEROSITY REGIME, BY ASSIGNMENT



Notes : This Figure compares the reporting errors of establishments in protected industries to that of establishments in non-protected industries. Employers in protected industries do not have to contribute to STW compensation below the cap while establishments in non-protected industries have to contribute by 10% of their worker's gross hourly wage. The first (resp. last) two columns illustrate the reporting behavior of employers in protected (resp. non-protected) industries. Blue columns correspond to compensations in the assigned regime while red columns correspond to compensations in the other regime. The protected status is reported by establishments upon claiming STW — hence the distinction between correctly reported and misreported. Column 2 corresponds to errors of establishments in protected industries — claims under a less generous regime than assigned to. If errors were random, they should be symmetric across protected status and be equal across columns 2 and 4. However, this is not the case. Establishments in non-protected industries claim more often in the incorrect regime — which is more generous — than do establishments in protected industries.

I then focus on real economic responses. I use an event study approach to estimate the take-up response to an increase in the cost of the program for the employer. Using a matching strategy, I compare establishments in non-protected industries (treated) to establishments in protected industries (control) in their usage of the program - at the firm, worker, and hours level - and in their employment levels. I find that establishments assigned to non-protected industries decrease relatively more their demand for the program in terms of workers and hours of STW, while they do not adjust differentially their employment levels. I complement this analysis with an instrumental variable approach where I instrument actual treatment by assignment to treatment. I estimate a decrease in the demand for the program by 22% (resp. 30%) in terms of workers (resp. hours) on STW following an increase in employer contributions from 0 to 10% of worker gross hourly wage (see Figure 22).

FIGURE 22: STW TAKE-UP RESPONSE TO AN INCREASE IN EMPLOYER CONTRIBUTION



Notes : This figure provides a graphical representation of the variation used to identify the causal effect of the change in the cost of the program on labor demand. Panel A uses as an outcome the probability to claim under the non-protected regime, which is the regime affected by the increase in the cost of the program. This is the difference in probability to face the increase in cost of the program between establishments in non-protected industries (assigned to the treatment) and establishments in protected industries (not assigned to the treatment). Panel B uses as an outcome short-time work take-up on the intensive margin — log number of workers on STW conditional on claiming STW. It allows to characterize the demand response, in terms of STW take-up, of establishments to the change in cost of the program. Panel B reports the estimated IV coefficient β_{IV} of the effect of an increase of the cost of the program.

Contributions. While there is a growing literature on the employment effects of STW, existing work is silent with respect to the extent and nature of the moral hazard it may trigger. We know that STW is effective at saving jobs and that its effects are heterogeneous across firms (Giupponi and Landais [2022], Tilly and Niedermayer [2016], Cahuc et al. [2021], Meyer et al. [2017]). However, we know very little on how the design of the program affects employers behavior and hence how to calibrate it optimally (Giupponi et al. [2022]). This paper is the first to document extensively behavioral responses to STW design. Papers studying the Great Recession relied on quasi-exogenous variation in eligibility (Giupponi and Landais [2022]) or in the speed of provision of the program (Cahuc et al. [2021] and Siegenthaler and Kopp [2021]) to identify the effects of benefitting from the program on employment and on firm-level outcomes. Here the approach is different, since the goal is to study how variation in the cost of the program affects firm usage and more generally labor demand.

The existing evidence on STW comes almost exclusively from the Great Recession. This paper studies STW over a different period, with higher take-up, and following an ad-hoc extension. Papers early into the pandemic have relied on calibrated models (Albertini et al. [2022], Birinci et al. [2020]), cross-country comparisons (Giupponi et al. [2022], Lafuente and Ruland [2022]) or survey data (Bennedsen et al. [2020]) to contribute in real-time to the policy debate. This

paper is the first to cover the pandemic relying on exhaustive administrative data at the worker and establishment level.

Lastly, this paper contributes to the literature on reporting and evasion. Employers are responsible for reporting a lot of information upon claiming STW. Reported information affects the level of government contribution as well as worker STW compensation. I provide an exhaustive assessment of the distortions that stem from the reporting margin by exploiting a unique setting to disentangle real from reporting responses. A key advantage of my setting is that I observe both reported and actual information and can directly compare the two. This is a unique advantage compared to the literature using bunching at kinks to detect behavioral responses, which relies on functional form assumptions to define the counterfactual response absent the reporting opportunity (Saez [2010], Chetty et al. [2011]). Moreover, I delve deeper into firm reporting behavior using worker level information. For each worker, I can compare reported earnings upon claiming STW with true earnings in employment data. This allows me to inform some key parameters of the cost of evasion in this context.

Chapter 3 - In-House or Outsourced : Where Do Workers in Services Stand ?

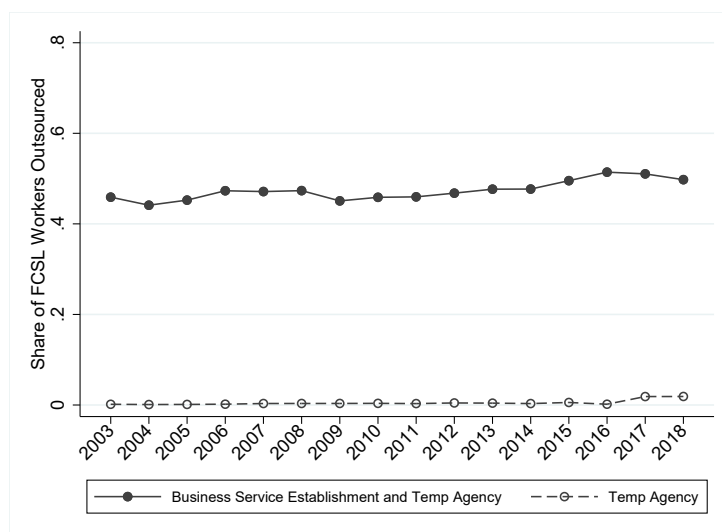
Domestic outsourcing has become a prevalent practice. Firms are increasingly focusing on their core activities, leaving other tasks to specialized service providers. Despite the magnitude of the phenomenon, there is no clear diagnosis of the prevalence and evolution of domestic outsourcing of services to firms in the context of France. Domestic outsourcing affects both workers and firms. For workers, being hired by a service contractor rather than in-house often translates into wage loss and reduced amenities. For firms, we need better insight into their motivation to outsource and the impact of domestic outsourcing on their organizational structure.

This paper addresses the following questions : How did domestic outsourcing evolve over the last twenty years ? What is the effect of domestic outsourcing on the wages of outsourced workers ? What drives firms to outsource ? How relevant is the rent-sharing – and exclusion from firm-rent – channel ?

Method and Findings This paper studies the incidence and effects of domestic outsourcing using exhaustive employer-employee data for France over nearly two decades (2002-2018).

First, I document the prevalence of domestic outsourcing in France, assessing the extent to which service workers are still employed in-house or by external contractors. I focus on the provision of food, cleaning, security, and logistics services – henceforth referred to as FCSL.

FIGURE 23: SHARE OF FCSL WORKERS EMPLOYED IN BUSINESS SERVICES ESTABLISHMENTS OR TEMP AGENCIES



Notes : This Figure reports the share of workers with occupations in the provision of food, cleaning, security and logistics services that are employed in business services establishments or temp agencies over time as a fraction of total employment in these occupations. The solid line corresponds to the share of FCSL workers employed in a specialised business services establishment or temp agency. The dashed line isolates temporary agencies. The sample is restricted to full-time workers and to establishments with more than one employee. Workers in food occupations who are employed in restaurants, hotels, and air travel establishments, are not incorporated in the food category. This Figure provides a sense of the general level of outsourcing in these occupations. The level of general outsourcing is quite high at the beginning of the period (46%) and is mainly driven by business services establishments. Temporary agencies account for a small fraction (less than 2%) of employment in FCSL occupations. General outsourcing slowly grows over the period and reaches 50% of FCSL workers in 2018.

I find that a significant proportion of FCSL workers are employed by business service firms or temp agencies (see Figure 23). The proportion of 'outsourced' workers increases progressively over the period of interest, despite starting from high levels in 2002 (nearly 50%). This growth is mainly driven by medium-sized establishments - those with 10 to 249 employees. The level of 'general' outsourcing is higher in France than in Germany. As a mirror image, I document that a considerable share of non-business service establishments no longer employ any workers in FCSL occupations, even though they likely still benefit from such services.

Second, I study outsourcing events. This section builds on [Goldschmidt and Schmieder \[2017\]](#), which identifies 'on-site' outsourcing events based on worker flows. These events correspond to situations where a group of workers, formerly employed in-house, moves to a business service provider or temp agency, presumably still perform the same service for their former employer. I use exhaustive employer-employee data to track worker flows between establishments. I capture 752 outsourcing events over the period (see Figure 24). I evaluate the definition of

'on-site' outsourcing events and propose amendments.

FIGURE 24: NUMBER OF ON-SITE OUTSOURCING EVENTS



Notes : This Figure reports the yearly number of on-site outsourcing events identified in the main sample. On-site outsourcing event are defined as per [Goldschmidt and Schmieder \[2017\]](#). They correspond to a joint flow of at least 10 workers leaving a large establishment (50 employees or more) and moving to a business services firm or temp agency. The number of on-site outsourcing events exhibits some variations over time and revolves around on average 12 events per year.

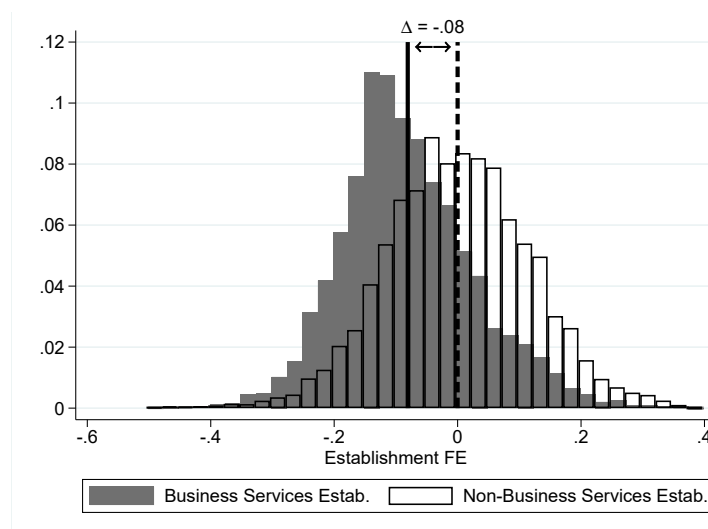
Taking advantage of a unique feature in French data – information on the filiation between establishments and firms – I document that a large fraction of them (25%) occur within a firm, hinting at a reshuffling of firm boundaries. This supports the idea that outsourcing is a way for firms to change the boundaries of their establishments, excluding specific workers for firm rent. Later in the paper, I use these events, combined with other outsourcing events, and correlate them with firm characteristics to address reasons for outsourcing.⁸

Third, I study the effect of outsourcing on earnings. I retrieve the average difference in earnings between FCSL workers employed in-house and those outsourced. On average, outsourced FCSL workers earn 15% less than their in-house counterparts. Subsequently, I conduct a wage decomposition à la [Abowd et al. \[1999\]](#) breaking down differences in wages into establishment and worker pay premia (AKM fixed effects). I observe that the average establishment pay premium for in-house FCSL workers is higher than that for outsourced workers, consistent with a systematic outsourcing penalty (see Figure 25).

Finally, I investigate the role of rent-sharing in the decision to outsource. I assess whether exclusion from firm rent motivates firms to outsource the provision of FCSL services, retaining only core competencies on the payroll. Using an AKM decomposition, I document

8. I combine 'on-site' outsourcing events with 'layoff' events, which correspond to situations where a firm separates from its last workers in a given FCSL occupation.

FIGURE 25: ESTABLISHMENT PAY PREMIA (AKM EFFECTS) FOR IN-HOUSE AND OUTSOURCED FCSL WORKERS

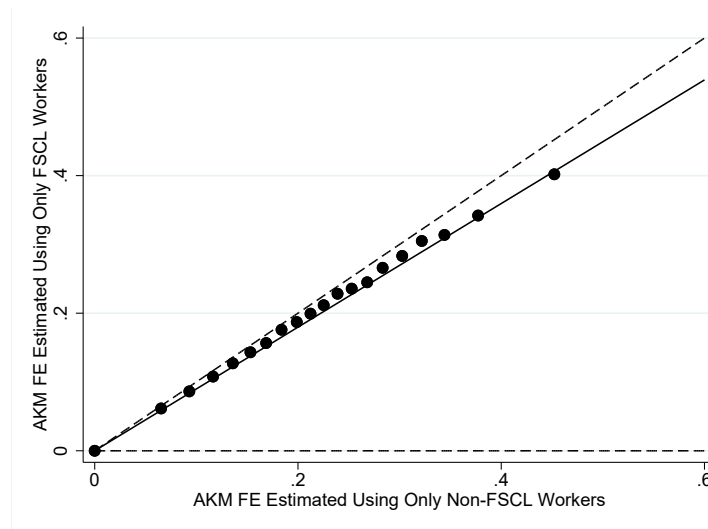


Notes : This Figure reports histograms of estimated AKM establishment effects estimated on FCSL workers using equation (3.2). The distribution of AKM establishment effects for workers in FCSL occupations is plotted separately for workers employed in-house (in light) and outsourced at a business services establishment (in dark gray). Values are centered around the average establishment effect for FCSL workers employed in-house. The distribution of establishments fixed effects for workers employed in business services establishments is shifted to the left compared to that for workers employed in-house, indicating that when employed outsourced workers benefit from lower pay premia. The dashed vertical lines marks the average firm pay premium in outsourcing establishments relative to the average of in-house establishments (dashed line, centered in 0). The difference in means across the two groups (Δ) is of $-.08$ and is statistically significant. Temporary agencies are excluded from the sample. All observations are weighted by the number of workers on which the establishment fixed effect has been estimated.

that : (i) FCSL workers benefit from an establishment pay premium similar to their non-FCSL counterparts when in the same establishment, suggestive of rent-sharing (see Figure 26); (ii) outsourcing establishments – i.e., those with no FCSL workers on the payroll – exhibit higher pay premia than those with in-house provision. Subsequently, I estimate a positive correlation between the probability to outsource and various measures of establishment pay premium, further supporting the exclusion from firm-rent channel.

Contributions. There is a growing literature on outsourcing in France. [Bilal and Lhuillier \[2022\]](#) study the welfare effects of domestic outsourcing, putting into perspective its impact on the wages of outsourced workers and on aggregate productivity. [Bergeaud et al. \[2024\]](#) investigate the role of technological change on outsourcing, using broadband expansion as an exogenous shock to identify outsourcing and its effect on earnings. Both papers use direct measures of outsourcing expenditures on the user-firm side (respectively, a survey of firms in [Bilal and Lhuillier \[2022\]](#) and firm-level transactions in high-turnover firms in [Bergeaud et al.](#)

FIGURE 26: ESTABLISHMENT PAY PREMIA (AKM EFFECTS) FOR FCSL AND NON-FCSL WORKERS, WITHIN ESTABLISHMENTS



Notes : This Figure is a binned scatter plot of AKM establishment effects estimated separately on FCSL (y-axis) and non-FCSL (x-axis) workers using equation (3.2). Sample is restricted to establishment with more than 50 employees and which employ both types of workers. Each dot correspond to 1/20th of the observations. I normalize both AKM effects in the lowest vingtile to 0. There is a positive correlation between the estimated pay premium for FCSL and non-FCSL workers within establishments.

[2024]). This paper leverages exhaustive data at the establishment level, allowing for a more comprehensive diagnosis and capturing within-firm (and across establishments) adjustments. In the U.S. context, [Dorn et al. \[2018\]](#) examine whether economic downturns trigger more outsourcing and find limited evidence supporting this during the Great Recession. This paper relies on a worker-flow approach to identify outsourcing.

This paper relies extensively on [Goldschmidt and Schmieder \[2017\]](#), which examines domestic outsourcing in the context of Germany from 1975 to 2009. They find that firms increasingly turn to outsourcing and establish a causal relationship between outsourcing and increased wage inequalities in Germany. Few replications exist in other contexts. [Dorn et al. \[2018\]](#) replicate the analysis for the United States, expanding the set of occupations. There is a tentative replication for the Swedish context, which plays around the definition of on-site outsourcing events ([Wartin \[2019\]](#)). I replicate their main analyses, adapting the framework to the French context.

The paper delves into the literature on rent-sharing and exclusion from firm rent. In this regard, it is closely related to the work of [Drenik et al. \[2023\]](#) on temporary workers. I replicate some of their analyses, providing context for FCSL and non-FCSL workers. Outsourcing serves as a means to exclude workers from establishment-specific pay policies and other amenities, such as pensions and health insurance ([Houseman et al. \[2003\]](#), [Houseman \[2001a\]](#)).

The study of firms' outsourcing decisions is closely related to the literature on organisational economics (Gibbons and Roberts [2012]). Following Coase [1937]'s seminal paper and the impulse of the 1970s, organisational economics questioned the rationale behind firm existence, the nature of tasks performed within firm boundaries, and the impact of organizational structure on firm performance.⁹ Firms cite various reasons for outsourcing part of their workforce, including adaptability to fluctuations (Abraham and Taylor [1996]), reduced managerial complexity, fairness perception, and labor cost savings (Houseman [2001b]). Legal constraints also influence firm activities (e.g., Coase [1988], Autor [2003]). In France, Perraudin et al. [2006] shows that establishments tend to outsource more below the 50-employee threshold, beyond which worker representation becomes mandatory. I present evidence of a positive correlation between generous collective agreements (proxied by AKM effects) and the probability of outsourcing. Additionally, I observe that many outsourcing events occur within firms, underlining the importance of establishment boundaries.

Overall, I find evidence that domestic outsourcing of FCSL services to firms is an earlier phenomenon in France than in Germany. I provide a first assessment of how the boundaries of establishments and firms change around those outsourcing events. I consider exclusion from firm rent as a possible motivation for outsourcing.

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Chapitre 1

Should We Insure Workers or Jobs During Recessions ?

Co-authored with Giulia Giupponi and Camille Landais

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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 diametrically opposed answers during the recent crisis. In the US, the focus was on insuring workers, by aggressively increasing the generosity of unemployment insurance (UI). In Europe, to the contrary, policies were concentrated on saving job matches, with the massive use of labor hoarding subsidies through short-time-work (STW) programs, on which so little is actually known. In this article, we try to understand who got it right. Building on the vast literature on UI and on a recent stream of papers on STW, we first provide a framework to determine the relative welfare effects of STW versus UI. We then show that UI offers more insurance value than STW, but tends to exhibit larger fiscal externalities, due to moral hazard. We finally focus on how STW and UI affect labor market equilibrium and how this interacts with inefficiencies in the labor market. We review recent evidence showing that STW can be an effective way to reduce socially costly layoffs in recessions. Overall, we conclude that STW is an important and useful addition to the labor market policy-toolkit during recessions, with strong and positive complementarities with UI.

Keywords : Short-Time Work, Unemployment Insurance, Employment, Welfare

JEL-codes : H20, J20, J65. ¹

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Introduction

In the wake of the COVID crisis, labor market policy responses have been immediate, absolutely unprecedented in scope, but also diametrically opposed in nature on both sides of the pond. The United States responded to the sudden labor market freeze and historical surge in layoffs by aggressively extending unemployment insurance (UI) generosity. The Coronavirus Aid, Relief, and Economic Security (CARES) Act 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.²

European countries, to the contrary, did not do much to adjust their UI policies. But they swiftly responded to the crisis by generously subsidizing hours reductions and temporary layoffs through short-time work (STW) or related schemes. Under STW schemes, firms can temporarily reduce their labor demand on the intensive margin and decrease the number of hours worked by their employees without severing the employment relationship. The state takes over by subsidizing these reductions in hours and complementing the employees' wage.³ In April 2020, at the onset of the crisis, the European Union announced that it would provide financial assistance for up to €100 billion to EU countries to help mitigate the consequences of the pandemic on the labor market by developing or extending STW schemes.⁴ The United Kingdom also created its own furlough scheme – the Coronavirus Job Retention Scheme – in March 2020. To put it simply, the focus of the labor market policy response in the US was clearly on insuring workers against the cost of job losses. In Europe, the emphasis was on preserving the relationship between workers and firms, on insuring job matches, rather than workers.

Panel A of Figure 1.1 gives a visual representation of these polar strategies, and an idea of

2. Under the Federal Pandemic Unemployment Compensation (FPUC), unemployment benefits were increased by \$600 a week from March to July 2020. 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 UI measures put in place by the CARES Act.

3. Online Appendix A provides a description of the main institutional characteristics of STW programs and how they have been used during the COVID crisis.

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

the magnitude of the respective policy responses. In the US, the fraction of the working age population on UI benefits surged from about 2 to 12% 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. In Europe, defined here as a weighted sum of Germany, France, Italy and the UK, the increase in UI recipients was very limited, but STW take-up immediately skyrocketed, with more than 16% of the working age population enrolled in such schemes in April 2020. There was a second spike in STW take-up at the end of 2020, although of smaller magnitude. There was no such increase in STW take-up in the US, although more than 26 US states have operational work-sharing schemes similar to STW. The consequences of these opposite labor market strategies on non-employment rates are laid bare in Panel B. While the US experienced a spike in non-employment rates, it 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 STW usage.

Did the US get it right by focusing its labor market policy response to the COVID crisis on insuring workers through UI? Or should they have used more STW, and focused more on preserving jobs, like in Europe? And what are the potential consequences of these polar policy choices for the dynamics of the labor market during the recovery? Will aggressive UI extensions lead to jobless recoveries? Or should we worry more about slower reallocation in Europe because of massive STW take-up?

Providing answers to these questions is complicated by the remarkably small attention devoted to STW, relative to the sprawling literature on UI. An issue this piece intends to remedy.

1.1 UI or STW? A Simple Framework

To make progress, the first necessary ingredient is a simple and general framework, to clarify the relative welfare gains and costs of increasing the generosity of UI versus STW during recessions. A good starting point is the variational approach abundantly used in the public finance literature : it teaches us that the optimal generosity of a social insurance transfer

balances the insurance value of the transfer against its induced fiscal externality (Baily [1978], Chetty [2008]). The insurance (or redistributive) value stems from the fact that, with decreasing marginal utility, it is socially desirable to transfer money to individuals who have been hit by labor market shocks, and have lower income and consumption as a result. But transferring a dollar to these individuals will cost more than one dollar, as moral hazard may induce them to adjust their behavior in a way that is costly to the government : this is the fiscal externality. Following the same logic, let us imagine, in the midst of a recession, to increase the generosity of social insurance by one dollar. Should this dollar be put into more generous UI or into more generous STW? The answer will lie in the comparison of the *relative insurance value* of an extra dollar of UI versus an extra dollar of STW, with the *relative fiscal externality* of a marginal increase in UI versus STW generosity.⁵

This standard public finance trade-off (also known as Baily-Chetty trade-off) is nevertheless missing a key piece of the puzzle. Its focus is on partial equilibrium, and does not account for firms' behaviors, nor for sources of inefficiencies other than moral hazard. In practice though, social insurance like UI or STW affects both workers' and firms' behaviors, and therefore has an impact on equilibrium in the labor market. These equilibrium effects in turn interact with the many potential sources of frictions that characterize labor markets, such as information asymmetries, market power, wage rigidities, inefficient bargaining, etc. When determining the optimal generosity of social insurance programs, it is therefore necessary to account for interactions between pre-existing distortions and equilibrium adjustments (as done in e.g. Landais et al. [2018]). More precisely, we need to know (i) the sign and magnitude of pre-existing welfare distortions in the current equilibrium, and (ii) how social insurance affects the equilibrium. Among the important labor market inefficiencies that social insurance may interact with during recessions, three deserve particular attention.

1. Inefficient separations : in the face of productivity shocks, firms and workers may fail to optimally preserve productive job matches, creating an excess sensitivity of separations to labor market fluctuations (e.g. Hall and Lazear [1984], Jäger et al. [forthcoming]).

5. This approach allows to compare the welfare impact of two policies, bypassing the thorny issue of expressing the MVPF in monetary terms for each policy separately. For an application of this logic to the optimal profile of UI benefits, see for instance Kolsrud et al. [2018].

Social insurance may amplify this excess sensitivity by subsidizing separations (UI) or, to the contrary, hamper it by subsidizing labor hoarding (STW).

2. Search inefficiencies : recessions are generally times of slack in the labor market, meaning that there are too few job openings relative to the large number of individuals searching for a job (e.g. [Michaillat \[2012\]](#)). By alleviating counterproductive rat-races for jobs, incentivizing workers to search less may therefore be welfare enhancing.
3. Inefficient reallocation : there is significant reallocation of workers during recessions, as less productive firms downsize or disappear, and workers move towards more productive job matches. By reducing incentives to search for more productive job matches, or by keeping alive less productive matches, UI and STW may delay the efficient reallocation of workers in the labor market.

To determine how much we want to insure workers versus jobs during recessions, we therefore need to account for the relative impact of UI and STW on these three critical labor market inefficiencies. To sum up, the optimal STW/UI mix is such that, at the margin :

$$\begin{aligned} \text{Relative Value of UI vs STW Transfer} &= \text{Relative Fiscal Externality} & (1.1) \\ &+ \text{Relative Correction of LM Externalities} \end{aligned}$$

With this simple framework at hand, let us now explore what we know empirically about the various terms of that trade-off.⁶ Table 1.1 summarizes the available empirical evidence on those key terms.

1.2 The Insurance Value of UI & STW

The value of insurance against labor market shocks depends on how workers value insurance (i.e. their risk aversion) as well on whether they have access to alternative means of consump-

6. An important feature of the variational approach is to allow the welfare evaluation of marginal reforms around current policies. This implies that all statistics in the trade-off are endogenous to both UI and STW : for instance the fiscal externality of STW depends on the generosity of UI. We come back to this important issue in the following sections.

tion smoothing (self-insurance). In general, the literature has devoted much less empirical attention to identifying the value of social insurance programs compared to measuring their moral hazard cost. Of course, as both UI and STW are mandated, the absence of insurance choice poses important challenges : one cannot simply elicit the value of insurance against job loss or labor market fluctuations through a direct revealed-preference approach. To get around these difficulties, the literature has mostly focused on measuring consumption dynamics around labor market shocks like job loss (e.g. [Gruber \[1997\]](#)), and usually finds significant but small consumption responses, that translate into a moderate value of insurance. Recent research using alternative revealed-preference methods (e.g. [Hendren \[2017\]](#), [Landais and Spinnewijn \[2021\]](#)) instead suggests that the value of insurance against unemployment shocks is much larger than previously thought, and is also strongly heterogeneous across individuals.

Unfortunately, we know very little about the insurance value of STW specifically and how it compares to UI. But two elements indicate that the value of UI may be somewhat larger than the value of STW.

First, recipients of STW and recipients of UI are quite distinct populations. Online Appendix Table B1, which uses data from the HOPP survey in Germany, a country where both generous UI and STW are available, shows unambiguously that during the COVID crisis, STW tended to protect mostly insiders, individuals with higher incomes, and better self-insurance options. UI, to the contrary, was mostly protecting outsiders of the labor market, like younger individuals at the beginning of their career, individuals with lower education and with fewer means to smooth household consumption (such as the presence of a working partner).⁷

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 1.2, STW clearly insures smaller shocks. The figure builds on administrative data from Germany ([Tilly and Niedermayer \[2016\]](#)) and Italy during the Great Recession ([Giupponi and Landais \[2020b\]](#)), and compares, using an event study design, the evolution of total earnings plus transfers around the onset of an unemployment

7. As noted by [Cahuc and Carcillo \[2011\]](#), because STW tends to protect insiders, it is perhaps not surprising that it tends to be more prevalent in countries with strong labor/employment protection regulations.

spell and a STW spell. 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 STW. But we also see an interesting difference between the two panels. In Germany, the earnings of workers who experienced a STW spell had fully recovered after three years. In Italy, to the contrary, they were still 30% lower than the year before entering STW, and they were converging to the level of earnings of workers having experienced an unemployment shock instead. 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 STW tends to insure against temporary shocks, but is less effective at insuring against permanent shocks : if the shock persists, a firm will not hold onto its workers and will eventually lay them off.

1.3 The Relative Moral Hazard Costs of UI & STW

When social insurance programs like UI or STW are made more generous, it will usually affect both the probability that workers claim these benefits, and how much they claim conditional on being in these programs. If these behavioral responses induce a fiscal externality, this is because of the existence of asymmetric information, that prevents the government from observing all actions of workers and firms, and from designing insurance contracts that are fully conditional on those actions. Hence, it is hard to monitor the search effort of unemployed individuals for instance, or the hours worked by individuals on STW. This in turn gives rise to moral hazard.

The literature on the moral hazard costs of UI is plethoric ([Schmieder et al. \[2016\]](#)). Its main conclusion is that the duration of unemployment spells is strongly responsive to the generosity of UI. A smaller literature also investigates the impact of UI generosity on the probability of entering UI, and finds moderate responses.⁸ But overall, the consensus is that the fiscal externality of increasing the generosity of UI is relatively large : the cost to the government of an additional dollar of UI ranges from 1.5 to 2.5 dollars.

8. There is indeed less scope for moral hazard along the extensive margin of unemployment, as layoffs are well-defined and well-monitored events, and quits have strongly restricted access to UI in many countries.

The evidence on the moral hazard costs of STW is much more limited. A priori, two elements suggest that these costs might be significant. First, while access to STW 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, STW subsidizes hours *reductions*, which requires an effective monitoring of hours worked by employees, a notoriously difficult task for administrations. As a result, the massive extension, during the COVID crisis, of STW access to 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 STW 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 STW using variation in eligibility rules across firms, and find that for every €1 transferred to a worker on STW 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 STW application during the Great Recession and find a negative mark-up : in other words, STW paid for itself.

What can explain these small (or even negative) fiscal externalities of STW, in contrast with the relatively large moral hazard cost of UI? First, it seems that, at least during the Great Recession, there was not much manipulation in the reporting of hours worked.⁹ Second, it appears that the probability of an individual worker being put on STW does not respond significantly to the generosity of her STW subsidies. Online Appendix Figure B1 illustrates this point using a large discontinuity in the STW subsidy amount available to workers in Italy at a particular wage threshold. Panel A shows, using Italian administrative data, that the average STW subsidy increases by 12% at the wage threshold. Yet, there is no sign of discontinuity in the probability that a worker is put on STW at the threshold, nor in the intensity of STW usage conditional on take-up. Rigidities or frictions to individual level bargaining within the

9. Using data on firm's balance sheet, [Giupponi and Landais \[2020b\]](#) show that in firms taking up STW, value-added per worker fell significantly, and by about the same magnitude as hours per worker. This indicates that reduction in hours upon STW take-up is in large part a real response rather than a reporting response.

firm may explain why STW take-up does not respond much to variation in the generosity of the subsidy at the individual level. These rigidities in turn can also rationalize why firms' behavior is generally much more responsive to variation in the firm's rather than the worker's side of the job surplus (Jäger et al. [forthcoming]). Evidence shows indeed that firms are responsive to how UI/STW is financed. There is for instance evidence that layoffs decrease when the level of experience-rating of the UI system increases. Time-series evidence also suggests that the take-up of STW by firms declines significantly with the tightening of STW experience rating.

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

1.4 How Do UI & STW Affect Inefficiencies in the Labor Market ?

1.4.1 Inefficient Layoffs

STW intends to preserve matches by subsidizing jobs rather than job seekers. It is therefore critical to establish to what extent STW effectively saves jobs. But if it does, the welfare impact will of course depend on whether separations are *inefficiently* high in recessions to begin with. So let us first review the evidence on the employment effects of STW, before delving into the reasons why layoffs may be inefficient, and determining whether subsidizing labor hoarding may be socially desirable.

The Employment Effects of STW To determine whether STW effectively saves jobs, a natural place to start is to leverage the large variation in STW usage during the COVID crisis across countries. Figure 1.3 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 STW and the evolution of the non-employment rate during the crisis. One additional worker enrolling in STW is correlated with .27 fewer workers being non-employed. This strong correlation between employment and STW usage echoes time-series and cross-country evidence from previous recessions (e.g. [Van Audenrode \[1994\]](#), [Abraham and Houseman \[2009\]](#), [Boeri and Bruecker \[2011\]](#), [Hijzen and Venn \[2011\]](#), [Cahuc and Carcillo \[2011\]](#)).

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

However, three recent papers focusing on the Great Recession address these selection problems and provide credible evidence of a positive, strong and causal relationship between STW and employment. [Siegenthaler and Kopp \[2021\]](#) compare Swiss firms whose STW application was granted to similar firms whose application was rejected. The unsuccessful establishments provide a valid counterfactual for the successful ones because cantonal approval practices are partly idiosyncratic. They find that STW prevented a large number of dismissals, and significantly reduced the incidence of long term unemployment. [Cahuc et al. \[2021\]](#) instrument STW take-up among French firms using the proximity to other firms that used STW before the recession. As an alternative instrument, they use response-time variation in the administrative treatment of STW applications across French departments. They find large and significant employment effects of STW treatment. Finally, [Giupponi and Landais \[2020b\]](#) exploit plausibly exogenous variation in STW eligibility rules across Italian firms based on the interaction between industry and firm size. Their approach and main results are presented in Figure 1.4. Panel A starts by showing, around the time of the Great Recession, the evolution of the

difference in STW take-up between eligible firms and similar counterfactual firms without access to STW. The figure confirms that after the onset of the crisis, the take-up of STW among eligible firms quickly surged. Panel A further reports the evolution of hours and total employment in eligible firms relative to counterfactual non-eligible firms. It demonstrates that STW had large and significant effects on firms' employment at both the intensive and extensive margin. Compared to counterfactual firms, firms treated by STW experienced a 40% 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 \[2021\]](#), 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 STW on the wages of incumbents, nor on the wages of new hires.

The Welfare Value of Labor Hoarding Subsidies Overall, recent evidence confirms that STW does preserve jobs. But why is that valuable? 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 obvious 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 (e.g. [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 frictions may prevent socially efficient hoarding in practice leading to too many separations. Among these frictions, liquidity constraints are probably the most obvious and prevalent ones : a firm may lack the funds necessary to pay wages and retain its workers in the face of a temporary shock. [Giroud and Mueller \[2017\]](#) for instance document that during the Great Recession, 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 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. Wage and hours rigidities may therefore interact with liquidity constraints to amplify the employment response to negative shocks (Schoefer [2021], Jäger et al. [forthcoming]). Finally, note that generous and imperfectly experience-rated UI may also already distort workers' and firms' choices in favor of (socially inefficient) dismissals.¹⁰

If separations are indeed inefficiently high during recessions because of liquidity constraints and other bargaining frictions, subsidizing labor hoarding can be efficient. Evidence from Giupponi and Landais [2020b], reproduced in Panel B of Figure 1.4, 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 STW. Moreover the treatment effects of STW 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 STW on the probability for the firm to survive.

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 would STW be the only way to implement such subsidies? What about other policy instruments? Could they not address such inefficiencies? A natural alternative instrument would be "recall" UI for instance. By allowing workers to get back to their former employer after a UI spell, recall UI can prevent the job match to be severed, and can offer similar benefits to STW. Yet, recall UI entails in practice much less commitment to preser-

10. This interaction between STW and the pre-existing distortions caused by UI is for instance central to the welfare analysis of STW in Braun and Brügemann [2014].

ving the job match. Furthermore, contrary to STW, 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 (PPP) 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 STW. Yet, two arguments can play in favor of STW : expediency and targeting. Expediency because STW can almost immediately provide the funds necessary to cover a firm's payroll, while dedicated loan programs, as demonstrated by the experience of the PPP, can take more time to be activated, and for funds to actually reach firms. Targeting because STW channels liquidity to firms that are willing to reduce their hours, which tends to be an effective screening mechanism. In practice, evidence shows that STW 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 STW more effective than non-targeted wage subsidies, that can end up subsidizing a lot of non-marginal matches.

1.4.2 Search Inefficiencies

Recessions are times of intense reallocation between workers and firms (e.g. [Foster et al. \[2016\]](#)). They are also usually characterized by slackness in the labor market : many workers are searching for jobs and firms post few vacancies. This slackness can be socially inefficient : if jobs are rationed, search can become a rat race ([Michaillat \[2012\]](#), [Landais et al. \[2018\]](#)). Because they impact workers' search effort and firms' labor demand, both STW and UI affect labor market tightness and, in turn, interact with search inefficiencies. The welfare consequences of such interactions will depend on (i) the direction and magnitude in which UI and STW affect tightness, and (ii) on how inefficiently tight or slack the labor market is to begin with.

Let us review what we know about the first point. As it turns out, it is a conceptually

thorny issue. The direction in which equilibrium tightness responds to the generosity of social insurance is indeed theoretically ambiguous. A priori, if during recessions labor demand is rigid and the labor market exhibits job rationing, this will lead to rat-race externalities. In such contexts, reducing search effort through more generous UI, or reducing the number of unemployed looking for jobs through generous STW, can increase tightness. But if generous UI increases wages (as in the standard Diamond-Mortensen-Pissarides framework with wage bargaining) or if STW strongly reduces the need for new hires, more generous insurance might reduce the number of vacancies posted by firms, and make the labor market even more slack in recessions, delaying recovery (Landais et al. [2018]).

In the end, it is therefore mostly an empirical question. So what do the data tell us about the impact of UI and STW on equilibrium tightness in practice? As a starter, we can again exploit the large variation in STW and UI usage across countries and over time during the recent crisis. For this purpose, we built consistent measures of job-filling probabilities, as 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 STW and in UI take-up across countries and across quarters during the current recession. Results, reported in Figure 1.D.6, show that increases in both STW and UI usage are correlated with a decline in the job-filling probability. In other words, STW and UI both seem to increase labor market tightness in a recession, which is consistent with the presence of significant job rationing in downturns.

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 et al. [2015] exploit a massive expansion in the generosity of UI to a large subgroup of workers in Austria and show that non-eligible workers have significantly higher job finding rates, lower unemployment durations, and a lower risk of long-term unemployment as a result. Marinescu [2017] uses job board data and exploits quasi-random variation in UI expansions across states in the US during the Great Recession : she finds that UI reduced search effort significantly but did not affect job vacancies, so that tightness

went up significantly as a result. [Marinescu et al. \[2020\]](#) and [Marinescu et al. \[2021\]](#) exploit variation in UI across 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 UI generosity significantly increased labor market tightness. Finally, using exogenous variation across local labor markets in exposure to STW, [Giupponi and Landais \[2020b\]](#) find that greater access to STW decreases the job finding probability in the labor market, but that the magnitude of the effect is small. So overall, these results confirm that both UI and STW increase tightness during downturns, and the effect seems to be more pronounced for UI.

Now, the welfare consequences of increasing tightness depend on whether tightness is too low or too high in recessions. Historically, labor markets tend to be very slack during downturns. [Michaillat and Saez \[2021a\]](#) offer a general characterization as well as a measure of the efficient level of tightness (or relatedly of the Beveridgean unemployment gap) in the US and 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 in Online Appendix Figure D3, it is striking to see that it has remained at a historic low during the crisis. There was clearly a brief surge in the second quarter of 2020, but this short episode can be entirely explained by early recalls from unemployment. Overall, this recession seems unique : it is a tight recession in the labor market. Can this sustained level of tightness actually be explained by the large expansion of UI generosity and coverage in the US at the onset of the COVID crisis ? And would the situation be different if the US had resorted more to STW, which seems to put less upward pressure on tightness ? As shown in Online Appendix Figure D4, it seems that European countries have also experienced a tight recession, which suggests that the mix of social insurance policies used during the COVID crisis is probably not responsible for the

current tension in the labor market. 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.

1.4.3 Reallocation Inefficiencies

Recessions trigger shocks that are asymmetric across firms and sectors, and that are heterogeneous in their persistence. As a result, significant reallocation usually follows in the labor market : workers move away from firms persistently hit by bad shocks, 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 (e.g. [Barrero et al. \[2021\]](#)).

Both UI and STW have the potential to hinder reallocation, although the mechanism by which they do so differs. In theory, UI 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. STW is a specific brake to sectoral/firm reallocation : it prevents workers in firms/sectors that are hit by productivity shocks to reallocate 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 STW may subsidize persistently unproductive matches and hinder reallocation towards more productive job matches.

How serious are these negative reallocation effects of UI and STW in practice? Regarding UI, we know surprisingly little on its overall impact on reallocation and aggregate efficiency in the labor market. As far as STW is concerned though, evidence from [Giupponi and Landais \[2020b\]](#) sheds some interesting light on its impact on reallocation. First, it confirms that STW tends to subsidize persistently low productivity matches, as low productivity firms tend to over-select into STW. As shown in Panel B of Figure 1.4, firms who were already below the median of labor productivity before the onset of the recession, were twice as likely to select into STW during the Great Recession in Italy. As the figure shows, the employment effects

of STW are also significantly lower for these low productivity firms. Furthermore, exploiting variation across local labor markets, they show that (exogenously) higher exposure to STW 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 STW. While this clearly supports the idea that STW slows down reallocation, it is important to note that the magnitude of the estimated effects remains small. However, the level of take-up of STW was also much smaller during the Great Recession than in the current crisis, and one cannot exclude that STW may have much stronger negative effects on reallocation in the current recovery.

1.4.4 Further Externalities

Besides the three main sources of labor market inefficiencies discussed above, it is worth pointing to a few further externalities that STW and UI may interact with.

Aggregate demand externalities A usual argument in favor of generous social insurance during recessions relates to their fiscal multiplier effects : UI and STW transfer money to individuals who tend to have higher than average marginal propensities to consume (MPC). These high MPCs, 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 (e.g. [McKay and Reis \[2016\]](#), [Michaillat and Saez \[2019\]](#), [Guerrieri et al. \[forthcoming\]](#), [Kekre \[2021\]](#)). So how large are these fiscal multiplier effects ? And which program commands the larger fiscal multipliers : STW or UI ?

UI, as explained above, tends to insure individuals experiencing larger shocks, and with lower means to smooth consumption : this suggests that UI recipients have larger MPCs. But STW, by preserving employment and improving expectations regarding future employment and income, may reduce the need for precautionary savings, and thus raise MPCs compared to UI.

Evidence confirms that the MPCs of UI recipients 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 MPC is around 25% higher when unemployed than employed. But much less is known on the MPCs of individuals on STW. Online Appendix Table B1, using elicited MPCs *à la* [Jappelli and Pistaferri \[2014\]](#), suggests that the MPCs of German STW recipients was slightly larger than that of employed workers, but smaller than that of UI recipients.

However, moderate differences in MPCs between UI and STW recipients are unlikely to translate into sizeable differences in aggregate demand externalities between these two policies. This is because the fraction of the labor force receiving UI or STW is small relative to the size of the employed population. For that reason, simulations, such as in [McKay and Reis \[2016\]](#), suggest that, quantitatively, the stabilization effects of social insurance are small.¹¹ In summary, the difference between UI and STW in terms of stabilization effects is likely to be second-order.

Other externalities : fairness, health Fairness appears to be an important institutional tenet in European labor markets ([Saez et al. \[2012\]](#), [Goldschmidt and Schmieder \[2017b\]](#), [Saez et al. \[2019\]](#)). In the presence of fairness concerns, STW may prove a more desirable 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 STW programs.

Finally, it is worth mentioning that, in the current pandemic, the ability, granted by STW, to flexibly reduce hours of work, and keep workers away from the workplace may have had some large positive health externalities by reducing the spread of the virus.

11. For social insurance to have large multiplier effects, it would need to strongly affect 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.

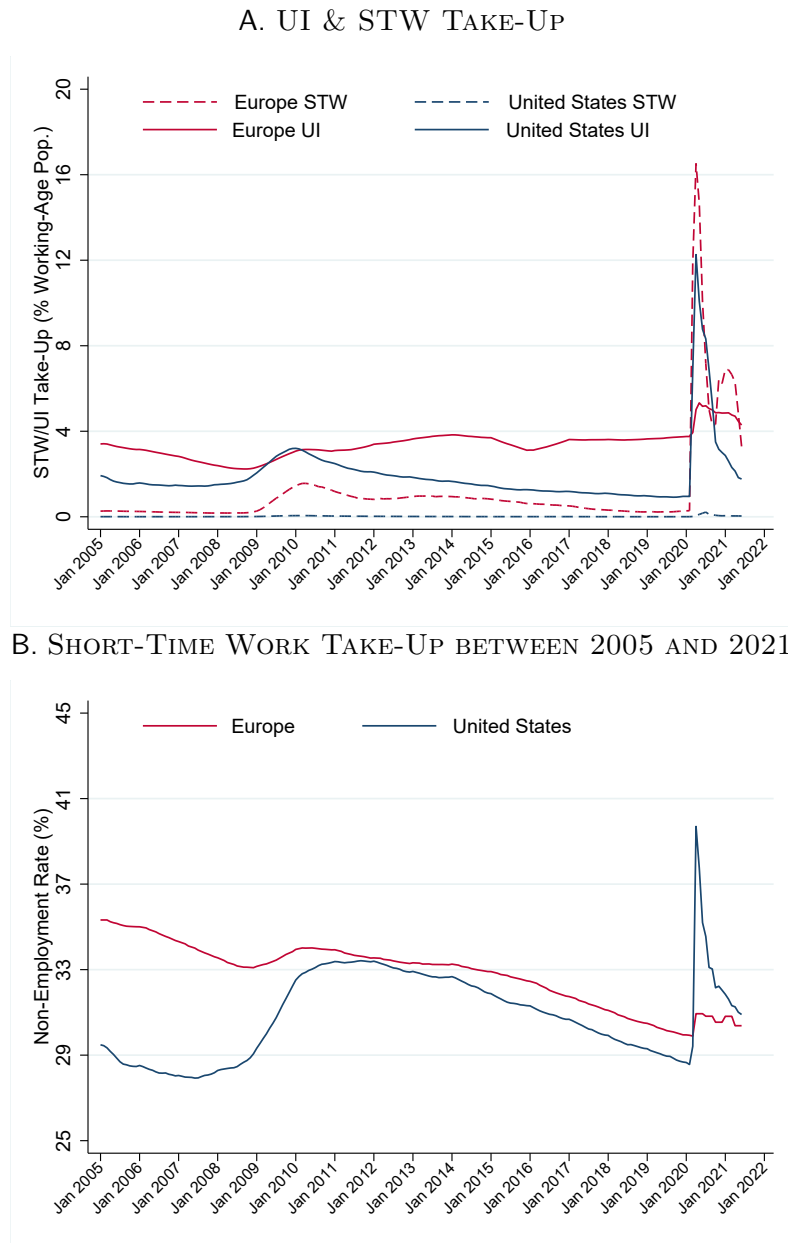
1.5 Conclusion

While very little was known about STW 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 1.1, shows they probably did the right thing. In countries with already generous UI and/or strong employment protection, like Europe, strong cyclical STW programs can be an extremely valuable complement to UI to respond to recessions. The value of insurance provided by their transfers is clearly lower than that of UI benefits, but the moral hazard they entail seems more limited than for UI (although the level of experience-rating of STW programs seems to matter a lot too). Importantly, recent evidence confirms that STW can also be an efficient way to attenuate the social costs created by “excess” layoffs in recessions.

But what this paper has showcased as well is 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 UI and STW affect reallocation will be key to determine the optimal policy path for the recovery. Attention should in particular be devoted to determining how UI and STW should be coordinated with other instruments such as hiring subsidies, in order to boost labor demand and prevent reallocation issues.

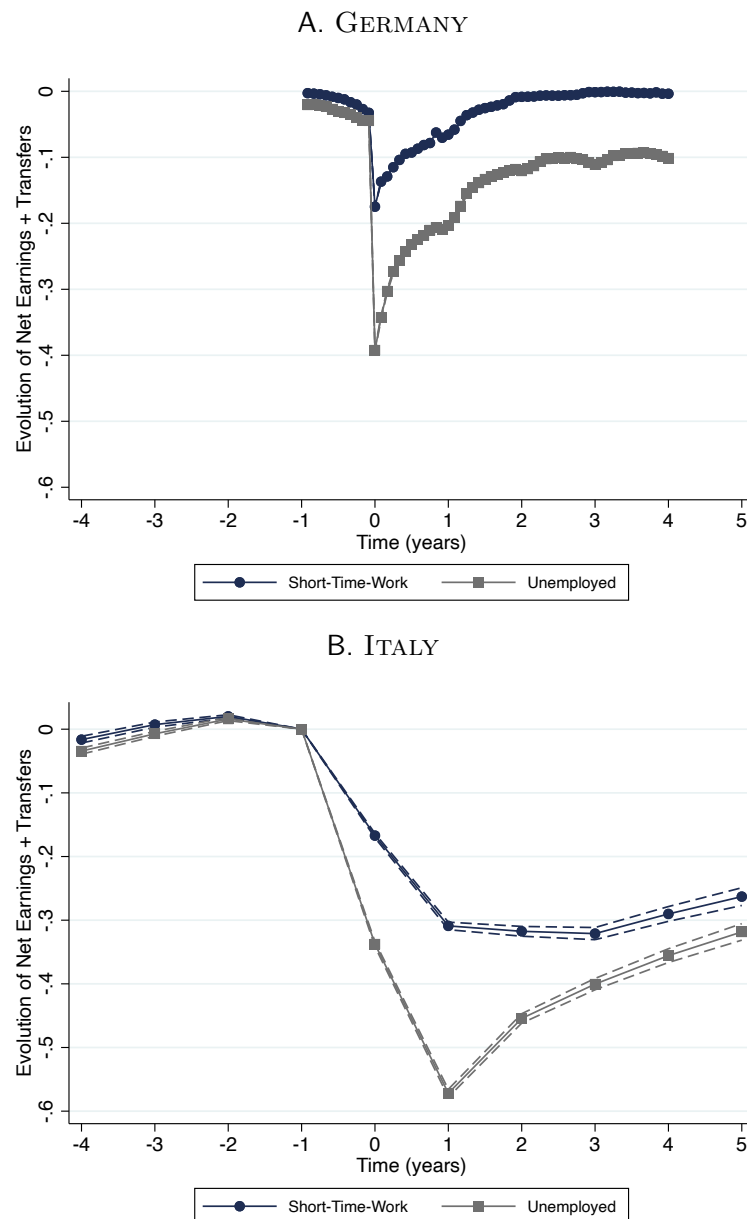
Figures

FIGURE 1.1: LABOR MARKET POLICY RESPONSES TO RECESSIONS & NON-EMPLOYMENT RATES IN THE UNITED STATES AND EUROPE



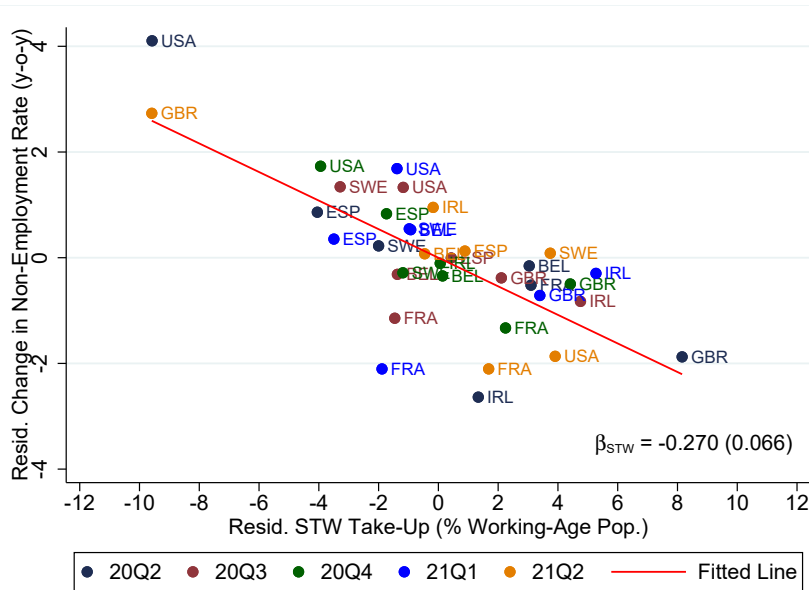
Notes : Panel A reports the evolution of STW (dashed lines) and UI (solid lines) take-up in Europe (red lines) and the United States (blue lines). STW and UI take-up are computed as the ratio of the number of individuals in the program in a given month, as a percent of the quarterly working age population. 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, i.e. one minus the employment rate (employed people as a percent of the working age population). 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 STW and UI take-up come from the OECD and national statistics. See Online Appendix C for details on data sources and the construction of STW/UI take-up.

FIGURE 1.2: EVOLUTION OF EARNINGS & TRANSFERS AROUND THE EVENTS OF JOB LOSS & STW 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 STW spell (in blue). It shows that job loss is associated with a much larger and much more persistent drop in resources than STW, implying that the marginal insurance value is likely greater for UI than for STW. Panel A reproduces estimates from [Tilly and Niedermayer \[2016\]](#) which uses German administrative data from the Institute for Employment Research (IAB). 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.

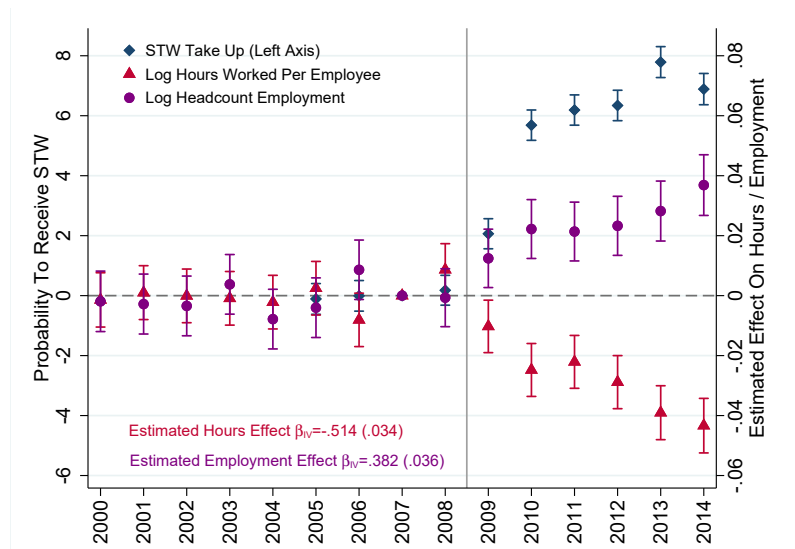
FIGURE 1.3: STW USAGE & NON-EMPLOYMENT DURING THE COVID CRISIS : CROSS-COUNTRY EVIDENCE



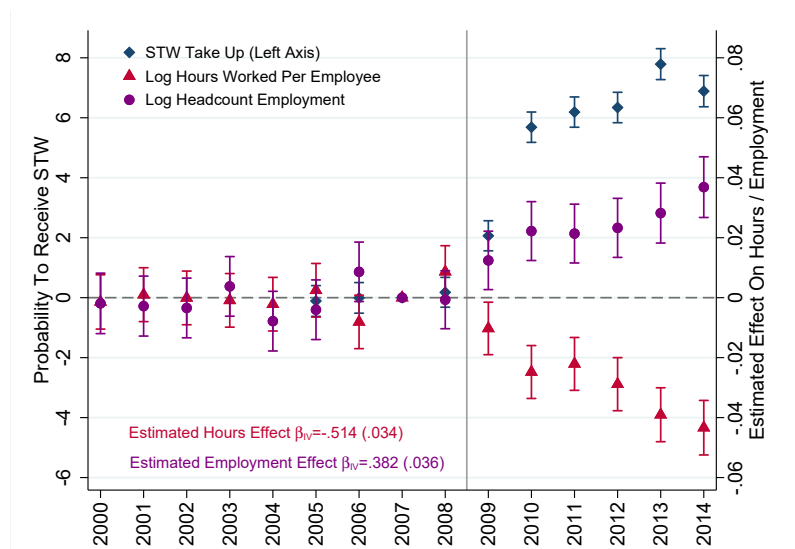
Notes : The figure reports a scatter plot of the relationship between the year-on-year change in the quarterly non-employment rate and the rate of STW take-up at the country level. Data are not seasonally adjusted. To remove the seasonal component, we take the year-on-year change – i.e. for a given year quarter (YYQX), we apply the following transformation to the data : $\tilde{x}_{YYQX} = x_{YYQX} - x_{(YY-1)QX}$. STW take-up is computed as the ratio of the number of individuals in the program over the working age population. For STW 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 UI 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 STW and UI take-up come from the OECD and national statistics. 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 STW/UI take-up.

FIGURE 1.4: EMPLOYMENT EFFECTS OF STW IN ITALY : EVIDENCE FROM QUASI-RANDOM ELIGIBILITY VARIATION ACROSS FIRMS

A. STW TAKE-UP, HOURS & EMPLOYMENT IN ELIGIBLE VERSUS NON-ELIGIBLE FIRMS



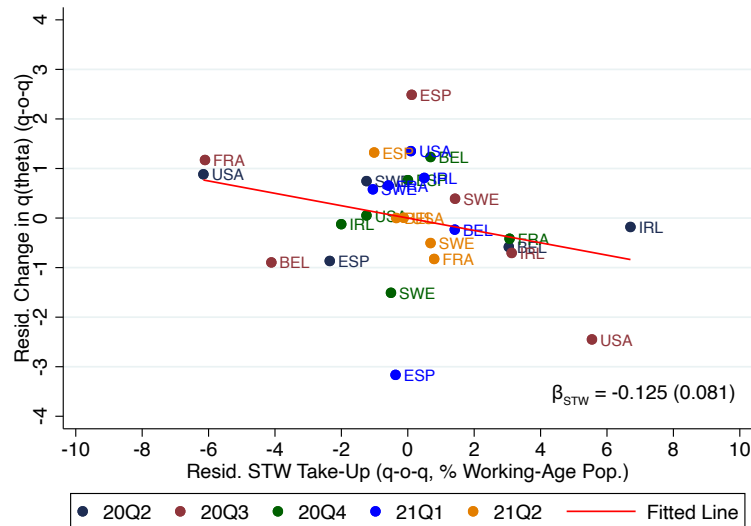
B. HETEROGENEOUS EFFECTS BY LIQUIDITY CONSTRAINTS & PRODUCTIVITY LEVELS



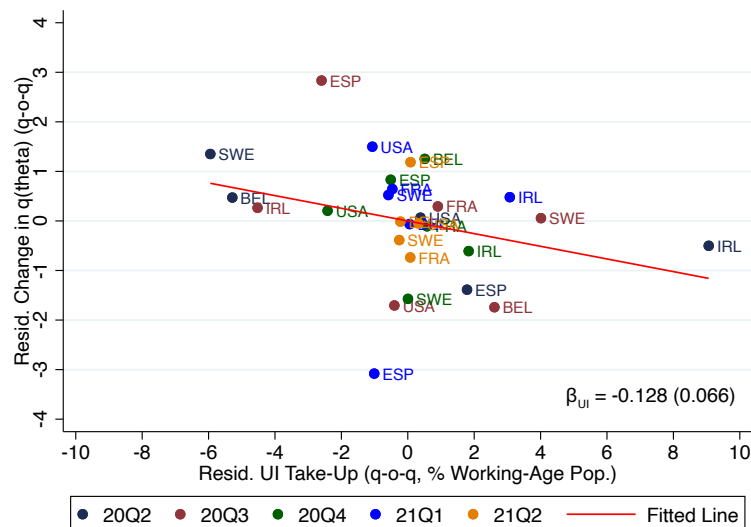
Notes : Panel A reproduces estimates from [Giupponi and Landais \[2020b\]](#) on the effect of STW eligibility on the probability of STW take-up, the log of hours worked per employee and the log of employment headcount at the firm level. The graph reports the estimated coefficients and associated confidence intervals (capped vertical bars) from a reduced-form regression of the outcome of interest on an indicator of STW-eligibility at the firm level interacted with year dummies. All results are relative to 2007. The graph also reports the IV coefficient (and s.e. in parenthesis) of the effect of STW take-up on log hours worked per employee and log employment headcount. Panel B reproduces estimates from [Giupponi and Landais \[2020b\]](#) on the effect of STW-eligibility on STW take-up and on the elasticity of employment to hours by measures of firm liquidity and firm productivity. Liquidity is defined as cash or cash equivalents over total assets, and productivity as value added per employee. The sample is then split between firms with below versus above median level of liquidity/productivity in 2008. The left-hand side of the panel reports the estimated effect of STW-eligibility on STW take-up. The right-hand side of the panel instead reports the elasticity of employment with respect to the hours reduction $\epsilon_{n,h} = -\frac{d \log n / d \text{STW}}{d \log h / d \text{STW}}$, with confidence intervals computed using the Delta-method.

FIGURE 1.5: CROSS-COUNTRY CORRELATION BETWEEN JOB-FILLING PROBABILITY AND STW/UI TAKE-UP

A. JOB-FILLING PROBABILITY $q(\theta)$ VERSUS STW TAKE-UP



B. JOB-FILLING PROBABILITY $q(\theta)$ VERSUS UI TAKE-UP



Notes : The figure shows how STW and UI 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 the rate of STW (UI) 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 : $\tilde{x}_{YYQX} = x_{YYQX} - x_{YYQ(X-1)}$. STW and UI take-up are computed as the ratio of the number of individuals in the program over the working age population. Outcomes are residualized against quarter fixed effects, the quarter-on-quarter change in 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 United States. 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 STW and UI take-up come from the OECD and national statistics. 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 STW/UI take-up.

Tables

TABLE 1.1: 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	Search Extern.	Reallocation
Short-Time-Work	+ (1)	+/- (2)	++ (3)	? (4)	- (4)
Unemployment Insurance	+ + (1)	- - (5)	? (6)	+ (6)	?

Notes : As illustrated in Section 1.1, the relative desirability of STW and UI is a function of the relative value of insurance, the relative size of the fiscal externality and the relative magnitude of the labor market inefficiency correction (layoff and search externalities, and reallocation effects) associated with the two schemes. The table provides a review of the literature evaluating features of STW and UI programs that map onto those key elements of welfare analysis. 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.

(1) While early evidence using consumption drops at job loss pointed to a limited value of UI, more recent research, e.g. Landais and Spinnewijn [2021], provides evidence of a large value of UI using more robust approaches to estimating the value of insurance. Much less is known on the value of STW transfers, but evidence from Tilly and Niedermayer [2016] and Giupponi and Landais [2020b] suggests that STW insures smaller shocks, and a population that has better means to smooth consumption than UI.

(2) Giupponi and Landais [2020b] estimate a negative fiscal externality of STW of 1.4 in Italy : the total cost of transferring 1€ of STW is 1.4€. Siegenthaler and Kopp [2021] find that the UI cost savings generated by STW are large enough to fully offset the cost of the STW program, suggesting the program pays for itself.

(3) Siegenthaler and Kopp [2021], Cahuc et al. [2021] and Giupponi and Landais [2020b] provide evidence that STW has large positive employment effects, that these effects are larger for firms hit by large shocks, and for firms subject to liquidity constraints. This suggests that – absent STW – the level of layoffs may be inefficiently high.

(4) Giupponi and Landais [2020b] provide evidence that larger access to STW within the labor market increases labor market tightness, and that by subsidizing unviable matches, STW has aggregate reallocation effects. It significantly decreases employment growth among non-treated firms, and has a significant negative impact on TFP growth in the labor market.

(5) Schmieder et al. [2016] summarize estimates of the moral hazard cost of UI – equal to one plus the elasticity of unemployment to UI generosity – from 18 studies in 5 different countries, and find a median of estimate of 1.53. This means that, for the marginal euro spent on UI to be efficient, society should be willing to pay a mark-up of about 53%.

(6) Lalive et al. [2015] exploit a large UI duration increase applying to a subgroup of workers in Austria to demonstrate the presence of sizable market externalities of UI. They show that non-eligible workers have higher job finding rates, lower unemployment durations, and a lower risk of long-term unemployment.

Appendix

1.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 [1.A.1](#) 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 1.A.1: 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 Name)	(Program	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. \[2020\]](#).

1.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 [[Volkert et al., 2021](#)]. The HOPP survey is based on a random sample of individuals drawn from the administrative data of the Federal Employment Agency in Germany.¹² 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 1.B.1 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

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

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 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.¹³ 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.¹⁴ 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.¹⁵

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

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

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

TABLE 1.B.1: 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; Volkert 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).

1.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,¹⁶ for Germany from the German Federal Employment Agency,¹⁷ for Italy from the Social Security Administration,¹⁸ and for the US from the Department of Labor.¹⁹ 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.²⁰

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).

16. [Dares \[2020\]](#) and [Dares \[2021b\]](#).

17. [Bundesagentur für Arbeit Statistik \[2021a\]](#).

18. [INPS Coordinamento Generale Statistico Attuariale \[2021\]](#).

19. [Employment and Training Administration \[2021\]](#).

20. Two- and three-digit ISO country codes are sourced from [Dun & Bradstreet \[2021a\]](#) and [Dun & Bradstreet \[2021b\]](#) respectively.

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,²¹ for Germany from the German Federal Employment Agency,²² for Italy from the Social Security Administration,²³ for the UK from the Office for National Statistics,²⁴ and for the US from the Department of Labor.²⁵ For the period from January to June 2021, monthly data on unemployment insurance are sourced from the OECD Social Benefit Recipients Database.²⁶ 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.²⁷

21. Dares [2021a].

22. Bundesagentur für Arbeit Statistik [2021b].

23. INPS Coordinamento Generale Statistico Attuariale [2021].

24. Nomis Official Labour Market Statistics [2021].

25. Employment and Training Administration [2021].

26. OECD [2021b].

27. OECD [2021a].

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). Quarterly 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).²⁸ 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.²⁹ 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.³⁰ 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.³¹

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.³² 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).³³ 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 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

28. Bureau of Labor Statistics [2000-2021]. Data for the US are at monthly frequency and have been aggregated at quarterly frequency, by taking the sum of monthly values over the quarter.

29. Eurostat [2001-2021a]. Surveys 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.

30. Eurostat [2001-2021b].

31. For 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.

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

33. Eurostat [2009-2021c].

rehired employees.³⁴ 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 [2021b], 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 [2021b].³⁵ 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 fulfill 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

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

35. Our replication is based on Hall and Kudlyak [2021a].

there are less unemployed workers and more job openings so labor market tightness is higher, making it more difficult for firms to hire workers.

In this paper, we provide a measure directly related to tightness. We define $q(\theta)$ as the ratio of hires to vacancies.³⁶ 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 [Dong et al., 2020]. 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.

36. Data 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.

1.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 1.D.1 and 1.D.2 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 1.D.1 displays the three series for a selected set of European countries.³⁷ 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.

37. The 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.

Findings for the US. Online Appendix Figure 1.D.2 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 1.D.2 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 1.D.2 plots the series of hires without recalls. In 2020, the dynamics is drastically different. It resembles much more the one in European countries, where 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 [2021b] 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.

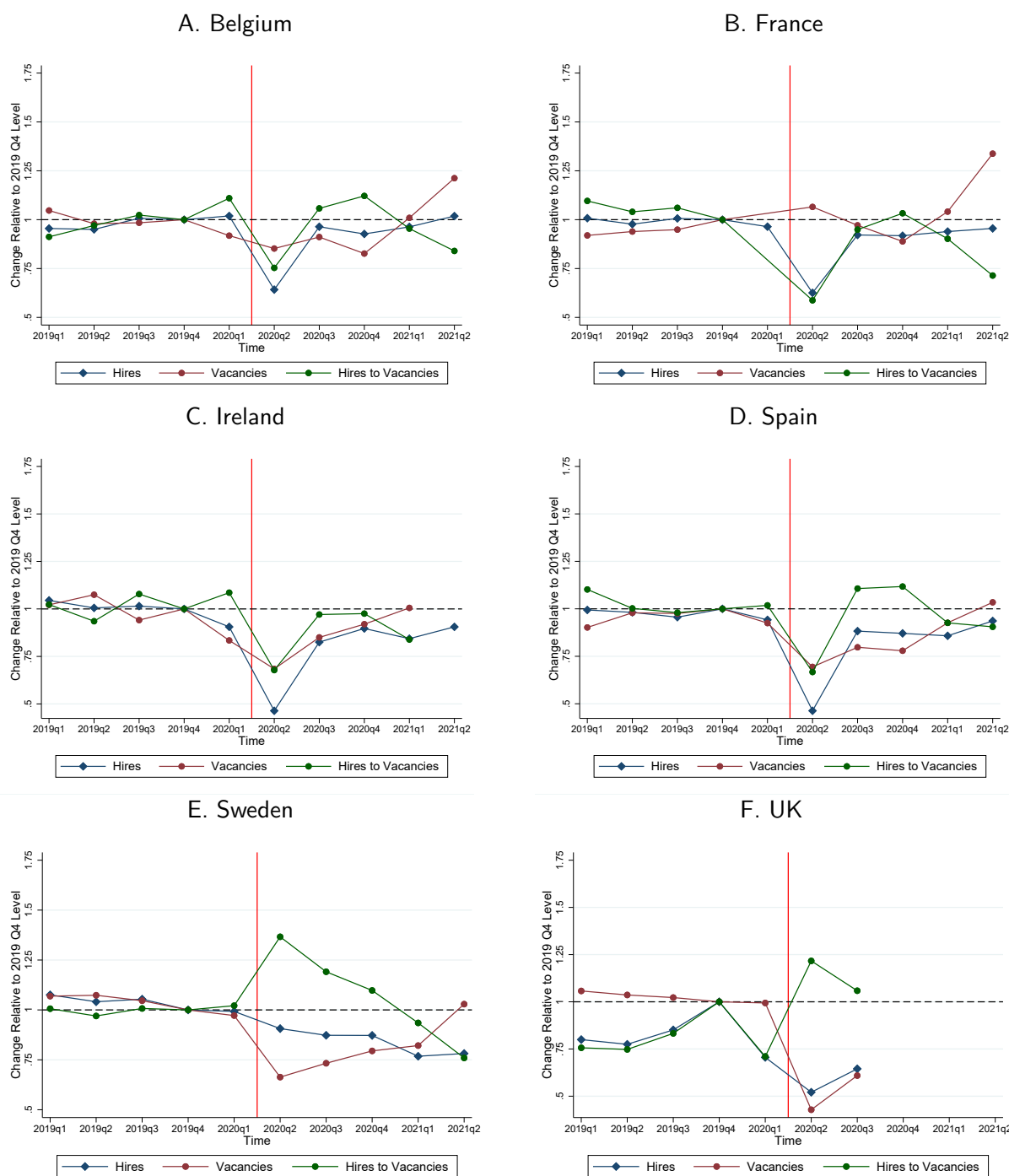
Online Appendix Figure 1.D.3 shows the evolution of $q(\theta)$ for the US from 2001 onwards. The blue line corresponds to the times series of $q(\theta)$ using raw JOLTS data.³⁸ The red line is obtained using our adjusted series of hires, i.e. hires without recalls.³⁹ Both series evolve hand in hand 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 [2021b].

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

39. See Online Appendix C.6 for more details.

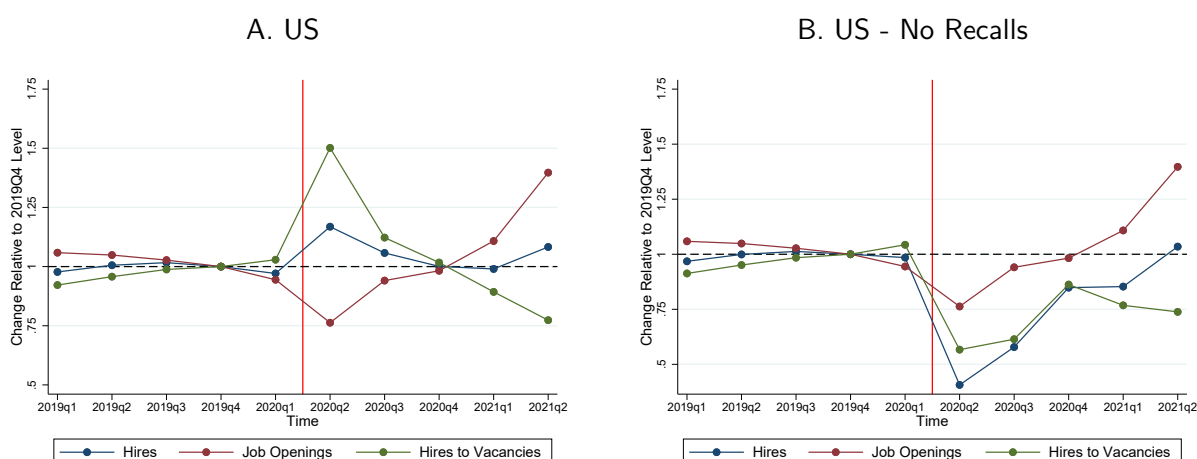
Cross-Country Comparison. Online Appendix Figure 1.D.4 stacks all the time series of $q(\theta)$ together. For the US, we plot the raw series (solid line) and the adjusted series (dashed line). The contrast in the evolution of the state of the labor market on both sides of the Atlantic is striking. In 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.

FIGURE 1.D.1: CHANGE IN HIRES, VACANCIES, AND $q(\theta)$ RELATIVE TO 2019Q4

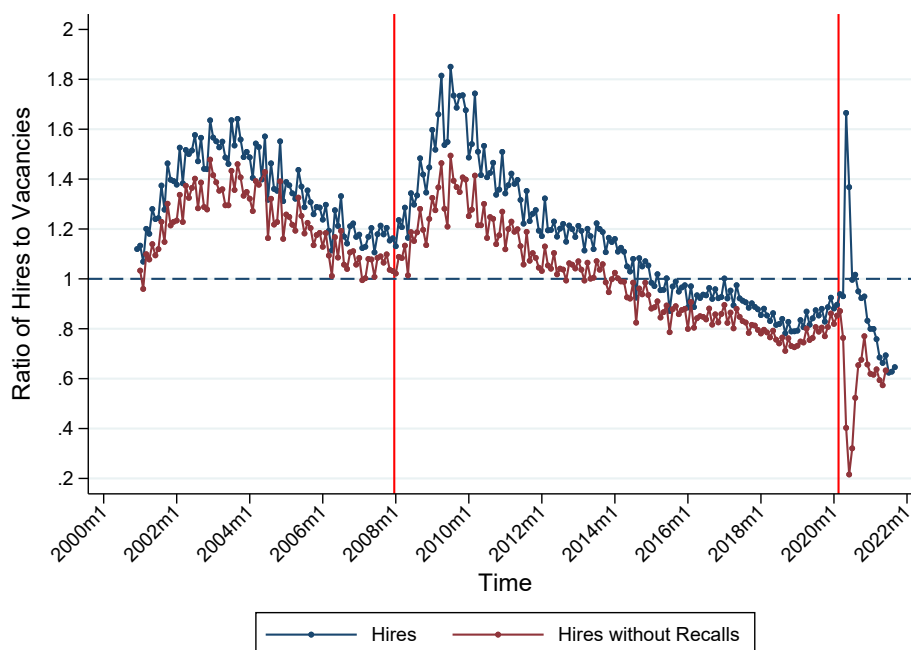


Notes : Data for European countries come from the Job Vacancy Statistics and Labor Force Survey, and for the US from the Job Openings and Labor Turnover Survey. $q(\theta)$ corresponds to the ratio of hires to vacancies. For European countries, hires are proxied by recent job starters – i.e. individuals 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.

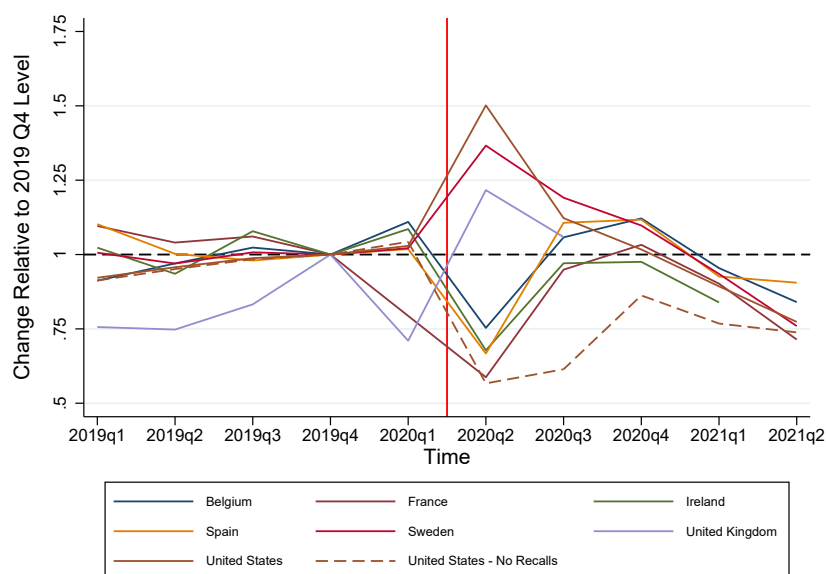
FIGURE 1.D.2: CHANGE IN HIRES, VACANCIES, AND $q(\theta)$ RELATIVE TO 2019Q4



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.

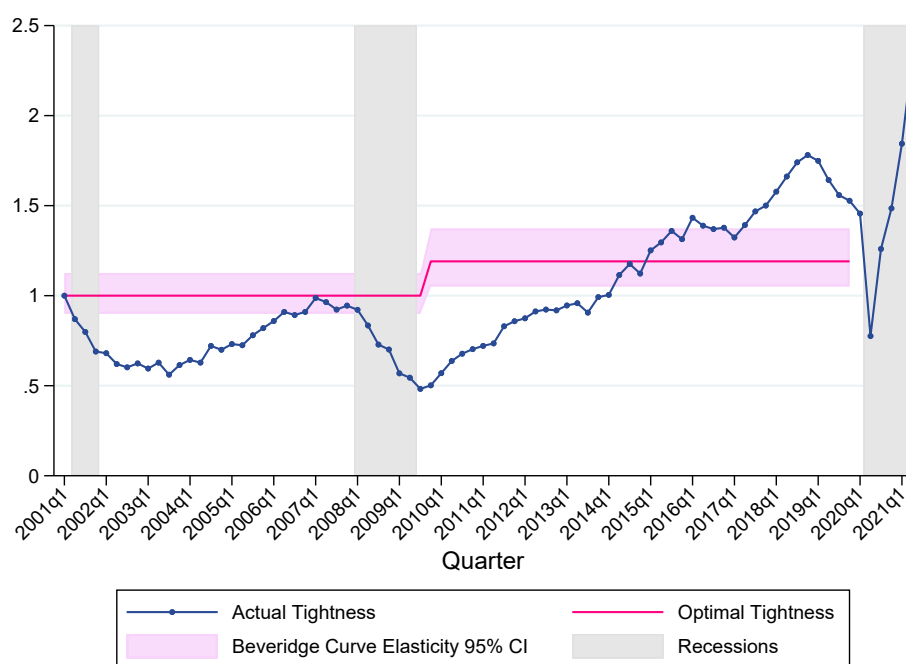
FIGURE 1.D.3: EVOLUTION OF $q(\theta)$ OVER TIME IN THE US

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 \[2021b\]](#). 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 1.D.4: 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 1.D.5: EVOLUTION OF TIGHTNESS OVER TIME IN THE US & OPTIMAL TIGHTNESS ESTIMATES FROM MICHAILLAT AND SAEZ [2021A].



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 1.D.3. Estimates of optimal tightness come from Figure 6 in Michailat and Saez [2021a]. Our replication is based on Michailat and Saez [2021b].

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 [1.D.6](#) plots the correlation between changes in $q(\theta)$ and in short-time work take-up (Panel A) or unemployment insurance take-up (Panel B).⁴⁰ 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 $\hat{\tilde{\xi}}_{t,i} = \tilde{y}_{t,i} - \hat{\tilde{y}}_{t,i}$. These residuals correspond to the dots in Online Appendix Figure [1.D.6](#).

The red line corresponds to the linear fit of a regression of $q(\theta)$ on short-time work take-up

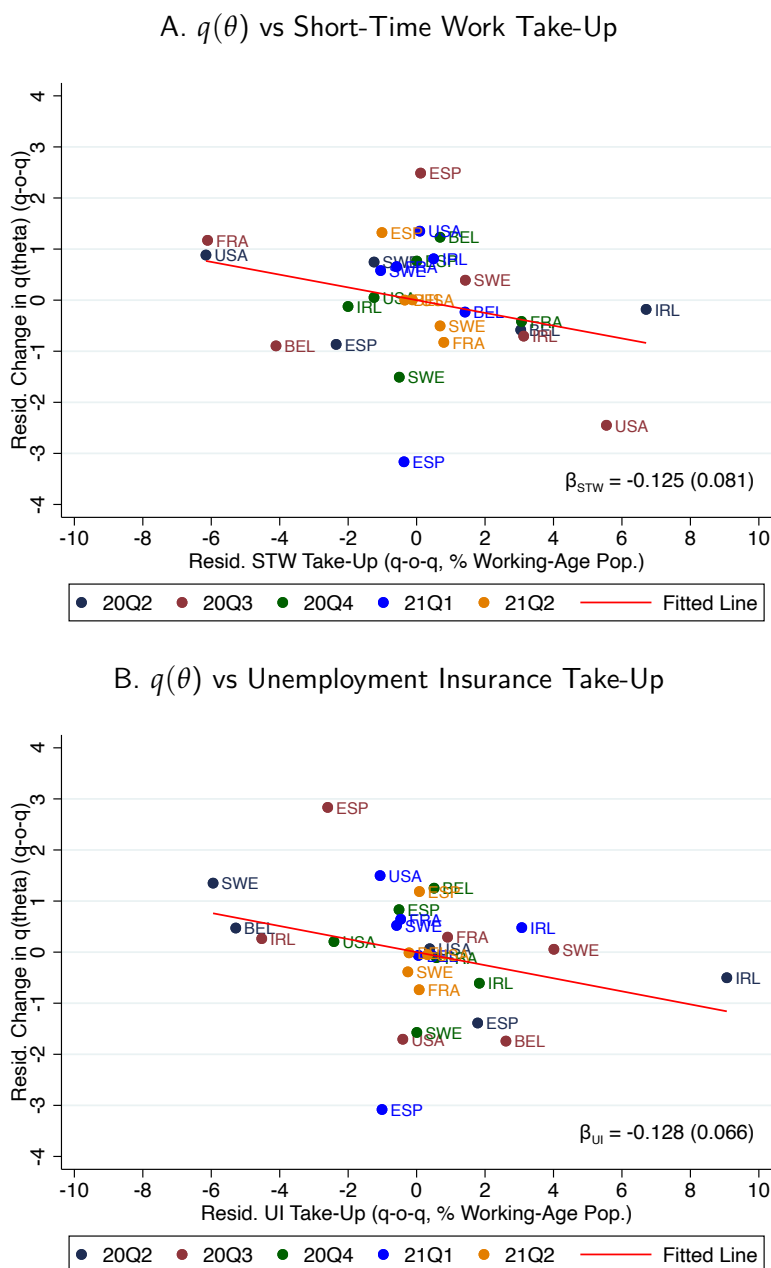
40. For more information on the definition of short-time work and unemployment insurance take-up data see Online Appendix [C.1](#) and [C.2](#).

and the set of controls. That is :

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

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 between 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 1.D.6: CROSS-COUNTRY SCATTER PLOTS OF $q(\theta)$ AND SHORT-TIME WORK/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 : $\tilde{x}_t = x_t - x_{t-1}$. 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.

Chapitre 2

Firm Moral Hazard in Short-Time Work

Abstract

Short-time work (STW) programs held a central stage in the policy response to the pandemic in Europe, subsidizing temporary reductions in hours worked. STW main objectives are to stabilize employment and provide insurance to workers (and firms). But, as any social insurance program, it may trigger moral hazard responses, the nature and extent of which has been largely under explored in the literature. This paper intends to quantify behavioral responses to STW in the context of France during the pandemic. Using exhaustive establishment-level and worker-level data on STW take-up and quasi-experimental variation in employer contributions to the program, I study two types of behavioral responses : (i) misreporting and (ii) changes in real economic behavior. I document bunching around a discontinuity in employer's STW costs along the wage distribution which is revealing of a pure reporting response. Using variation in employer contributions across industries, I quantify a misreporting response as well as real labor demand adjustments.

Keywords : Short-Time Work, Policy Design, Firm Behavior

JEL-codes : H20, H32, H53, J23 ¹

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Introduction

In response to the economic shock triggered by COVID-19, governments across the world extended and newly implemented support programs for firms and individuals. In Europe, to mitigate the labor market consequences of the pandemic, the focus was on preserving employment relationships through short-time work (STW) programs. STW programs — also known as short-time compensation, or work-sharing programs — subsidize temporary reductions in hours worked. When faced with a negative shock, a firm can temporarily reduce the number of hours worked by its employees. The employer pays for the hours worked and STW compensates the worker for the hours not worked. In this way, the employment relationship is preserved. STW allows for adjustments on the intensive – the hours — margin rather than on the extensive – the employment — margin.

One main concern is that by changing economic incentives for agents, these programs will generate behavioral responses. More precisely, in the context of policy expansions with room for reporting, two types of behavioral responses can arise : (i) fraud due to misreporting and (ii) changes in real economic behavior, both leading to an excessive use of the programs. These behavioral responses will in turn weigh on the cost of providing insurance which matters for optimal design.

While these programs were not new in Europe, the extent to which they have been used in the pandemic is unprecedented. In countries with pre-existing STW schemes, these programs were massively extended. In France, which will be the context of the paper, while the program never covered more than 3 percent of the working age population during the Great Recession, it skyrocketed to more than 20 percent of the working age population in April 2020 (see Figure 2.4.1). In countries with no such programs, they were implemented in an emergency. In the United Kingdom, the program reached magnitudes similar to those in France in April 2020 despite having been created just at the end of March 2020 (see Figure 2.4.1). STW take-up remained at high levels throughout 2020 and 2021.²

2. Besides Europe, many other countries have short-time work schemes. Across the Asia-Pacific region, 26 of 37 economies implemented or adjusted an existing employment protection scheme in response to the pandemic (Huynh [2021]). In Latin America, Argentina, Brazil, Chile, Colombia, Mexico, Peru relied on wage subsidies and loans to support employment retention (Komatsuzaki et al. [2020]). In the United States, 26

While empirical evidence from the Great Recession suggests that STW is effective at preserving jobs, we still know very little about how the design of the program affects employer behavior. One concern is that, by providing insurance against the cost of having to reduce working hours, STW will distort employer behavior. Employers may have an incentive to rely excessively on subsidized hours reductions as they do not fully internalize the cost of the program — a problem called moral hazard. This is likely to be particularly relevant in the context of the pandemic, where STW programs exhibited limited experience rating. An obvious tool to mitigate moral hazard is to increase employer contribution to STW. It is therefore crucial to understand how STW utilization responds to the cost of the program.

This paper provides a comprehensive assessment of the effects of employer's STW costs on misreporting and STW utilization. It also characterizes heterogeneity in the nature and size of responses across firms. Given that STW is likely to remain part of the policy toolkit in many countries, and that it spurred interest in countries with no such program, shedding light on these questions is key for optimal policy design.

From an empirical perspective, assessments of firm behavioral responses to the design of STW are scarce. There are three main reasons for this : (1) a lack of credible sources of variation in the design of the program to causally identify these responses, (2) a lack of granular micro-data on STW claims and missing link to other administrative records to estimate them, and (3) a lack of a conceptual framework to quantify the extent of moral hazard. This paper addresses these challenges.

First, the French setting offers a set of credible quasi-exogenous variation in the cost of the program. This paper leverages discontinuities in employer contributions to STW across workers — depending on their gross hourly wage —, over time — as some proportional employer contribution is phased in —, and across industries — as the timing of the phase-in differs by industry code. This allows to causally identify how firms respond to changes in economic incentives.

Second, the paper relies on extraordinarily granular and in-time data on STW. In France, all

states have operating short-time compensation programs.

claiming procedures were centralized through an online platform. French administrative data on STW claims and compensations is exhaustive. There is information on the entire application process — from initial claims to actual compensations. The level of granularity is another key feature of the data, with information being available both at the worker and at the employer level.³ Additionally, information is available at weekly frequency. This is key to pin down the effect of one of the policy changes exploited in the paper and isolate it from other events occurring within a month. Information is timely and covers the entire pandemic up to June 2022. Lastly, information on STW take-up can be matched with exhaustive employer-employee data as well as any establishment-level data.

Finally, by bridging the labor literature of firm labor demand with the public economics literature on optimal design of social insurance, this paper develops a conceptual framework delivering a simple formula of the fiscal externality, in the spirit of [Baily \[1978\]](#) and [Chetty \[2006\]](#) and inspired by [Giupponi and Landais \[2022\]](#). The peculiarity of short-time work, compared to unemployment insurance, is that here the agent is the firm, hence the focus on firm behavioral responses. For the firm problem, the model illustrates the effect of STW on labor demand both on the intensive margin — trade-off between hours worked and hours of STW — and on the extensive margin — decision to maintain the worker into her job and use STW or separate from the worker. An augmented version of the model incorporates a reporting margin, where firms are responsible to report key information upon claiming short-time work. This fits the recent context, where in order to insure expediency, governments allowed for reporting by employers upon claiming.

This paper shows that STW is prone to behavioral responses of two sorts (i) misreporting — use of the opportunity to misreport of information relevant for the level of government contribution and the cost to employer — and (ii) real economic responses — changes in usage of the program or labor demand.⁴ The empirical exercises rely on two sources of quasi-

3. This is a new feature of the French data as for the Great Recession it was aggregated at the establishment-level.

4. To ensure expediency, the French government gave employers the task to report information upon claiming STW. The premise was that *ex-post* this information could be and would be cross-checked by the public administration and fraud would be sanctioned.

experimental variation in employer contributions to STW. Thanks to the richness of the data, each source of variation can be used to identify both types of responses.

I first rely on a kink in the employer's cost schedule along the wage distribution in 2020. Worker's hourly STW compensation corresponds 70% of her gross hourly wage. The government contributes up to a fixed nominal cap. Above the cap, the remainder of the cost is borne directly by the employer. In practice, STW compensation — and the ensuing government contribution — is based on the reported wage of the worker by her employer.

Theoretically, one could expect three types of responses to the existence of this kink in employer contributions : (i) reduced take-up above the kink — due to higher relative marginal cost of STW relative to work, (ii) an adjustment of hourly wages to incentives — through re-bargaining, and (iii) an evasion response — leveraging the opportunity to misreport the worker's gross hourly wage.

I start by plotting the density of workers on STW in 2020 based on their reported earnings and find a large mass of workers with reported hourly earnings exactly at the kink. I benchmark this density against the density of workers on STW based on actual earnings in administrative records. Interestingly, the bunching response is entirely absent in the administrative data, revealing substantial reporting responses. Employers misreport their workers' gross hourly wage, bunching at the wage level where the government contribution is maximal and their contributions minimal.

I leverage a unique feature of the data : for each worker, I observe both reported information and true information in administrative records. I locate workers reported at the kink along the true administrative wage distribution. I find that bunching is not local. Workers reported at the kink come from over a large segment above the kink, suggesting that the perceived cost of evasion is not sensitive to the size of evasion.

The second set of empirical exercises exploits a policy change which increased employer contributions to the scheme in some industries but not others. In June 2020, the government issued a categorization of industries into protected industries — *secteurs protégés* — and non-

protected industries — *secteurs non-protégés* — defined at the 5-digit industry level.⁵ From June 2020, employers in non-protected industries contribute proportionally to STW for 10% of the worker hourly wage, while employers in protected industries still face no proportional contribution to the scheme. I leverage the phasing in of employer contributions to estimate two types of responses : (i) reporting responses and (ii) real economic responses.

Upon claiming STW, employers self-report the regime they belong to — protected or non-protected — which then determines their contribution to the scheme. Comparing assignment to treatment — based on establishment industry code — to actual treatment — based on reported regime, I document that employers in non-protected industries claim disproportionately more under a more generous program than they are eligible to. They misreport 3.5 times more their hours than employers in protected industries, translating into an excess spending by the government of €60 million over just five months.⁶

I then focus on real economic responses. I use an event study approach to estimate the take-up response to an increase in the cost of the program for the employer. Using a matching strategy, I compare establishments in non-protected industries (treated) to establishments in protected industries (control) in their usage of the program - at the firm, worker, and hours level - and in their employment levels. I find that establishments assigned to non-protected industries decrease relatively more their demand for the program in terms of workers and hours of STW, while they do not adjust differentially their employment levels. I complement this analysis with an instrumental variable approach where I instrument actual treatment by assignment to treatment. I estimate a decrease in the demand for the program by 22% (resp. 30%) in terms of workers (resp. hours) on STW following an increase in employer contributions from 0 to 10% of worker gross hourly wage.

While there is a growing literature on the employment effects of STW, existing work is silent with respect to the extent and nature of the moral hazard it may trigger. We know that STW is effective at saving jobs and that its effects are heterogeneous across firms ([Giupponi](#)

5. Protected industries are industries most affected by the pandemic — directly or through their trade partners.

6. This is estimated for the period of June to October 2020, a snapshot of total excess spending.

and Landais [2022], Tilly and Niedermayer [2016], Cahuc et al. [2021], Meyer et al. [2017]). However, we know very little on how the design of the program affects employers behavior and hence how to calibrate it optimally (Giupponi et al. [2022]). This paper is the first to document extensively behavioral responses to STW design. Papers studying the Great Recession relied on quasi-exogenous variation in eligibility (Giupponi and Landais [2022]) or in the speed of provision of the program (Cahuc et al. [2021] and Siegenthaler and Kopp [2021]) to identify the effects of benefitting from the program on employment and on firm-level outcomes. Here the approach is different, since the goal is to study how variation in the cost of the program affects firm usage and more generally labor demand.

The existing evidence on STW comes almost exclusively from the Great Recession.⁷ This paper studies STW over a different period, with higher take-up, and following an ad-hoc extension. Papers early into the pandemic have relied on calibrated models (Albertini et al. [2022], Birinci et al. [2020]), cross-country comparisons (Giupponi et al. [2022], Lafuente and Ruland [2022]) or survey data (Bennedsen et al. [2020]) to contribute in real-time to the policy debate. This paper is the first to cover the pandemic relying on exhaustive administrative data at the worker and establishment level.

STW schemes also sparked curiosity in the United States. Several US states have operating short-time compensation programs. Yet, STW take-up remained low in the United States despite strong financial incentives by the Federal government. There is a small literature on STW programs in the United States (Rodriguez et al. [2022]). Given the limited take-up of these programs, it is difficult to determine how they would fare once deployed on a broader scale. In that sense, this paper provides important insights into how these programs fare when deployed at a large scale. An alternative employment preservation scheme called the Paycheck Protection Program (PPP) was widely deployed and highly operative during the Pandemic. Employers could apply for a loan under the PPP which would then be forgiven upon keeping their workers on payroll. This financial intermediation affected access to the program (Chetty

7. There is an even earlier literature that leverage time-series and cross-country evidence to document the correlation between employment and STW usage (e.g. Van Audenrode [1994], Abraham and Houseman [2009], Boeri and Bruecker [2011], Hijzen and Venn [2011], Cahuc and Carcillo [2011]).

et al. [2020], Autor et al. [2020], Granja et al. [2020], Griffin et al. [2022]). There is a strong interest in understanding how STW programs performed — in terms of targeting, access, effects, and distortions — compared to the PPP.

Lastly, this paper contributes to the literature on reporting and evasion. Employers are responsible for reporting a lot of information upon claiming STW. Reported information affects the level of government contribution as well as worker STW compensation. I provide an exhaustive assessment of the distortions that stem from the reporting margin by exploiting a unique setting to disentangle real from reporting responses. A key advantage of my setting is that I observe both reported and actual information and can directly compare the two. This is a unique advantage compared to the literature using bunching at kinks to detect behavioral responses, which relies on functional form assumptions to define the counterfactual response absent the reporting opportunity (Saez [2010], Chetty et al. [2011]). Moreover, I delve deeper into firm reporting behavior using worker level information. For each worker, I can compare reported earnings upon claiming STW with true earnings in employment data. This allows me to inform some key parameters of the cost of evasion in this context.

The remainder of the paper proceeds as follows. Section 1 offers a description of the institutional background and of the data. Section 2 covers the discontinuity in employer contribution depending on worker's gross hourly wage. Section 3 studies employer behavioral responses to a change in cost of the program across industries. Section 4 concludes.

2.1 Institutional Background and Data

2.1.1 The French *Activité Partielle*

Short-time work has been a longstanding program in France, albeit with historically low take-up. While there was a renewed interest for the program during and after the Great Recession, its coverage never exceeded 3% of the working age population.⁸ The pandemic

8. See Panel B of Figure 2.4.1 for a long run perspective on STW take-up in France.

brought the program to a new level. Figure 2.4.2 illustrates the monthly number of workers on STW throughout the pandemic. Although in January and February 2020 very few people were covered by the program, the utilization of STW soared to encompass almost 6 million workers by March 2020. This trend persisted robustly during the initial lockdown, and then stabilizing at 1 to 2 million workers until Spring 2021. This increased reliance on STW was the result of a deliberate policy decision to position STW as the main instrument to alleviate the labor market consequences of the pandemic. This entailed significant modifications to the program, including increased compensation for workers, reduced costs for employers, expanded eligibility and coverage, and simplified access procedures.

Worker Compensation The program was made more generous to workers. Worker hourly compensation went from 60% to 70% of her gross hourly wage. Figure 2.4.3 describes the relationship between a worker gross hourly wage and her hourly STW compensation in 2020. Worker hourly STW compensation corresponds to 70% of her gross hourly wage (roughly 84% of her net hourly wage), with a floor at the minimum wage and no cap. Alterations to the worker hourly compensation schedule occurred later in 2021, although they are excluded from current considerations.⁹

In comparison to its European counterparts, the statutory replacement rate closely aligns with the average replacement rate. However, there exist substantial disparities among countries regarding the minimum and maximum limits placed on worker compensation. In France, workers at the minimum wage encounter no loss in income.¹⁰ As a result, the effective replacement rate for low-income workers surpasses that of other European nations. Conversely, at the other end of the income distribution, France ranks among the nations with the most generous upper cap relative to median income. This upper limit, set at 4.5 times the minimum wage, corresponds to 262% of the median income, compared to 200% in Sweden and 100% in Spain.

9. In 2021, a cap was introduced in worker hourly compensation at 4.5 minimum wage (MW). Beyond that cap, a worker is compensated at 70% of 4.5 MW regardless of her hourly wage, translating into a decreasing replacement rate. Additionally, starting from September 2021, worker hourly compensation was further reduced to 60% of her gross hourly wage.

10. Workers at the minimum wage get a replacement rate of 100% — the floor. There is then a range of hourly wage between the floor and when the floor corresponds to 70% of the worker's gross hourly wage, where worker's replacement rate is above 70%.

Employer Contribution The program was also made less costly to employers. While pre-pandemic the employer bore most of the cost of the program, at the onset of the pandemic, there is little to no employer contribution. The government played a critical role in insurance provision.

Figure 2.4.4 illustrates the decomposition of costs between the government and the employer. In the early stages of the pandemic, the government's contribution to STW was uniform across industries. Panel A Figure 2.4.4 illustrates the schedule in use at the core of the pandemic, up to June 2020 in all industries, and going forward in some industries until 2021.

The worker receives 70% of her gross hourly income as STW compensation (as indicated by the purple line). The government, represented by the blue line, covers the entirety of the STW compensation up to a specified cap, set at 4.5 times the minimum wage (MW). Beyond this cap, the employer (depicted in orange) steps in to supplement the government's contribution, ensuring that the worker's replacement rate remains at 70%.

In June 2020, the government defined a list of industries most adversely impacted by the pandemic — called *protected* industries. These corresponded to industries directly affected by the pandemic (S1) and those affected indirectly through trade partners (S1 bis). Table 2.D.1 provides descriptive evidence on establishments with *protected* and *non-protected* industry codes.

Throughout 2020, establishments in *protected* industries adhered to the aforementioned framework. However, from June 2020 onward, establishments in *non-protected* industries followed a less generous schedule.¹¹ This revised schedule is illustrated in Panel B of Figure 2.4.4. Below the cap, employers are now subject to a proportional contribution of 10% of the worker's gross hourly wage, with the government covering the remaining 60%. Similar to the previous setup, above the cap, the employer assumes full responsibility for all additional STW costs.

Interestingly, the cost of the program remains unaltered by an employer's level of utilization. In opposition to experience rating, which factors in past program usage to establish present contributions, all employers participating in this program follow a consistent contribution

11. There is a third, smaller, category which corresponds to establishments subject to administrative closure. They are excluded from the main analysis.

schedule, irrespective of their prior involvement with the program.

Eligibility and coverage With the pandemic, STW coverage was substantially expanded, encompassing a wider range of workers and employers. Coverage was extended to the universe of workers — with no restriction on tenure, on the type of contract, or on hours arrangement — and STW take-up was not tied to an employment preservation clause.¹² On the employer front, STW accessibility was extended to all employers — including individual employers. The maximum coverage duration was successively extended from 6 to 12 months and eventually to 24 months, effectively covering the entire duration of the pandemic.¹³

The application procedure underwent substantial streamlining. Whereas, before the pandemic, employers had to provide justifications for using STW, the pandemic prompted a simplified approach wherein employers could invoke the pandemic as a *force majeure*, without the need for detailed justification.

To ensure expediency, the absence of a response from public administration within 2 days was deemed as tacit agreement, a significant reduction from the previous 15-day period. This was later adjusted back to 15 days in October 2020. Additionally, employers were granted the ability to make retroactive claims within 30 days. The elimination of all eligibility constraints, combined with a simplified claiming process, alleviated uncertainty for employers regarding their ability to benefit from the program.

One notable aspect of the French Short-Time Work (STW) program is its emphasis on individualization. Employers have discretion in selecting which employees to place on STW and to what extent. There are no limitations on the number of hours or of workers on STW. This is the most flexible form of design. In contrast, the UK initially imposed a restriction on hours reduction at 100%, requiring workers to be either fully on STW or entirely active.

Claiming Short-Time Work A distinctive feature of Short-Time Work (STW) in comparison to Unemployment Insurance (UI) is that it is initiated by the employer. The employer

12. Later into the pandemic, a supplementary program emerged called long term short-time work — *activité partielle de longue durée*. It targeted establishments affected more permanently by the pandemic and comprised an employment preservation clause.

13. For a cross-country comparison of the evolution of STW schemes in Europe see Corti et al. [2023].

is responsible for applying for and claiming STW benefits. The claiming process encompasses several steps. These steps are illustrated in Figure 2.B.1.

First, the employer establishes profiles for both the establishment and each employee covered by the program. Subsequently, the employer submits a preliminary authorization request outlining the intended coverage, including the date, the number of employees, and the hours of STW.

Upon receiving notification from the public administration and obtaining approval, the employer can proceed to claim STW benefits for each covered month. The employer records the weekly hours worked by each employee, which determines the count of hours of STW and the corresponding government assistance amount. Following this, the employer compensates their workers for the hours of STW, combining both the government transfer and the employer's own contribution.

All these processes are centralized through an online platform, with most stages of the procedure being accessible for research purposes.

The claiming process heavily relies on the employer's reporting. Employers manually input various details about their employees, including their gross hourly wage, which plays a pivotal role in determining both worker compensation and employer contribution. With the introduction of distinct employer contribution levels across industries, employers are accountable for accurately reporting their eligibility for different generosity regimes. This declaration establishes the extent of the employer's proportional contribution to the scheme.

2.1.2 Data

Short-Time Work Data

I use the entire universe of administrative records of STW claims and compensation. Data covers the entire claiming process from initial application, to government decision, to STW claims and subsequent compensations. Information is available both at the establishment and at the worker level.

Employer-level data I have access to two sets of data for every establishments : (i) its profile on the platform and (ii) the complete history of claims submitted. Each establishment is uniquely identified by its establishment identifier (SIRET), which allows to match this information with any establishment-level administrative data. Establishment profiles contain some establishment characteristics such as its location, industry code, and number of employees.

I also have information on applications, claims, and government contributions to STW. Every procedure initiated through the portal is recorded. Each application or claim may undergo multiple iterations, with the final one corresponding to the approval of compensation. I restrict the sample to final iterations. Within the claims data, I have access to details encompassing the claim's context, including the government's contribution rate, as well as the scope of utilization, which includes the numbers of workers and hours of STW. The key information of interest is whether the claim falls under the *protected* or *non-protected* regime. I extract information on the government's proportional contribution rate to STW to discern under which regime the STW claim falls.

Worker-level data For each worker, there is monthly information on the number of hours of STW and the corresponding government transfer (in €). For most workers, information is also available at the weekly frequency.¹⁴ Some demographic information on workers is available such as their gender, date and place of birth, and occupation.¹⁵ These correspond to information reported by the employer upon setting up the worker profile. Interestingly, worker gross hourly wage is reported by the employer. This piece of information is crucial to determine worker compensation and employer contribution.

14. Weekly level information is available for workers for which working hours can be decomposed at the weekly frequency — e.g. standard employment contracts. See Appendix D.4 for a comparison of the weekly sample to the entire sample.

15. Occupation categories on the platform are distinct from the French occupation classification (PCS-ESE) and consist of 12 categories. While some, like managers, are quite conventional, the majority are highly specific, encompassing roles such as apprentices and freelance workers. These latter categories were utilized by the public administration to classify the specific working time arrangements applicable to the respective workers.

Other Administrative Sources

Employment data I use exhaustive employer-employee data for 2020. The data structure is such that for each worker information is available in year t (2020) but also $t-1$ (2019). Information on 2019 serves as a pre-pandemic baseline, while that of 2020 covers the pandemic period. There is information both on work and STW at the yearly frequency. For each worker, there is information on the total number of hours worked and of STW as well as on earnings from work and STW compensation received. The latter corresponds to the sum of government and employer contribution. It is pretty straightforward to match information on STW and employment at the establishment level using the establishment identifier. However, there is at the time of writing no common worker identifier to map workers across STW and employment data. To circumvent this, I rely on a matched sample. I use exact matching on the establishment identifier of the employer, on the worker gender and place of birth and Mahalanobis distance on worker's age and on the total number of hours of STW in 2020.¹⁶ I specifically do not match on reported hourly wage as it could subject to misreporting.

Establishment-level data I use information on the universe of existing establishments in 2019 and of 2020. This data takes stock of the universe of operating establishments as of Dec 31st of a given year. It contains information establishment characteristics — e.g. location, industry code, and total employment. The sample is restricted to establishments with a real economic activity in the tradable non-agricultural industry, construction, trade, and service sectors.

2.2 Discontinuity in Cost Across Workers

In this section, I exploit a kink in the employer's hourly contribution to STW based on the gross hourly wage of its worker. I estimate the impact of STW cost on employer STW decision. Importantly, the worker's gross hourly wage is reported by the employer when claiming STW.

16. In some empirical exercise I further restrict the sample to workers for which total hours of STW and age are within a range of one unit.

I develop a conceptual framework to illustrate how the kinked schedule affects labor demand — trading-off hours worked and hours of STW — in a framework with and without reporting.

Empirically, I have a unique setting where information on reported earnings upon claiming STW can be contrasted with true earnings from administrative records. First, I conduct a population-level diagnosis, in line with the standard evasion literature. Then, I leverage information at the worker-level to inform some key parameters of the evasion decision of firms.

2.2.1 Setting

Policy design Figure 2.4.4 illustrates the schedule of employer and government hourly contribution to STW in 2020. For each level of gross hourly wage (x -axis), it shows a decomposition of the worker's hourly STW compensation (in €) — marked by the purple line — into government (in blue) and employer (in orange) contribution (y -axis). Panel A of Figure 2.4.4 corresponds to the schedule prevalent at the core of the pandemic, from March to June 2020, for all establishments and onwards for establishments in *protected* industries. Panel B of Figure 2.4.4 illustrates the schedule faced by establishments in *non-protected* industries from June 2020.¹⁷

In both configurations, for each hour of STW, a worker gets compensated by 70% of her gross hourly wage, subject to a floor but no cap. There is a discontinuity in employer's contribution to the program at 4.5 times the minimum wage, as marked by the red vertical line. Below this cap, both the employer and the government contribute proportionally to the STW compensation. In Panel A of Figure 2.4.4, the employer's proportional contribution is null, while in Panel B, it amounts to 10% of the worker's gross hourly wage. At the cap, government contribution reaches a maximum, as denoted by the red dashed vertical line. Above the cap, government contribution remains constant and the employer bears all additional cost of STW to meet worker's 70% replacement rate. In Panel A of Figure 2.4.4, this corresponds to the entire orange shaded region while in Panel B this corresponds to the orange shaded area between the purple line (worker's replacement rate) and the white dashed line (isolating employer

17. For more details on the categorization of protected and non-protected industries, see Section 3.1.

proportional contribution up to the cap). In both scenarios, at the cap, there is a kink in the employer's hourly contribution to STW. This change in slope in the cost of the program based on the worker gross hourly wage is used to assess the effect of changes in economic incentives on employer decision.

Data and sample I leverage two sources of information : (i) exhaustive administrative data from the STW platform (ii) exhaustive employer-employee data. In the STW data, for each worker, I have the reported gross hourly wage by the employer upon claiming STW. From the employment data, I can retrieve worker's a measure of gross hourly wage in 2019, 2020 and hourly STW compensation in 2020.¹⁸

2.2.2 Conceptual Framework

I introduce a simple framework to derive predictions of how this kink in employer contribution to STW affects its labor demand on the intensive margin. I abstract from the separation margin. To conceptually illustrate the effect of the kink on employer decision, I use a two-stage reasoning.

First, I consider how these changes in economic incentives affect real economic decisions in a setting with no reporting. Using a simple framework with two workers, one above and one below the kink, I illustrate how the kink changes economic incentives. I show that the kink reduces the relative marginal cost of an hour of work relative to an hour of STW for workers above the kink compared to workers below the kink. This should tilt the labor demand (l) towards workers above the kink and increase the demand for STW ($L-l$) for workers below the kink. This is the first potential margin of adjustment – a labor demand response. An alternative response is to adjust wages in response to economic incentives. Employers and workers may engage in renegotiations over the worker's hourly wage (ω), thereby modifying the location of workers with respect to the kink.

Then, I incorporate a reporting margin — as per the French design — and illustrate the trade-off in the decision to report worker's gross hourly wage truthfully.

18. For more details on the derivation of these measures, see Appendix C.1

A Model With No Reporting

Conceptual model I start from a standard model of firm labor demand — a cost minimization program under a production constraint. I consider a setting with two workers, one with hourly earnings above the cap and the other with hourly earnings below the cap. Workers are assumed complementary in the production function. I start from a pre-pandemic equilibrium and introduce a shock to the demand the firm faces. I consider successively how the firm adjusts its labor demand to the shock — trading off hours worked and hours of STW — (i) under a linear STW schedule — where employer contribution is proportional to worker's hourly wage — and (ii) under a kinked STW schedule — where employer contribution is a non-linear function of worker's hourly wage. For now, I ignore the reporting margin to focus solely on real economic responses.

The core of the text presents the intuitions behind the predictions, using as supporting material a graphical illustration. Formal derivations are available in Appendix C.2.

Let us consider two types of workers : a low type — indexed by L — with gross hourly wage ω_L below the cap $\bar{\omega}$ and a high type — indexed by H — with gross hourly wage ω_H above the cap. For each hour of STW, the worker receives a compensation of $\tau * \omega$ with τ the replacement rate — i.e. the fraction of earnings loss covered by STW. Under the linear schedule, the employer contributes proportionally — by a fraction ρ — to STW compensation. The employer pays $\rho * \tau * \omega$ per hour of STW. Under the kinked schedule, the employer contributes proportionally and additionally tops up above the cap : $\rho * \tau * \min(\omega, \bar{\omega}) + \tau * \max(\omega - \bar{\omega}, 0)$.

Theoretical illustration Figure 2.C.1 provides a visual illustration of how a linear or kinked STW schedule affect the employer STW take-up decision. The x-axis corresponds to the labor demand for the low type (l_L) and the y-axis to the labor demand for the high type (l_H). The convex curves corresponds to isoquants, combinations of labor demand that yield similar levels of production. The highest isoquant (north east quadrant) corresponds to labor bundles that allow to produce the pre-pandemic output (\bar{y}). The lower isoquant allows to produce the pandemic output (\tilde{y}). The iso-cost curves are represented by the downward sloping lines.

They correspond to combinations of labor demand that add up to a similar cost for the employer. Their slope is equal to minus the ratio of marginal cost of an hour of work between the high and the low type.

The initial equilibrium (A) is the tangency point between the isoquant corresponding to the initial demand (\bar{y}) and the iso-cost curve with slope equal to the ratio of gross hourly wages ($-\omega_H/\omega_L$). The shock to the demand is characterized by a lower isoquant (\tilde{y}). The iso-cost curves under the linear STW schedule have a similar slope to before — as under the linear schedule, the marginal cost of each type of labor is affected proportionally and therefore the ratio simplifies. The iso-cost curves under the kinked STW schedule have a lower slope in absolute value ($-(1 - \rho * \tau) * \omega_H/\omega_L$) as illustrated by the dashed line. This is due to a decrease in the relative marginal cost of an hour work relative to STW for the high type. Moving from a linear to a kinked schedule shifts the equilibrium from B to C. There is a substitution of hours worked by the low type for hours worked by the high type.

In conclusion, compared to a linear schedule, the kinked should distort employer labor demand towards the high type. Indeed, it reduces the marginal cost of labor (relative to the cost of STW) for the high type — as the employer saves on STW contributions — but not that of the low type.¹⁹

A Model With Reporting of Hourly Wage

We now incorporate the reporting margin. Upon claiming STW, the employer manually reports its worker's hourly wage. Based on this reported information, the level of government contribution is calculated. This reporting margin allows for a wedge between the wage paid on hours worked (ω) and reported wage used for STW compensation ($\hat{\omega}$).

The employer can choose to misreport the worker's gross hourly wage and report a wage $\hat{\omega} \neq \omega$. Misreporting entails a cost, $C(\cdot)$, on whose structure I remain agnostic for now but will inform later on. From the employer perspective, there is a trade-off between reducing the

19. For simplicity, this toy model considers only interior solution (i.e. demand for the two types of workers), ignores the impact of total cost on separation or production margin.

tax liability — i.e. reducing its hourly contribution to STW — by reporting $\hat{\omega} < \omega$ — and the cost of evasion — encapsulated by the $C(\cdot)$ function.²⁰ The cost of evasion depends on the perceived probability of audit and perceived sanctions.

Let us consider for simplicity the framework in which there is no proportional contribution below the kink ($\rho = 0$). For workers below the kink, there is no gain for the employer from evasion — as employer contribution is null — but the cost of evasion is non-zero. Hence, from the employer perspective, there is no incentive to misreport their worker's gross hourly wage below the kink. For workers above the kink, there is an incentive to misreport as employer contribution is non-null. The first order condition for optimality of the reporting response tells us that the employer misreports as long as the marginal cost of evasion is lower than the marginal gain from evasion.

A standard assumption in the literature is to assume that the cost of evasion is increasing and convex in the size of evasion ($\hat{\omega} - \omega$). This assumption rationalizes local bunching - i.e. a region above the kink where the gains from evasion are greater than its cost. The empirical exercises at the worker level will be informative about this cost of evasion.

2.2.3 Population-Level Evidence

Method

I compare the density of reported wage to the density of observed wage among the population of short-time work takers in 2020. For the population of workers on STW in 2020 and continuously employed in 2019 and 2020, I put into perspective the distribution of reported gross hourly wage upon claiming ($\hat{\omega}$) to that of true gross hourly wage (ω) in employment data pre-pandemic (2019) and contemporaneously to the claim (2020).

I start the diagnosis plotting the density of workers on STW along the wage distribution based on their 2019 administrative earnings. This measure of earnings is immune to re-bargaining, as it is determined prior to any changes in incentives from the policy design. The density of

20. Note that misreporting the worker's hourly wage also affects the level of worker compensation. Indeed, the hourly STW compensation is now determined based on $\hat{\omega}$ and not ω .

gross hourly wage of STW takers as per 2019 earnings is informative of whether there is a differential take-up decision above and below the kink.

Then, I compare the density of gross hourly wage of STW takers as observed in the employment data in 2020 to that of 2019 to assess whether there is an adjustment of wages to incentives. Indeed, it could be the case that workers are distributed smoothly along the kink based on their 2019 earnings but then when looking at the distribution of earnings of the same workers based on their 2020 earnings, there is a discontinuity in take-up decision around the kink due to contemporaneous adjustment of wages to incentives.

Finally, I assess whether the reporting margin induces additional distortions. I overlap the previous two distributions with the distribution of workers based on their hourly STW compensation.²¹ Any wedge between the two would stem from the ability of employers to report worker's gross hourly wage to determine STW compensation. This is extremely unique. In my setting, counterfactual information on worker hourly wage is directly available and not manipulable. This is the ideal experiment in the reporting literature to benchmark reported information. Indeed, the assessment of the magnitude of the reporting response relies on no assumption about the counterfactual distribution of hourly wage. I can exactly quantify the bunching response by comparing the number of workers compensated based on earnings at the kink to the actual number of workers with earnings at the kink.

Appendix Section C.5 conducts a similar diagnosis using reported information by employers upon claiming STW. This is informative about the reporting behavior of employers to the public administration. However, given that employers top-up, what matters eventually is the level of worker STW compensation and whether this complies with the 70% replacement rate.

21. In order to compare the three densities, I convert hourly STW compensation into the hourly wage which rationalizes this level of hourly STW compensation. That is, I define reported hourly wage as hourly STW compensation divided by the replacement rate (70%). An alternative, equivalent, method would be to retrieve a measure of *theoretical* hourly STW compensation based on gross hourly earnings — i.e. apply a 70% replacement rate to it — and compare it to *actual* hourly STW compensation.

Findings

Main findings Figure 2.4.5 overlaps the densities of workers on STW based on their gross hourly wage as per administrative data for 2019 (in gray) and for 2020 (in blue), and the density of workers on STW based on their hourly STW compensation (in red). The sample is restricted to short-time work takers in 2020. The cap in government contribution at 4.5 minimum wage is marked by the red dashed vertical line. While the density of workers on STW based on their gross hourly wage as per administrative employment data is smooth around the kink, there is a large mass of workers with reported earnings at the kink. Interestingly, this corresponds to a reporting response rather than a real behavioral response. Employers and workers do not adjust gross hourly earnings to be at the threshold (as illustrated by the distribution of workers based on their contemporaneous earnings distribution, in blue). Employers misreport their employees' gross hourly wage and bunch where government contribution is maximal and where they do not yet bear any additional cost of STW.

Real economic response The conceptual framework with no reporting suggests that a kinked schedule should, in theory, distort the relative demand for work in favor of workers above the kink. Figure 2.4.5 offers some insights into this. There is no discontinuity in the density of workers on STW along the observed earnings distribution — be it in 2019 (in gray) or in 2020 (in blue). This suggests little to no substitution across workers. Figure 2.C.3 provides a formal test of the change in slope in number of workers on STW around the kink. Panel A (resp. B) corresponds to the diagnosis based on 2019 (resp. 2020) earnings. There is no significant discontinuity in STW take-up around the kink based on 2019 or 2020 true earnings.

Reporting response From Figure 2.4.5, the reporting response is striking. There is a large mass of workers reported at the discontinuity in employer contribution. This corresponds to the wage which would imply maximal contribution from the government and no contribution from the employer. Compared to the counterfactual distributions, based on true administrative earnings, this suggests that the behavioral response stems entirely from a reporting margin.

2.2.4 Worker-Level Evidence

I leverage another unique feature of the data : worker-level information on reported wage and true hourly wage. For each worker on STW, I pin down her true gross hourly wage in the employment data and put it into perspective with the wage which rationalizes the level of STW compensation

I can precisely locate workers reported at the kink along their true wage distribution. This is informative about the local dimension of bunching. Then, I study heterogeneity in the bunching propensity. I consider whether workers within a same wage bin are homogeneously reported at the kink or not and identify heterogeneity in the probability to be reported at the kink within wage bins. I then decompose this heterogeneity between and within establishments. I have key ingredients to inform the perceived cost of evasion — $C()$.

Origin of Workers Reported at the Kink

Origin of workers reported at the kink Panel A of Figure 2.C.4 provides evidence on the location of workers reported at the kink in the true wage distribution. The x-axis corresponds to bins of 10€ of gross hourly wage as per the employment data, the origin of workers. The y-axis corresponds to the count of workers reported at the kink per wage bin of origin. The red vertical line marks the discontinuity in the cost of the program. While there are a few workers with earnings below the kink that are reported at the kink, most of them come above the kink. In absolute quantity, the bins with most workers reported at the kinks are between 50 and 65€.

The first take-away is that most workers compensated at the kink are to the right of the red vertical line, meaning that their true hourly wage lies above the kink and that employers should have topped-up worker compensation. The second take-away, and potentially the most striking one, is that bunching is not local and persists for high values of hourly earnings.

Heterogeneity Panel B of Figure 2.C.4 provides information on the reporting pattern across and within wage bins. The x-axis corresponds to bins of gross hourly wage. The y-axis cor-

responds to the share of workers on STW reported at the kink among all workers on STW in each wage bin. This corresponds to a rescaling of Panel A by the number of workers on STW in each bin. There are two take-aways from this graph : (i) the share of workers reported at the kink is not decreasing in the distance to the kink (ii) the bunching response is not uniform within wage bin. Taken together, these findings suggest that distance to the kink is not the only determinant of the probability to be reported at the kink.

Standard models of evasion rely on the assumption of an increasing and convex cost of evasion in the size of evasion (i.e. in the distance of the reported value to the true value). This generates a prediction of local bunching, via a segment where the cost of evasion is first dominated by the reduction in tax liability and then dominates the latter. Figure 2.C.4 does not support this assumption and rather suggests of a cost of evasion insensitive to the size of evasion. The second take-away is that there is residual heterogeneity in bunching probability, conditional on the distance to the kink.

2.2.5 Concluding Remarks

Conclusion There is no distortion in the decision of who to put on STW around the kink. The main response is a reporting response. There is a bunching mass in reported earnings at the kink, where government contribution is maximal and employer one-for-one contribution does not yet kick in.

The bunching response is not local and workers reported at the kink have true earnings above the kink. Put together, these findings suggest that (i) the (perceived) probability of audit does not increase exactly at the kink (ii) the cost of evasion is not convex in the distance to the true value (iii) there is heterogeneity in the reporting behavior of firms. Additional empirical evidence will follow on the characterization of this heterogeneity.

Way forward While the bunching response has no effect on government spending — holding the demand for the program constant — as government contribution is capped, it affects worker's hourly STW compensation through a lower effective replacement rate ($\tau \times \hat{\omega} <$

$\tau \times \omega$). The employer saves on the top-up he was subject to.

Further work is needed to understand what makes this acceptable from the worker perspective : absence of bargaining power ? firm financial constraint ? absence of outside option ?

An alternative scenario is that employers also misreport (inflate) the hours of STW by reporting less hours worked (\hat{l}). By leveraging this margin, this could yield a neutral scenario for the worker ($\tau \times \omega \times (L - l) = \tau \times \hat{\omega}(\downarrow) \times (L - \hat{l})(\uparrow)$) while affecting the split of the cost of STW between the government — more spending, due to compensating more hours of STW — and the employer — no top-up. Among potential explanations for this would be would : collusion between workers and firms and low perceived cost of evasion (on both sides).

Table 2.C.1 provides preliminary evidence on average usage of the program by location of reported wage to the kink. It provides information on hours of work and of STW and earnings from work and STW compensation for workers reported below (Column 1), at (Column 2), and above (Column 3) the kink. It suggests that, if anything, workers reported at the kink claim less hours of STW.

More research is needed to determine whether misreporting falls onto workers — through lower STW compensations — or onto the government — through strategic manipulation to shift the cost of the program to government.

2.3 Discontinuity in Cost Across Industries

In this section, I exploit the introduction of some proportional employer contribution in some industries but not other. I study the effect of this policy change on the demand for STW. Importantly, in this setting too, employers report information which then affects their cost. They report the generosity regime they are eligible to when claiming STW – i.e. whether they should bear some or no proportional contribution. I provide a diagnosis of the effect of this discontinuity in cost along two dimensions : a reporting margin and on their true economic behavior.

This section complements the previous section. It completes the diagnosis of the effect of the

different parameters of the policy on employer behavior.

2.3.1 Policy Design

Policy change This empirical exercise relies on a policy change occurring in June 2020. Prior to June 2020, employers did not contribute proportionally to STW compensation (see Panel A of Figure 2.4.4). June 1st 2020 marks the introduction of some proportional employer contribution by 10% of worker's gross hourly wage (see Panel B of Figure 2.4.4) for employers in non-protected industries. Establishments in protected industries, defined by a list established by the government, remained in the previous contribution schedule and did not face this increase in employer contribution.

Behavioral responses I study two types of behavioral responses to this price change.

The first is a misreporting response. Upon claiming STW, employers manually report the generosity regime they are eligible to. I use establishments' industry code to establish their assignment. Then, I compare assignment to treatment to their effective treatment — the regime they claim under. I document the extent to which establishments that had to face this proportional employer contribution misreport the regime they belong to avoid the proportional contribution.

The second response is the adjustment of real economic behavior. I study how this price change affects the demand for STW. Using an event study method and a matching procedure, I compare the evolution of the demand for STW for establishments assigned to the non-protected schedule compared to establishments assigned to the protected schedule. The outcomes of interest are the number of firms claiming STW and the number of workers on STW and hours of STW claimed. I then move to an instrumental variable regression approach. I instrument the fact of bearing the proportional contribution to the program by assignment to this increased employer contribution. This allows to rescale the estimated effect by incorporating the reporting margin.

2.3.2 Identification of Protected Status

Classification I manually retrieve information on assignment up to October 2020. I use the press release by the government that establish the list of activities covered by the *protected* regime and map them into the French industry code classification (NAF).²² The mapping is mainly straightforward with a few exceptions.²³

For each establishment, I retrieve information industry code from the 2020 administrative registry of establishments. Then, based on their industry code, I define *assignment to treatment* – i.e. to the proportional contribution – based on the classification of protected industries.

Descriptive statistics Table 2.D.1 offers some descriptive evidence on the characteristics of establishments with protected (resp. non-protected) industry codes as of 2019. The sample corresponds to the stock of existing establishments in 2019. Column 1 corresponds to the general population while columns 2 and 3 correspond to establishments respectively in protected and non-protected industries. Establishments in protected industries account for 17% (220,000) of all establishments. Compared to the general population, they are on average over-represented in the service industry (99% compared to 77%). Establishments are on average slightly younger with 20% of them less one year old (against 14% in the general population) and 36% between 2 and 9 years old (against 30% in the general population). In terms of employment, there have on average 9 workers compared to 14 for the general population. They have a higher proportion of workers on fixed-term contracts (15% against 11%) as well as less hours worked per employee.

22. The list of activities covered by the *protected* regime are defined in a press release on June 10, 2020. For more details on the timeline and content of the different announcements see Appendix D.1.

23. I exclude from the sample the few industry codes which comprise both protected and non-protected activities. For example, model agency (resp. currency exchange offices) belong to a broader category of placement agencies (resp. brokers). My analyses are immune to ambiguity of categorization.

2.3.3 Reporting Margin

Incentives to Misreport

Let me walk you through the incentives of employers to misreport upon claiming based on their assignment. Establishments with *protected* industry codes remain exempt from proportional contribution to STW, and benefit from the most generous schedule. In this group, employers have no incentive to misreport the generosity regime they belong to, otherwise they contribute more than they should. As such, their reporting errors can be considered as "good faith" errors.

On the contrary, establishments in *non-protected* industries have, by assignment, to contribute proportionally to STW — by 10% of their worker's gross hourly wage. Upon claiming, they face the following trade-off (i) report the correct regime and face the additional (proportional) cost (ii) misreport, with a probability of being caught, and avoid this additional cost.

Method

To study empirically the reporting response, I leverage the fact that upon claiming STW employers self-report the generosity regime they are eligible to. They do so by ticking a box indicating whether the government needs to contribute by 70% of the worker's hourly wage — i.e. leaving no proportional contribution to the employer — or by 60% — leaving the remaining 10% contribution to the employer.²⁴ I manually retrieve information on assignment, as described above, and compare assignment to treatment to actual treatment based on reported information as per STW claim data.

First, I count the number of establishments claiming under each regime by assignment. Then, I compute the share of establishments in each configuration — correctly report vs misreport — among establishments in protected (resp. non-protected) industry codes. I define excess misreporting as the difference between the share of employers that misreport among employers in non-protected industry codes — those with an incentive to misreport — and the share of

24. See Appendix 2.D.1 for a snapshot of the claiming platform when reporting the generosity regime they are eligible to.

employers that misreport among employers in protected industry codes — those with no incentive to misreport, the "good faith" errors. The underlying assumption here to identify the excess misreporting, is that the "good faith" error is symmetric across the two groups, an assumption discussed in the robustness section.

I consider successively three outcomes : the number of establishments, the number of hours of STW claimed, and total government contribution to STW (in €). The latter two allow to rescale misreporting by the intensity of STW usage.

Results

Establishment-level Panel A of Figure 2.4.6 reports the share of establishments compensated under each regime by assignment. The first two columns correspond to the decomposition of claims for establishments in protected industry codes while the last two for establishments in non-protected industry codes. Between June and October 2020, 88% of employers in protected industry codes claim under the correct regime (Column 1) while the remaining 12% (Column 2) claim under a regime less generous than the one they are eligible to. These proportions are drastically different when looking at claims of employers in non-protected industry codes. Indeed, only 71% of employers in non-protected industry codes claim under the correct, non-protected, regime (Column 3) while 20% of establishments claim under a more generous regime than they are eligible to (Column 4).

The difference in the propensity to misreport between the two groups is of 17 percentage points. In order to isolate behavioral responses to incentives, one needs to disentangle strategic manipulation from "good faith" error. The underlying assumption here is that the share of errors of establishments in protected industry codes — that work in their disfavor — can be considered as "good faith" errors. And deducing it from the observed errors of establishments in protected industry codes — that work in their favor — should allow to isolate strategic manipulation.

Hours and compensations Panel B of Figure 2.4.6 performs a similar exercise using as an outcome hours of STW. Establishments in protected industry codes claim 94% of their STW

hours under the correct regime (Column 1). For 6% of hours of STW, the claims fall under a less generous regime than what they are eligible to (Column 2). Again, the repartition is radically different for establishments in non-protected industry codes. Employers only claim 79% of hours of STW under the correct regime (Column 3) and misreport 21% of hours of STW in a regime more generous than they what are eligible to (Column 4).

Putting into perspective Panel A and Panel B of Figure 2.4.6 is informative about intensive vs extensive margin of the reporting response. While a fair share (12%) of establishments in protected industry codes claim under a less generous regime than they are eligible to, they account for a significantly smaller share of hours of STW (6%). They claim on average fewer hours than their counterpart that claim under the correct regime. Interestingly, we do not observe the same pattern for establishments in non-protected industry codes. Misreported claims accounts for 29% of establishments and 23% of hours of STW.

Finally, Figure 2.D.2 provides a similar diagnosis using as an outcome government transfer — which is a combination of both hours of STW claimed and hourly wages of workers on STW. Table 2.D.2 provides the levels behind these proportions.

Misreporting ratio Figure 2.4.7 offers an alternative representation of these findings. It computes the ratio of the share of errorx of establishments in non-protected industry codes over that of establishments in protected industry codes. Columns 1 and 2 correspond to the ratio of the two red columns of respectively Panel A and B of Figure 2.4.6. This ratio (Column 1) is of around 2 in terms of establishments (Column 1) and around 4 in terms of hours of STW and government transfers (Column 2 and 3). Said differently, establishments in non-protected industry codes misreport nearly four times more their hours of STW than establishments in protected industry codes (Column 2). These findings are consistent with estimates from the French Ministry of Labor (DARES [2023]).

Excess spending Finally, Figure 2.D.3 derives a measure of excess spending from the government the due to misreporting. The decomposition goes as follows : the government *saves* on misreporting from establishments in protected industry codes and *over-spends* due to mis-

reporting from establishments in non-protected industry codes. Indeed, for establishments in protected industry codes, the government was willing to contribute by 70% of the worker's hourly wage but end up contributing by 60% due to misreporting. This *saved* amount is computed in Column 1 of Figure 2.D.3, and corresponds to a negative excess spending, i.e. savings. On the contrary, when establishments in non-protected industry codes misreport their regime and ask the government to cover 70% of the worker hourly wage instead of 60%, the government *over-spends* by 10% of the worker's hourly wage. This positive excess spending corresponds to Column 2 of Figure 2.D.3. Finally, Column 3 of Figure 2.D.3 takes the sum of the two. Over the period of study, June to October 2020, the government spent an excess €60 million in STW compensation due to misreporting, a cost which should have been born by employers. This represents 1.4% of total transfers during the period of analysis

This quantification is holding constant the demand for STW. Absent the opportunity to misreport, it is possible employers would have adjusted their STW demand. In other words, if they *had* to internalize some of the costs, they might decrease their demand for STW, subsequently lowering government expenditures.

Robustness

This robustness section addresses two crucial ingredients for an accurate measure of excess misreporting : (i) assuming symmetric "good faith" error across the two groups and (ii) ensuring reliable assignment to treatment. To tackle the former, I restrict the sample to broad industry codes (2 digits) that encompass protected and non-protected industry codes (5 digits), making errors likely in both directions. To address the latter, I use lagged information on firm industry code. In a second exercise, I restrict the sample to establishments with a single activity.

Within broad industry diagnosis The quantification of excess misreporting in Figure 2.4.6 relies on the assumption that the baseline error of those eligible to the most generous regime and yet claim under a less generous regime is a "good faith" error and that the non-protected establishments could also make errors in "good faith" by the same extent. In this paragraph, I

restrict the comparison of establishments within the same broad industry code (2-digits). The idea is (i) to make establishments comparable and, most importantly, (ii) for the boundaries between protected and non-protected regimes to be similarly porous.

Panel A of Figure 2.D.4 corresponds to the baseline results, discussed above. Panel B of Figure 2.D.4 corresponds to the same exercise, placing an additional sample restriction. Panel B exhibits two noteworthy differences. First, the "baseline" error is higher for establishments in protected industry codes (11% compared to 7%). While they have no incentive to misreport, it could be that the boundaries between the two regimes are more porous and lead to more errors. Second, the difference in reporting error between the two groups of establishments is larger (22 p.p. compared to 17p.p.).

Lagged assignment Panel C of Figure 2.D.4 uses as an assignment variable establishment industry code as per 2019. The findings are consistent with Panel A – the baseline panel – suggesting that manipulation of industry code in administrative records plays little role.

Single activity firms Finally, I address two potential issues related to diversity in economic activities within firms or establishments. The first is that claims can be placed at the firm level or at the establishment level. To circumvent misclassification due to firms claiming on behalf of their establishments, I restrict the sample to single-industry firms. I use a dummy variable indicating whether all establishments within the same legal unit have the same industry code. Panel D of Figure 2.D.4 provides evidence on the sample of single-industry code firms. I find similar levels of baseline misreporting from the group of protected establishments and a similar difference in probability of misreporting across the two groups.

The second is that the economic reality of an establishment can be more complex than its industry code. It could be that what I consider as misreporting based on the establishment industry code is actually due to the fact the industry code only reflects part of the activity of the establishment (i.e. 70% of it) and that some of its activity (i.e. 30%) of it is actually eligible to a different generosity regime. Think here for example of a small establishment that provides reprography services and serves alcoholic beverages. It could be the case that the

reprography part of the business has recovered, and was indeed classified as non-protected, but the hospitality part of the business is still affected, thus triggering a claim as a protected establishment. In order to abstract from mixed economic activities within a single establishment, I rely on a second proxy for unicity of economic activity within the firm, and consequently within establishment. It relies on a decomposition of value added by economic activity. The main downside of this approach is that information is only available for part of my sample as it comes from a survey of firms.

Heterogeneity

I now turn to an assessment of heterogeneity in establishment misreporting behavior along a set of establishment characteristics. To analyse how heterogeneity along some dimension affects the probability to misreport, I discretize establishment characteristics into bins. First, I estimate equation (D1) and retrieve the average difference in probability to misreport when assigned to the non-protected regime relative to when assigned to the protected regime, controlling for differences in establishment characteristics (H). The estimated coefficient and the corresponding standard errors are displayed at the top left corner of Figure 2.D.5.

Then, I estimate equation (D2) which fully interacts dimensions of heterogeneity H with assignment to treatment – i.e. to the non-protected regime. Figure 2.D.5 reports the estimates of β_h , which correspond to the relative difference in misreporting behavior across the two groups along the dimension h of establishment characteristics, when all dimensions H are entered simultaneously into the specification. I focus on baseline establishment characteristics (age) as well as characteristics affecting the ability to mitigate the shock (liquidity) and characteristics usually associated with evasion or selection (self-employed status, size, productivity). All estimates are relative to the baseline category for each dimension. Results confirm the presence of substantial heterogeneity in the propensity to misreport along these observable characteristics, and the importance of labor productivity, defined as value added per full-time equivalent, in particular. There is also a negative gradient in firm age and firm size whereby older and larger firms tend to misreport less. Self-employed also tend to misreport more. Findings along the liquidity margin call for additional refinement of the measure (e.g. allowing for non-linearity

or rescaling by total employment).

Conclusion

This section quantifies reporting responses in a tagging setting, where generosity of government transfer depends on establishment characteristics. Upon claiming STW, a significant number of employers misreport their eligible generosity regime. While some inaccuracies stem from *good faith* errors, a majority of the misreporting is strategic in nature. Establishments assigned to the less generous regime — with an incentive to misreport for increased government transfers — exhibit higher misreporting rates than those assigned to the more generous regime, with no incentives to misreport. The distortion is larger when accounting for the size of evasion, considering outcomes such as compensated hours of STW or government transfers. The estimated cost to the government is approximately €60 million.

The presence of a reporting response is surprising given the public administration's ability to cross-verify information. Robustness exercises rule out the possibility that these errors stem from discrepancies between firm industry codes and actual economic activity or claims aggregation at the firm level.

In response to observed misreporting, local public administrations, commissioned by the French Ministry of Labor, investigated sectors with high incidences of misreporting.²⁵ A survey among entities with erroneous claims revealed that 90% claimed "good faith", citing: no knowledge of policy changes, uncertainty about which activities were subject to the less generous regime, and confusion between government contribution (60% or 70%) and worker compensation (70% unchanged). In 10% of cases, suspected fraud prompted more thorough investigations.

2.3.4 Real Economic Responses

Descriptive evidence Let us first consider how aggregate demand for STW evolves around the policy change. Figure 2.4.2 plots the evolution of the number of workers on STW in

25. For more details, see the policy report "Le recours à l'activité partielle pendant la crise sanitaire : le rôle du reste à charge" by Rémi Monin and Augustin Baron at DARES.

France at the monthly frequency. There is a sharp decrease in the number of workers on STW between May 2020 and June 2020. However, given the aggregate nature of the diagnosis, it is difficult to attribute this decrease solely to the policy change. Indeed, it confounds the demand response due to the end of the lockdown (May 11th, 2020) with the policy change (June 1st, 2020). Appendix Figure 2.D.6 performs a similar exercise this time using weekly information on STW take-up. The grey shaded area corresponds to the first lockdown (March 17 - May 11, 2020). The red vertical line marks the increase in STW cost for employers in non-protected industries. There is a first sharp decrease in the number of workers on STW at the end of the lockdown, marked by the end of the shaded area, and a second sharp decrease after the increase in the cost of STW, marked by the red vertical line. This is suggestive of an aggregate demand response to the change in the cost of STW for some employers.

Identification

Identification This discontinuity in employer contribution to the scheme creates a sharp difference in incentives for employers to use STW based on their industry code. I use this quasi-experimental variation in STW generosity to identify the demand response of establishments in terms of STW take-up. I consider the effect of an increase in employer contribution, by 10 p.p. of worker's hourly wage, on the demand for STW. I study this response both at extensive margin — number of firms claiming — and the intensive margin — number of workers on STW and hours of STW. The treatment group is composed of establishments in the non-protected industry codes which face an increase in the cost of using STW. The control group is made of establishments which do not see an increase in the cost of using STW, i.e. in protected industry codes.

Conditional independence Protected industry codes are most affected by the pandemic, directly or through their trade partners. In that sense, treatment assignment is partly endogenous. To circumvent this, I use a matching procedure to create a credible control group. I exclude from the donor pool establishments in the hospitality industry as they are subject to specific reopening rules. I restrict the sample to establishments that take-up STW in all

five weeks prior to the event.²⁶ I use exact matching on the establishment location and size category and Mahalanobis distance on employment gender and contractual composition as of 2019 as well as weekly total employment, weekly hours of STW and workers on STW in the five weeks prior to the policy change. The identifying assumption is that absent the change in cost, the two groups' demand for STW would have evolved in the same way.

Reduced form estimation For each outcome Y , the baseline specification underlying the reduced form graphical evidence is :

$$Y_{i,s,t} = \sum_j \beta_j \times \mathbb{1}\{s \in \mathcal{E}\} \times \mathbb{1}\{j = t\} + \sum_j \gamma_1^j \times \mathbb{1}\{j = t\} + \gamma_2 \times \mathbb{1}\{s \in \mathcal{E}\} + \epsilon_{i,s,t} \quad (2.1)$$

with $Y_{i,s,t}$ the outcome Y for establishment i , belonging to industry code s , in week t . An establishment either belongs to the group of industry codes where employers contribute proportionally to STW ($s \in \mathcal{E}$) or to the group of industry codes that face no proportional contribution ($s \in \mathcal{E}^C$). The regression comprises both non-protected (γ_2) and week (γ_1^j) fixed effects to control for baseline differences across the two groups and common time effects.

The coefficients of interest are the β_j . They track the dynamics of the effect of the change in the cost of STW on the outcome of interest. They correspond to the relative evolution of the outcome of establishments in non-protected industry codes relative to that of establishments in protected industry codes over time. All coefficients are expressed relative to t-1 levels which corresponds to the last week of May 2020.

IV estimation I complement the reduced form evidence with an instrumental variable approach where I instrument the probability of bearing the proportional contribution to STW,

26. The policy change occurs on June 1st, four weeks after the end of the first lockdown on May 3rd. The sample thus focuses on establishments that take-up the program consistently in the four weeks following the end of the first lockdown.

T , by the assignment to this proportional contribution. The instrument corresponds to an interaction term of being after June 1st, 2020 ($t > 2020w23$) and belonging to the set of industry codes which are non-protected ($s \in \mathcal{E}$). Specification (2.2) illustrates this instrumental variable approach with specification (2.3) the corresponding to the first stage :

$$Y_{i,s,t} = \beta_{IV} \times T_{i,s,t} + \sum_j \eta_1^j \times \mathbb{1}\{j = t\} + \eta_2 \times \mathbb{1}\{s \in \mathcal{E}\} + \mu_{i,s,t} \quad (2.2)$$

$$T_{i,s,t} = \kappa_1 \times \mathbb{1}\{s \in \mathcal{E}\} \times \mathbb{1}\{t > 2020w23\} + \sum_j \kappa_2^j \times \mathbb{1}\{j = t\} + \kappa_3 \times \mathbb{1}\{s \in \mathcal{E}\} + \nu_{i,s,t} \quad (2.3)$$

Results

Main results Each of the four panels of Figure 2.4.8 plots the coefficients β_j for all weeks from the last week of April ($t=-5$) till the second week of July ($t=+5$) from a regression following specification (2.1). The vertical dashed line between $t=-4$ and $t=-3$ corresponds to the end of the first lockdown in France. The policy change occurs three weeks later, on June 1st 2020, and is marked by the vertical solid line.

Panel A of Figure 2.4.8 uses as an outcome the probability to claim under the non-protected regime — that is the probability to face the increase in cost of the program. It confirms previous evidence from Figure 2.4.6, that being assigned to the non-protected regime is correlated with claiming under this less generous regime.²⁷ This corresponds to the variation used to identify the causal effect of the change in price on the demand for STW. The instrument accounts for

27. In Figure 2.4.6, the difference in probability is of 73 p.p. (= 79 - 6) somehow larger than that of the first stage. While Figure 2.4.6 looks at claims over the whole course of June till October 2020, Figure 2.4.8 zooms on the first week of June and subsequent weeks. Moreover, there might be a composition effect due to restrictions on the matched sample : (i) establishments claiming STW in the five weeks prior to the event (ii) exact matching on location and employment size. This likely affects the composition of establishments in both groups and therefore the probabilities.

a 50 percentage point increase in the probability of claiming under the non-protected regime, starting from a baseline of zero as this generosity regime did not exist prior to the policy change. This probability remains close to 50 percent in all subsequent weeks.

Panel B, C, and D of Figure 2.4.8 display estimates of the effect of employers facing a costlier scheme on the demand for STW in terms of the number of establishments claiming (Panel B), of log number of workers on STW (Panel C), and log number of hours of STW (Panel D). There is a sharp relative decrease in the number of firms claiming following the increase in the cost of STW. On the intensive margin, employers in non-protected establishments reduce the number of workers and hours of STW following the introduction of proportional employer contribution. The estimated IV coefficients, β_{IV} , from specification (2.2) are reported for Panel C and D.²⁸ They correspond to the effect of an increase of the cost of the program on respectively the number of workers and hours of STW. An increase in the proportional contribution to the program from 0 to 10% of workers' gross hourly wage reduces the number of workers (resp. hours) on STW by $e^{-.231} - 1 = 21\%$ (resp. 33%).

These findings are aligned with previous evidence from the STW literature. Indeed, Cahuc and Carcillo [2011] document a negative correlation between the average remaining cost for employer and STW take-up rate across countries. More recently, Albertini et al. [2022] show through simulations that had employers been asked to contribute to STW by 10% of the worker's hourly wage during lockdown, STW take-up would have decreased with no effect on employment.

Heterogeneity by establishment characteristics Appendix Figure 2.D.7 reports the estimated IV coefficient β_{IV} of the effect of an increase of the cost of the program following the IV regression in specification (2.2). The IV coefficient is estimated for the entire sample (baseline) and then subsequently by establishment characteristics. To do so, I interact the treatment dummy with establishment characteristics in the estimation. I use three measures of financial well-being : liquidity, value added per worker and profit per worker. Establishments are categorized based on their rank relative to the median in terms of each characteristics

28. The IV estimate for Panel B is not available as the claiming status is unobserved for firms not claiming STW beyond the policy change.

(above or below). Panel A uses as an outcome the log number of workers on STW while Panel B uses as an outcome the log number of hours of STW conditional on claiming STW. Both panels suggest that more liquidity constrained firms respond more to the increase in the cost of the program in terms of STW usage and that more productive firms (higher value added or profits worker) respond less.

2.4 Conclusion

In response to the COVID-19 pandemic, policy makers have aggressively extended their policy toolkit to address the economic challenges posed by the crisis. By changing economic incentives, these policy interventions are likely to affect agents' behavior. This paper focuses on the extension of short-time work (STW) — the main policy instrument to mitigate the labor market consequences of the shock in Europe. This paper studies the context of France, where the program was pre-existing but had historically low take-up, and was massively adjusted ad hoc in response to the pandemic.

Using exhaustive administrative records on STW claims matched with detailed data on employment and establishments, this paper uses quasi-experimental variations in the cost of the program to study firm behavioral responses of two sorts (i) misreporting and (ii) real economic responses. Employers were given significant flexibility in reporting upon claiming STW, leaving room for manipulation.

I first leverage a discontinuity in the cost of the program across workers. I find that employers misreport their workers' gross hourly wage and bunch where government contribution is maximal and their contribution minimal. Counterfactual information on earnings from administrative records allows to rule out real adjustment of earnings in 2020 and attribute the bunching to a reporting margin only. Information at the worker level allows to characterize the reporting behavior of firms. Bunching is not local — workers reported at the kink come from a large segment above the kink — suggesting that the cost of evasion is not sensitive to the size of evasion.

Second, I leverage the introduction of some proportional employer contribution in non-protected

industries but not in protected industries to estimate (i) reporting responses and (ii) real economic responses. Upon claiming STW, employers self-report the generosity regime they are eligible to. Comparing eligibility to treatment status, I find that employers in non-protected industries select into a more generous program than they are eligible to.

I then turn to the estimation of real behavioral responses. I use an event study approach and an instrumental variable approach to estimate the demand response to an increase in cost of the program. I estimate a 21% decrease in the demand for the program in terms of workers on STW following an increase in employer contribution from 0 to 10% of worker gross hourly wage.

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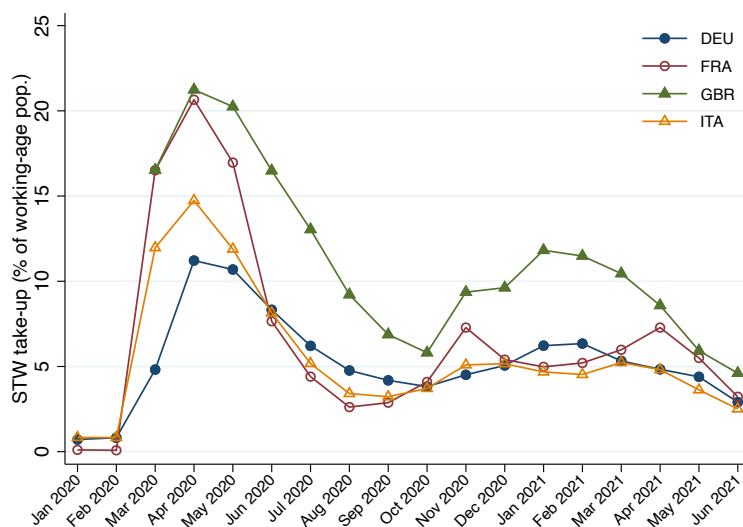
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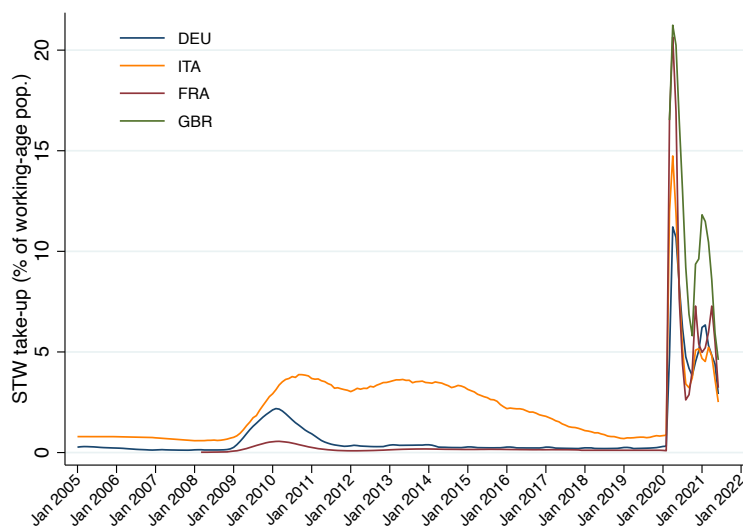
Figures

FIGURE 2.4.1: SHORT-TIME WORK USAGE IN EUROPE

A. SHORT-TIME WORK TAKE-UP DURING THE PANDEMIC

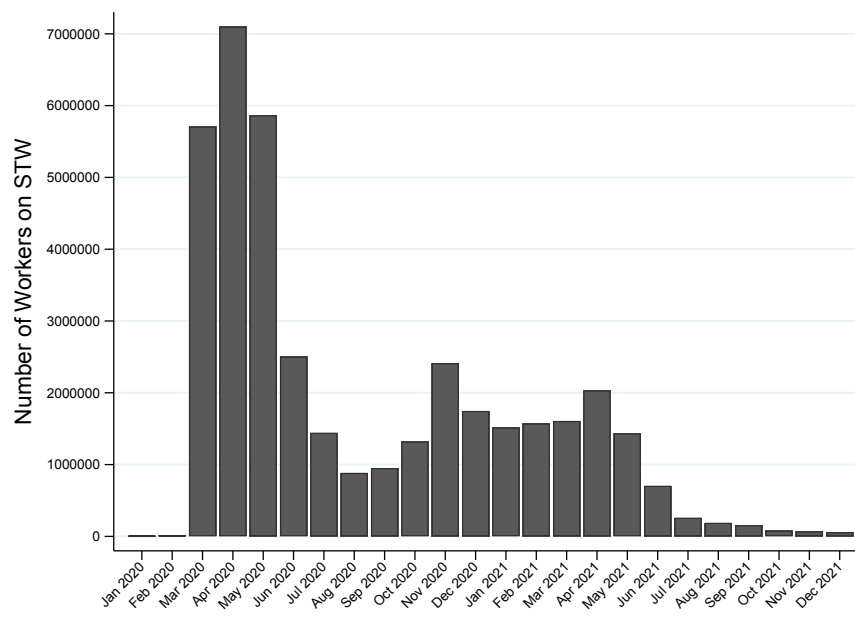


B. SHORT-TIME WORK TAKE-UP BETWEEN 2005 AND 2021



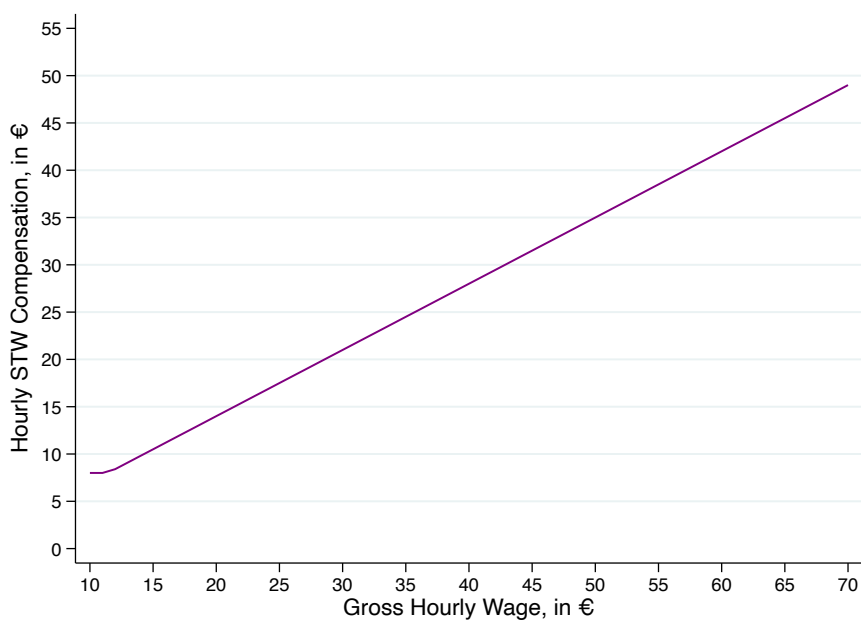
Notes : These figures report the evolution of STW take-up in European countries. STW take-up is computed as the ratio of the number of individuals in the program in a given month, as a percent of the quarterly age population. Panel A covers the pandemic while Panel B looks at STW utilization between 2005 and 2021. The plotted series are moving averages of the raw series. The moving average is based on twelve lagged terms, one forward term and uniform weights. Data on employment comes from OECD. Data on STW and UI take-up comes from the OECD and national statistics.

FIGURE 2.4.2: NUMBER OF WORKERS ON STW OVER TIME



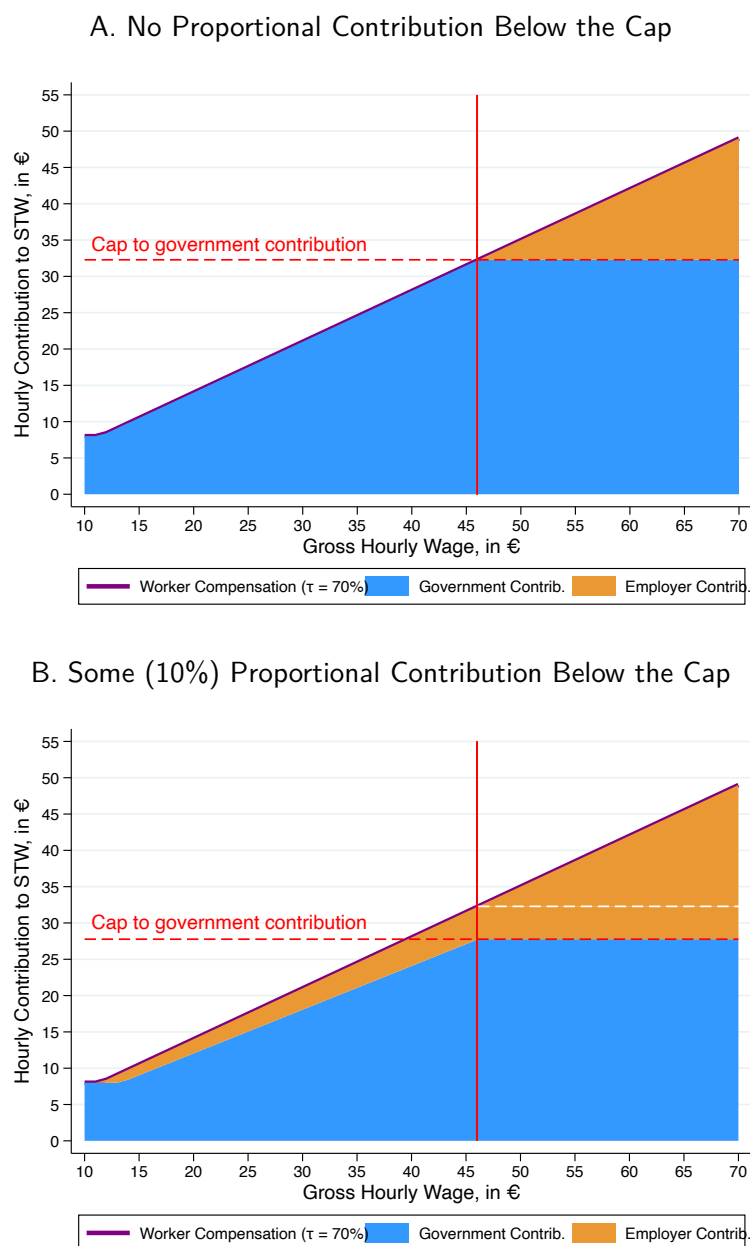
Notes : This figure shows monthly short-time work utilization at the worker level. Sample is restricted to the main short-time work scheme — *activité partielle classique*. Sample is restricted to workers aged 20-65 in Metropolitan France and excludes trainees and subsidized jobs. Short-time work usage corresponds to validated claims and for which a compensation has been made in month *m*. The number of workers corresponds to the number of workers with at least one hour of STW in the month of interest. Figure 2.A.1 reproduces this graph using as outcome the number of firms taking-up the program and the number of hours compensated.

FIGURE 2.4.3: WORKER HOURLY SHORT-TIME WORK COMPENSATION AS A FUNCTION OF GROSS HOURLY WAGE



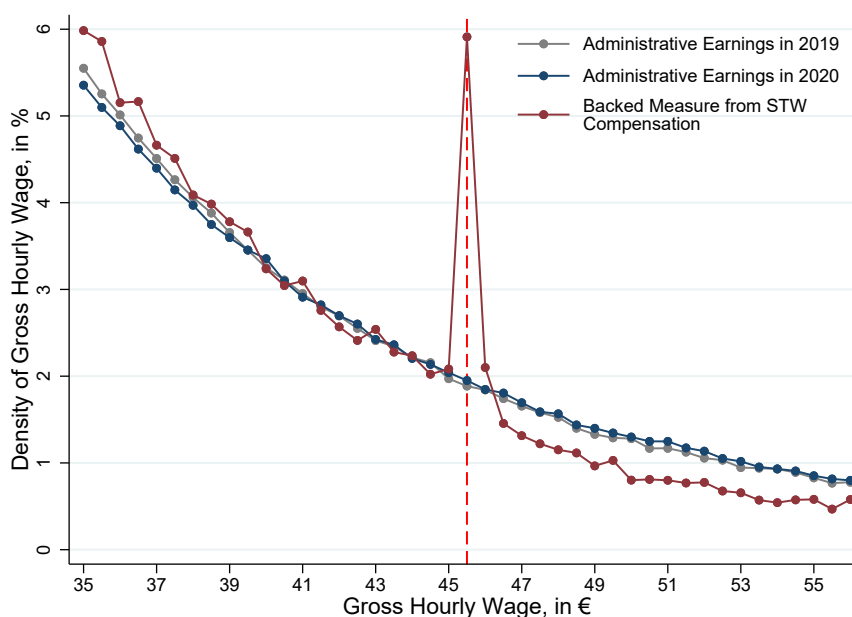
Notes : This figure illustrates how short-time work compensation is defined at the worker level in 2020. Hourly short-time work compensation (y-axis) is a function of worker gross hourly wage (x-axis). For each hour of STW, the worker receives a compensation of 70% of her gross hourly wage. This roughly corresponds to 84% of net hourly wage. There is a floor at the minimum wage — hourly STW compensation cannot go below 8,03 € per hour. There is no cap to worker compensation.

FIGURE 2.4.4: GOVERNMENT AND EMPLOYER CONTRIBUTION TO SHORT-TIME WORK IN 2020, BY WORKER GROSS HOURLY WAGE



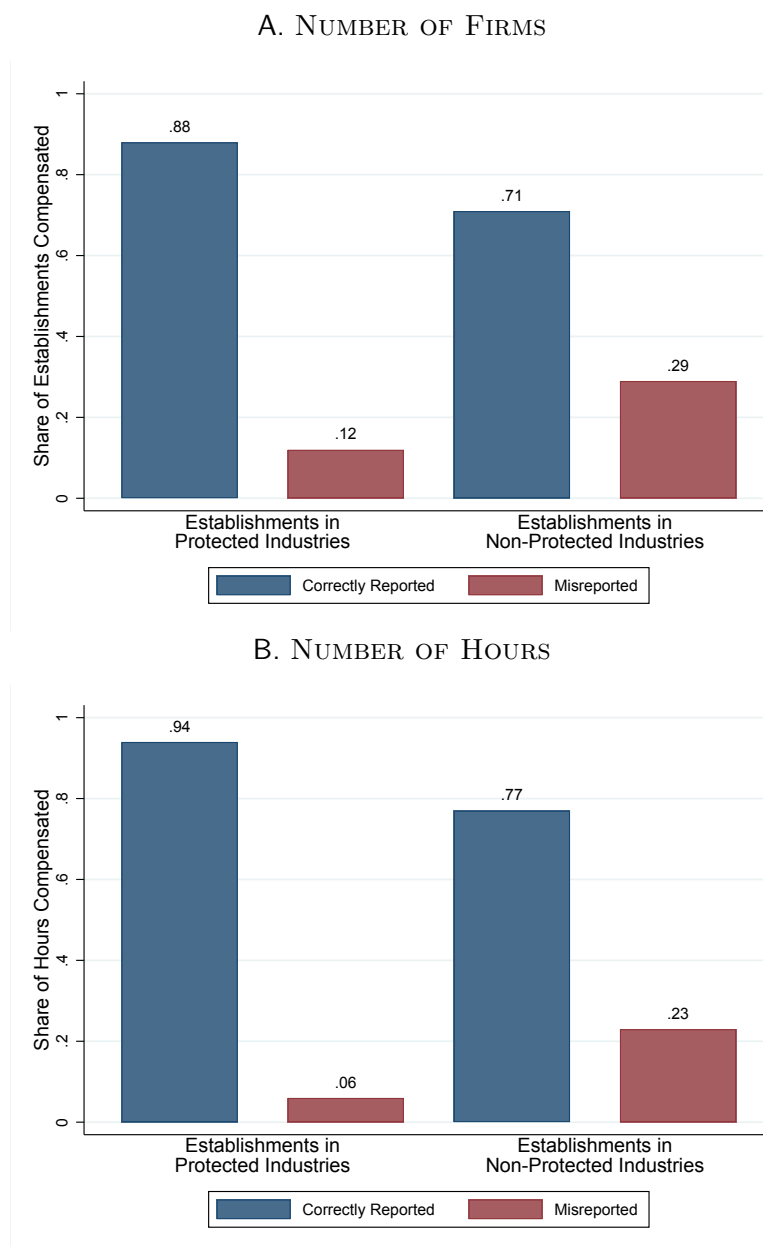
Notes : This figure plots government (in blue) and employer (in orange) contribution to hourly STW compensation (y-axis) as a function of worker's gross hourly wage (x-axis). Worker hourly compensation corresponds to the sum of the two (in purple). Both panels correspond to STW compensation as per 2020. Panel A illustrates the schedule to which all firms were subject during the first lockdown and up to June 2020 and some firms beyond June 2020. Panel B illustrates the schedule some firms, in specific industries, were subject to from June 2020. In both schedules, there is a discontinuity in employer contribution at 4.5 minimum wage (45.7€) — marked by the vertical red line. In Panel A, to the left of the red line, the government bears the entire cost of STW and compensates the worker 70% of her gross hourly wage. Beyond the red line, government contribution is capped at 32€ ($= .7 \times 45.7\text{€}$) — marked by the red dashed line. The employer takes over and bears all additional STW compensation. For every additional 1€ of gross hourly wage, the employer pays .70€ of STW compensation to the worker. In Panel B, the same discontinuity applies. The only difference is that below the cap the employer was already contributing to STW by 10% of worker gross hourly wage. The white dashed line marks employer proportional contribution.

FIGURE 2.4.5: DENSITIES OF GROSS HOURLY WAGE MEASURES FROM EARNINGS AND SHORT-TIME WORK COMPENSATION, AMONG SHORT-TIME WORK TAKERS



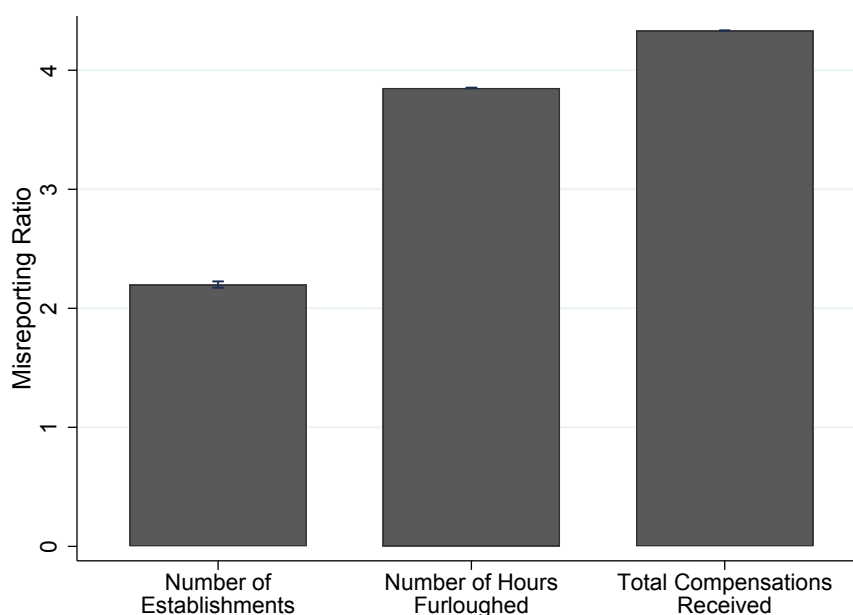
Notes : This figure displays the densities of gross hourly wage measure using bins of $.1\text{€} / \text{hour}$. The blue (resp. gray) curve corresponds to gross hourly wage in 2020 (resp. 2019). Both measures are defined as the ratio of gross earnings on number of hours worked and are derived from employment data. The red curve corresponds to reported gross hourly wage based on short-time work hourly compensation. The red dashed line marks the discontinuity in government contribution. Beyond this line, government contribution is capped and employers cover all additional short-time work compensation. For every additional 1€ of gross hourly wage, employers pay $.70\text{€}$ of short-time work compensation to the worker. While the densities for hourly wage in 2019 and 2020 are almost indistinguishable, the density of reported gross hourly wage exhibits a large spike at the discontinuity in employer contribution. This is indicative of bunching as a response to changes in incentives. Appendix Figure 2.C.5 provides a similar diagnosis using reported hourly wage by firms on the STW claiming platform. It exhibits a larger bunching mass, suggesting that some firms report their workers at the kink but top-up their compensation.

FIGURE 2.4.6: SHARE OF FIRMS AND HOURS COMPENSATED UNDER EACH GENEROSITY REGIME, BY ASSIGNMENT



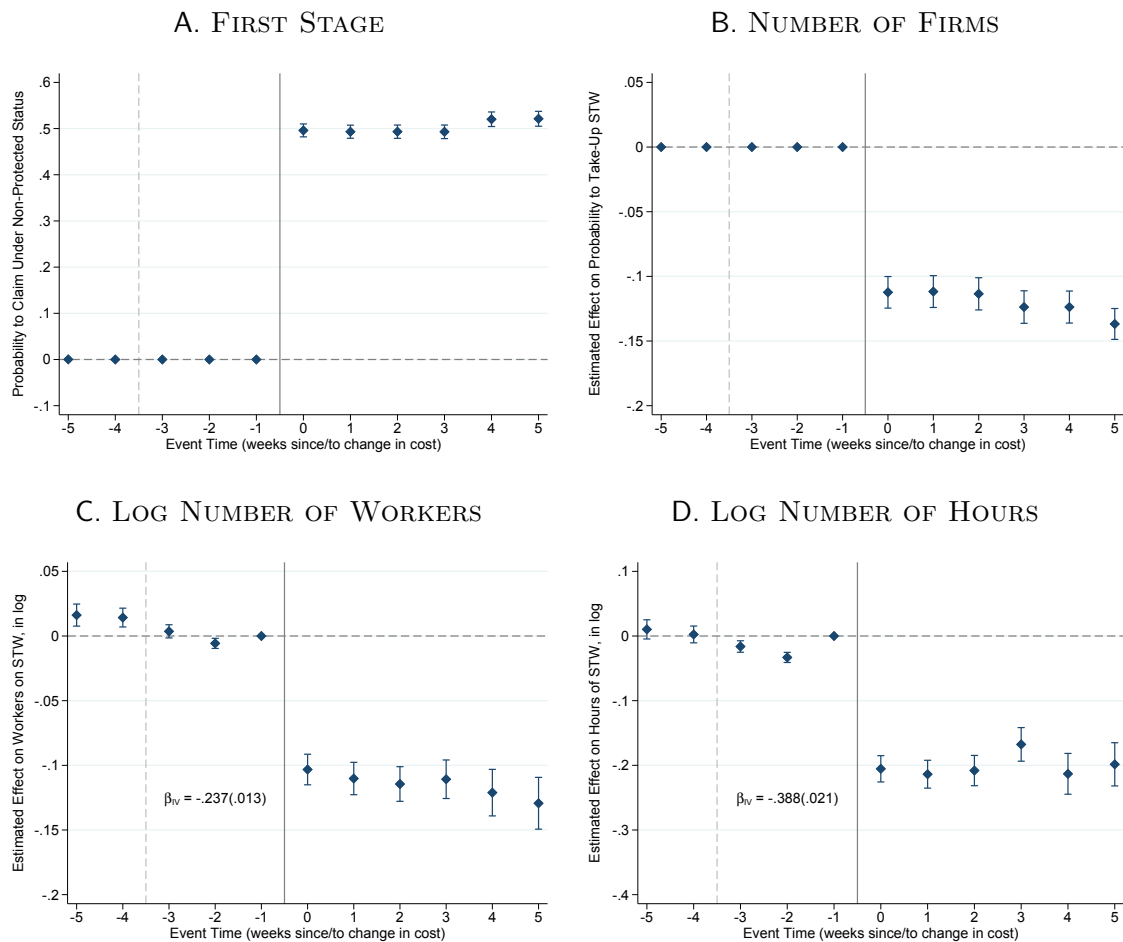
Notes : These Figures compare the reporting errors of establishments in protected industries to that of establishments in non-protected industries. Employers in protected industries do not have to contribute to STW compensation below the cap while establishments in non-protected industries have to contribute by 10% of their worker's gross hourly wage. The first (resp. last) two columns illustrate the reporting behavior of employers in protected (resp. non-protected) industries. Blue columns correspond to compensations in the assigned regime while red columns correspond to compensations in the other regime. The protected status is reported by establishments upon claiming STW — hence the distinction between correctly reported and misreported. Column 2 corresponds to errors of establishments in protected industries — claims under a less generous regime than assigned to. If errors were random, they should be symmetric across protected status and be equal across columns 2 and 4. However, this is not the case. Establishments in non-protected industries claim more often in the incorrect regime — which is more generous — than do establishments in protected industries. The sample corresponds to STW compensation between June and October 2020. For a similar diagnosis using total compensations (in €) see Figure 2.D.2.

FIGURE 2.4.7: MISREPORTING RATIO BETWEEN NON-PROTECTED AND PROTECTED ESTABLISHMENTS



Notes : This figure computes misreporting ratios defined as the share of misreported outcomes among non-protected establishments over that of protected establishments. If errors were random on both sides — among establishments in protected and non-protected industries — then these ratio would be equal to one. Column 1 corresponds to misreporting in terms of the number of establishments claiming. There are twice as many establishments that misreport into a more generous regime than eligible than establishments that misreport into a less generous regime than eligible. Column 2 corresponds to misreporting in terms of hours of STW. This corresponds to the ratio of column 4 to column 2 in Figure 2.4.6. Column 3 corresponds to the amounts of transfers involved in the misreporting. There are around 4 times more hours and amounts misreported from establishments in non-protected industries than in establishments in protected industries. The sample corresponds to short-time work compensation between June and October 2020.

FIGURE 2.4.8: STW TAKE-UP RESPONSE TO AN INCREASE IN EMPLOYER CONTRIBUTION



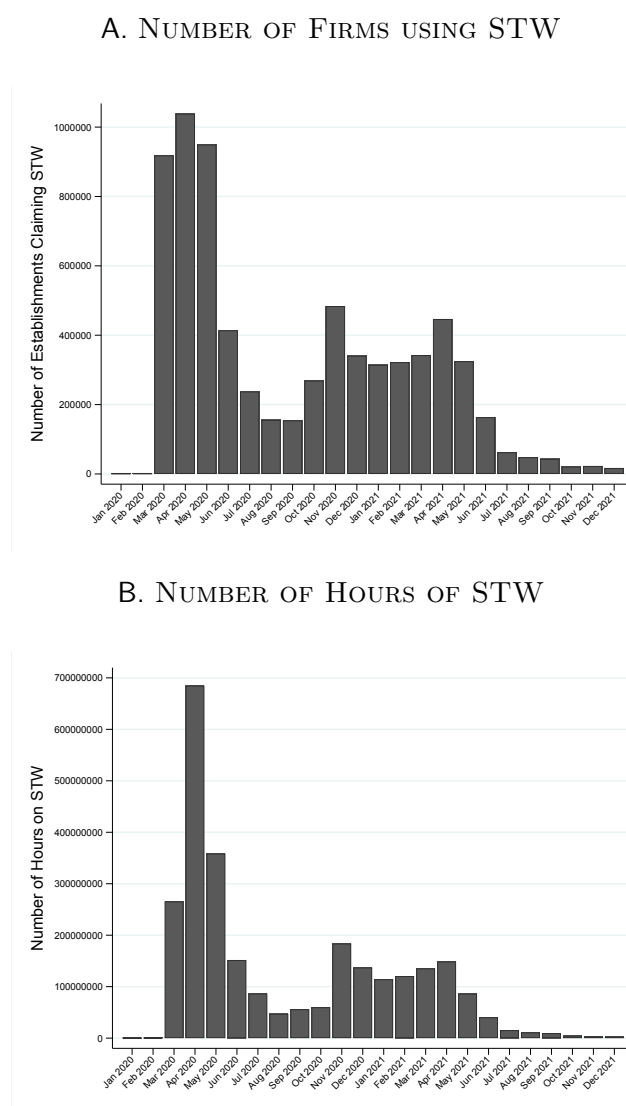
Notes : This figure provides a graphical representation of the variation used to identify the causal effect of the change in the cost of the program labor demand. It plots coefficients β_j for all weeks from a regression following specification (2.1). Panel A uses as an outcome the probability to claim under the non-protected regime, which is the regime affected by the increase in the cost of the program. This is the difference in probability to face the increase in cost of the program between establishments in non-protected industries (assigned to the treatment) and establishments in protected industries (not assigned to the treatment). Panel B, C, and D use as an outcome short-time work take-up at respectively on the extensive margin — number of establishments claiming — and on the intensive margin — log number of workers and hours of STW conditional on claiming STW. The last three panels allow to characterize the demand response, in terms of STW take-up, of establishments to the change in cost of the program. Panel C and D report the estimated IV coefficient β_{IV} of the effect of an increase of the cost of the program following the IV regression in specification (2.2).

Appendix

2.A Short-Time Work Take-Up in France

A.1 Short-Time Work Take-Up over Time

FIGURE 2.A.1: SHORT-TIME WORK TAKE-UP OVER TIME



Notes : This Figure shows monthly short-time work utilization at the establishment (Panel A) and hours (Panel B) level. Sample is restricted to the main short-time work scheme. Sample is restricted to workers aged 20-65 in Metropolitan France and excludes trainees and subsidized jobs. Short-time work usage corresponds to validated claims and for which a compensation has been made in month m . A firm is considered a short-time work taker if it uses STW for at least one worker in month m . Figure 2.4.2 reproduces this graph using as an outcome the number of workers on STW.

A.2 Different Short-Time Work Programs

Description of the Programs

Standard Short-Time Work The main program is called *Activité Partielle Classique* (AP) — "standard" short-time work. It is the most commonly used program during the pandemic and this for a few reasons. First, at the onset of the pandemic, this was the only program in place. Second, it is very flexible. It comes with no employment preservation condition and is not subject to any employee consultation. Employers can reduce hours worked all the way to 0.

Long Term Short-Time Work In July 2020, an alternative short-time work scheme was re-instated called *Activité Partielle de Longue Durée* (APLD) — long term short-time work. The goal was to progressively substitute this scheme to the main scheme and was targeted at establishments facing a durable reduction of activity. Take-up of the program is conditional on the existence of a collective agreement — at the industry, company, firm, or establishment level. There is no additional eligibility restriction. Upon using the program, employers commit not to layoff workers covered by the agreement.²⁹ Contrary to the main scheme, reduction in hours is capped at 40% of hours worked (resp. 50 in some specific cases). As in the main scheme, the worker gets an hourly compensation equivalent to 70% of her gross hourly wage. However, proportional government contribution was initially less generous than in the main scheme (at 60% of worker gross hourly wage).³⁰ The cap to government contribution remains the same. APLD can be leveraged for a maximum duration of 24 months (over 3 years) 6 months at a time. In practice, employers can take-up both programs at the same time and choose which worker to allocate to which program.

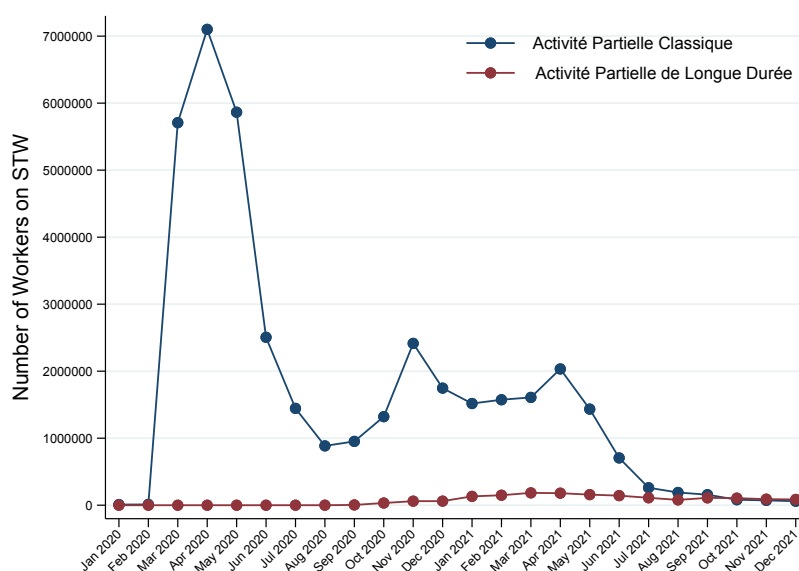
29. Else, they have to repay all compensation received. However, firms can lay off workers not covered by the agreement.

30. At the time, the prevailing government contribution to the main scheme was 70% (resp. 60%) of workers gross hourly wage for establishments in protected (resp. non-protected) industries.

Empirical Evidence on Take-Up of the Programs

Figure 2.A.2 offers a visual representation of the relative magnitude of those two programs. It shows monthly short-time work utilization at the worker level for workers compensated under the main scheme — *activité partielle classique* — and under the long term scheme — *activité partielle de longue durée*. Take-up of the long-term program was initially low despite extensive communication by the government and remained essentially flat until the summer of 2021 due to poor calibration.

FIGURE 2.A.2: SHORT-TIME WORK TAKE-UP BY TYPE OF PROGRAM

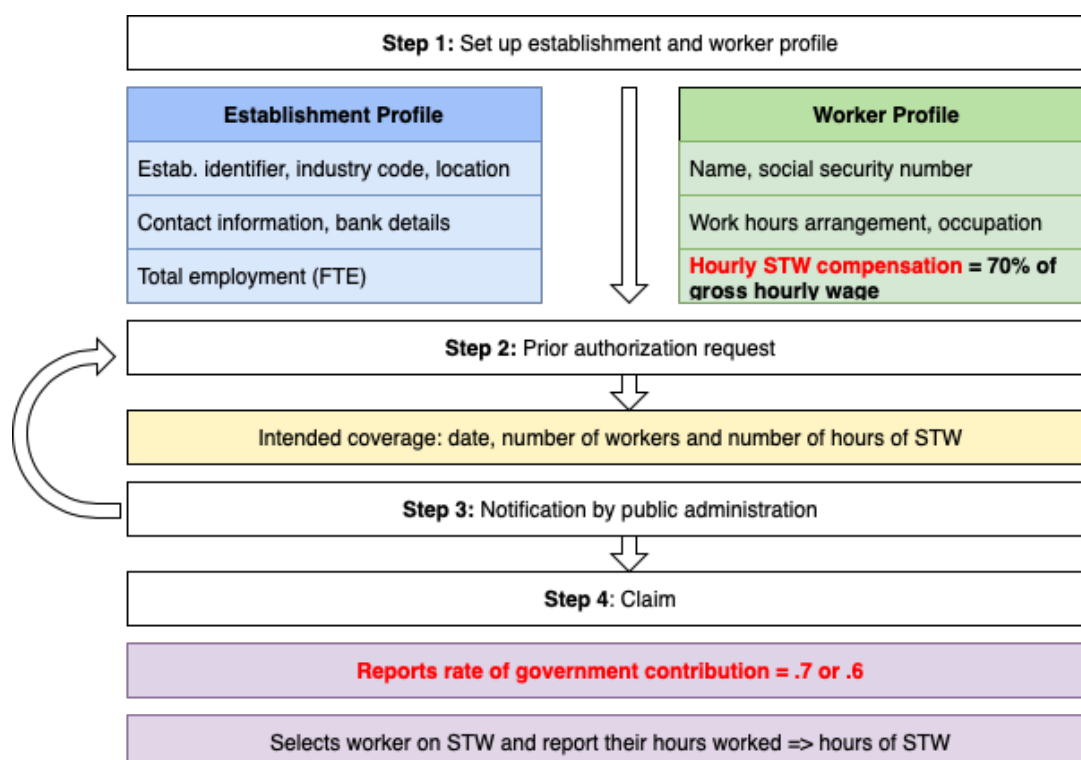


Notes : This Figure shows monthly short-time work utilization at the worker level. Blue dots correspond to workers compensated under the main scheme — *activité partielle classique* — while red dots correspond to workers compensated under the long term scheme — *activité partielle de longue durée*. Short-time work usage corresponds to validated claims and for which a compensation has been made in month *m*. The number of workers correspond to the number of workers with at least one hour of STW in the month of interest. The long term scheme was introduced in July 2020 but take-up remained essentially flat until the summer of 2021 due to poor calibration.

2.B Policy Design

B.1 Claiming Process

FIGURE 2.B.1: STEPS FOR EMPLOYERS TO CLAIM SHORT-TIME WORK

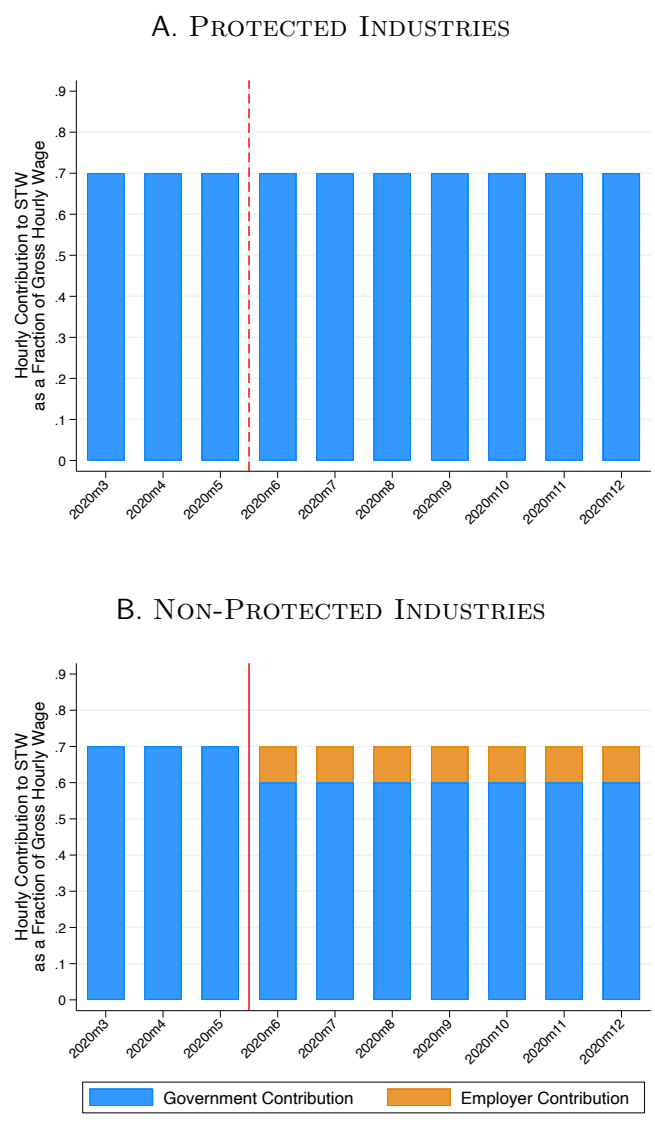


Source : Author's computation.

Notes : This figure describes the different steps of claiming STW employers have to go through. Data corresponding to each of the stages displayed on this Figure are available to researchers. Red bold words emphasize specific elements of reporting from the employer considered in this paper.

B.2 Schedule for Proportional Employer Contribution

FIGURE 2.B.2: THEORETICAL EMPLOYER PROPORTIONAL CONTRIBUTION TO STW OVER TIME, BY PROTECTED STATUS



Notes : This Figure shows the schedule of proportional employer contribution to the program for establishments in protected industries (Panel A) and in non-protected industries (Panel B) in 2020. For each month, it shows the decomposition of employer (in orange) and government (in blue) contribution to worker hourly compensation as a fraction of her gross hourly wage below the cap. From March till May 2020, there is no proportional employer contribution to the scheme. On June 2020, some proportional employer contribution is introduced in non-protected sectors by 10% of worker's gross hourly wage. There exists a third regime which corresponds to establishments subject to administrative closure. The schedule of the latter is not represented as it is excluded from all the empirical exercises.

2.C Discontinuity in Cost Across Workers

C.1 Data and Sample

Data

Gross hourly wage Exhaustive employer-employee data is used to retrieve a measure of gross hourly wage both for 2019 and for 2020. For each worker, gross hourly wage is defined as the ratio of gross earnings over the number of hours worked over the year.

In the employer-employee data, the measure of gross earnings comprises elements of remuneration — baseline salary, payment of overtime hours, and bonuses — as well as in kind benefits, severance payments, employer contribution to professional expenses (transportation and food), and other elements of remuneration.

According to government guidelines, when claiming STW, the employer should report the hourly gross remuneration that the worker would have received excluding non-contractual overtime and specific bonuses.³¹

To get as close as possible to this measure (i) I restrict the sample to workers continuously employed between 2019 and 2020 — to avoid severance payments — and with at most 1820 hours of work per year — to avoid overtime (ii) I subtract from gross earnings the purchasing power bonus — *prime exceptionnelle de pouvoir d'achat*. There remain some elements of compensation that should be excluded from the reported hourly earnings for which information is not available.

As a consequence, the resulting measure of observed gross hourly earnings is potentially marginally inflated. The hypothesis here is that locally, around the kink, there should be no reason for differential measurement error. If our measure of gross hourly wage is inflated by bonuses or another element of compensation that enter gross earnings, there is no reason so as to why this would be more of a concern for workers at 43€/hour than for workers at 47 €/hour.

31. Bonuses excluded from the computation of hourly STW compensation are : bonuses or contributions to professional expenses, profit-sharing bonuses, bonuses not affected by STW status, purchasing power bonus

Importantly, in 2020, gross earnings do not include short-time work compensation — as they are not earnings *per se* but social transfers — which allows to isolate earnings from STW compensation.

Hourly STW compensation I derive a measure of hourly STW compensation from the same data. The administrative employer-employee data contain information on total STW compensation (€) and total hours of STW for 2020. I define average hourly STW compensation as the ratio of STW compensation over hours of STW. To get to a measure of reported wage, I simply divide hourly STW compensation by the replacement rate (70%). This gives me the average reported gross hourly wage (weighted by the number of hours claimed).

The main advantage of this measure is that all the information — on earnings and STW compensation — is available within a single data source, the administrative employer-employee data. The drawbacks are that (i) it is a less direct measure of reported information (ii) information is aggregated at the yearly level, which prevents any dynamic analysis.

Reported hourly wage I also have the exact reported wage by the employer upon claiming STW. This information is available in the worker-level STW claiming data. The instruction was for the employer to report 70% of its worker's gross hourly wage — her hourly STW compensation, abstracting from contribution rules, i.e. the kink or level of proportional employer vs government contribution.

This information is extremely interesting. First, it corresponds to the exact reported information (and as such one can precisely document reporting behavior). Second, it is available at a monthly frequency allowing for a dynamic study of reporting behavior — e.g. as the contribution/generosity rule changes.

Some empirical exercises will leverage the information on reported gross hourly wage on the STW claiming platform. But, the core analyses will rely on information on hourly STW compensation from the administrative employer-employee data. I will discuss in further details what we learn from the reporting behavior of firms on the STW claiming platform and from the comparison of the reporting behavior on the platform and final worker STW compensation.

Sample

The sample corresponds to workers aged between 20 and 65 years old in Metropolitan France with continuous employment spells in 2019 and 2020. The sample is further restricted to workers who are on STW for at least 20 hours in 2020 to avoid a noisy estimate of hourly STW compensation. I restrict the sample to workers with at least 1248 hours worked per year (by a proportional amount for 2020) — corresponding to the minimum workweek requirement. Trainees, apprentices, and any other subsidised employment contract are excluded from the sample as they are subject to a specific compensation rules.

The main advantage of these sample restrictions is that I am confident in my measures of gross hourly wage and hourly STW compensation (e.g. abstracting from severance payments). The main downside is that it focuses on workers with long tenure thus excluding most recent hires or people that were eventually separated from during 2020. This matters to the extent that employer behaviour may vary across the different types of workers.

C.2 Conceptual Framework with No Reporting

This sub-section illustrates how the kinked schedule in employer contribution to STW theoretically affects the firm relative demand for work across two type of workers depending on their relative position with respect to the kink — one above and one below. Initially, it abstracts from any reporting margin but will be incorporated in the subsequent sub-section.

Let us consider a toy model with two workers : the low type (indexed by L) with an hourly wage $\omega_L < \bar{\omega}$ and the high type (indexed by H) with an hourly wage $\omega_H > \bar{\omega}$, with $\bar{\omega}$ the hourly wage at the kink. Workers are complementary in the production of a single good. Our conceptual framework illustrates how initial labor demand (pre-pandemic) adjusts to a shock in a setting with linear vs kinked STW schedule.

Model

Let us first consider the pre-pandemic equilibrium, that is the equilibrium labor demand in steady state. Then, we will illustrate how the employer adjusts its labor demand when facing a shock when faced with a linear STW schedule — *i.e.* with no discontinuity in cost depending on worker hourly compensation. Lastly, we will study how the kinked schedule theoretically distorts the employer's labor demand across workers.

Pre-pandemic Equilibrium In order to determine the initial labor demand, let us consider a simple program where the employer minimizes its cost subject to a production constraint. I consider labor as the only input in the production function but introduce two types of workers who differ in labor productivity. I refer to the first type of worker as the high type, indexed by H, and the other type as the low type, indexed by L. Workers enter the production function in respective quantities l_L and l_H and are complementary in the production process. To each worker is associated an equilibrium wage ω_i .

This exercise illustrates the effect of a discontinuity in employer contribution to STW depending on worker's hourly wage. For that reason, I consider that the low type has an hourly wage (ω_L) below the cap ($\bar{\omega}$) and the high type an hourly earnings (ω_H) above the cap : $\omega_L < \bar{\omega} < \omega_H$.

The program writes as follows :

$$\begin{aligned} \text{Min}_{l_L, l_H} \quad & \omega_L l_L + \omega_H l_H \quad \text{subject to} \quad F(l_H, l_L) \geq \bar{y} \\ & l_L \geq 0 \\ & l_H \geq 0 \end{aligned}$$

The employer minimizes its labour costs to meet the production constraint subject to a positive (or null) demand for the two types of workers. Assuming an interior solution — i.e. that the bundle of workers makes sense — the first order conditions yield :

$$\begin{aligned} \frac{w_L}{w_H} &= \frac{F'_{l_H}(l_L^*, l_H^*)}{F'_{l_L}(l_L^*, l_H^*)} \\ F(l_L^*, l_H^*) &= \bar{y} \end{aligned}$$

This is the standard equilibrium where the marginal cost equals the marginal rate of transformation. The level of demand (\bar{y}) determines the optimal labor demand : l_L^*, l_H^* where l_i^* corresponds to the total labor demand for type i which can be thought of equivalently in terms of hours or number of workers.

Pandemic Equilibrium under Linear Schedule Let us now consider the impact of a shock to the demand ($\tilde{y} < \bar{y}$) on firm labor demand. Let us first consider a linear STW schedule where the marginal cost of the program does not differ according to the worker hourly wage. For simplicity, I illustrate the framework with no proportional employer contribution ($\rho = 0$) although it can be easily incorporated.³²

32. Under the linear schedule and proportional employer contribution, each hour worked costs ω_i and each hour of STW costs $\rho * \tau * \omega_i$. For each additional hour of work, the employer compensates the worker by her hourly wage but implicitly saves on an hour of STW which marginal cost is $\rho * \tau * \omega_i$. So the marginal cost of an hour of work is $(1 - \rho * \tau) * \omega_i$. The relative marginal cost writes $(1 - \rho * \tau) * \omega_H / (1 - \rho * \tau) * \omega_L$ which simplifies to ω_H / ω_L . The trade-off is similar to that of the core of the text. The only difference is total cost for the employer which might affect the separation margin or decision to produce.

$$\begin{array}{ll}
 \text{Min}_{l_L, l_H} & \omega_L l_L + \omega_H l_H \quad \text{subject to} \\
 & F(l_H, l_L) \geq \tilde{y} \\
 & \bar{y} > \tilde{y} \\
 & l_L^* \geq l_L \geq 0 \\
 & l_H^* \geq l_H \geq 0
 \end{array}$$

Here the employer determines the optimal labor demand (l_i) given the initial labor demand (l_i^*) and the new production level. The trade-off remains the same as the STW schedule affects proportionally the marginal cost of labor for the high or low type. What differs is the level of production reached, this will determine the level of labor demand.

$$\frac{\omega_H}{\omega_L} = \frac{F'_{l_H}(l_L, l_H)}{F'_{l_L}(l_L, l_H)}$$

$$F(l_L, l_H) = \tilde{y}$$

Assuming an interior solution, a negative shock, and an adjustment on the two workers, the new equilibrium is such that the labor demand allows to produce a lower quantity of output ($\tilde{y} < \bar{y}$). Both workers face a proportional reduction in hours worked.

Pandemic Equilibrium under Kinked Schedule Let us now consider the distortion introduced by a kink in employer contribution to STW — as per French context in 2020. Under this design, the relative cost of an hour of work — or equivalently the opportunity cost of an hour of STW — varies depending on the worker gross hourly wage. In turn, this distorts the relative marginal cost between the two workers.

$$\begin{array}{ll}
 \text{Min}_{l_L, l_H} & \omega_L l_L + \omega_H l_H + \tau \times (\omega_H - \bar{\omega}) \times (l_H^* - l_H) \quad \text{subject to} \\
 & F(l_H, l_L) \geq \tilde{y} \\
 & \bar{y} > \tilde{y} \\
 & l_L^* \geq l_L \geq 0 \\
 & l_H^* \geq l_H \geq 0
 \end{array}$$

Assuming an interior solution, the first order conditions simplify to :

$$\frac{\omega_H - \tau \times (\omega_H - \bar{\omega})}{\omega_L} = \frac{F'_{l_H}(l_L, l_H)}{F'_{l_L}(l_L, l_H)}$$

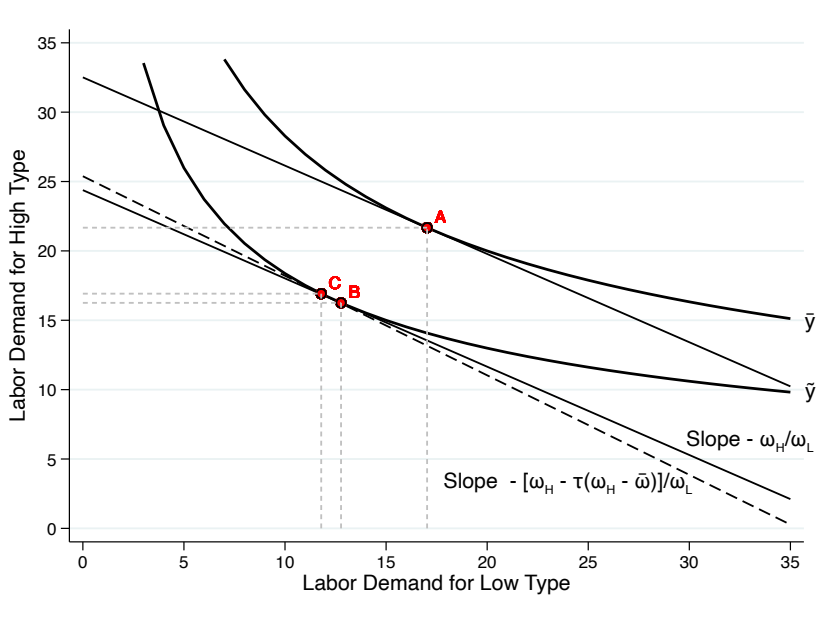
$$F(l_L, l_H) = \tilde{y}$$

Compared to the equilibrium under the linear schedule, the relative cost of an hour of work for the high type worker is reduced. This induces a shift for relatively more demand for high type labor and less relative demand for low type labor. The overall total cost of production is higher. The kinked schedule reduced the marginal cost of labor of the high type through the marginal cost of an hour of STW. This is equivalent to a subsidy on work of the high type.³³ Importantly, the magnitude of the substitution across workers depend on their hourly wage (ω_L and ω_H), on the magnitude of the shock ($\Delta = \tilde{y} - \bar{y}$), and on the substitutability across workers (α in the case of a CES production function).

33. Similarly to before, one can incorporate proportional contribution to the kinked schedule. The relative marginal cost writes $[(1 - \tau) * \omega_H + \tau * (1 - \rho) * \bar{\omega}] / (1 - \rho * \tau) * \omega_L$.

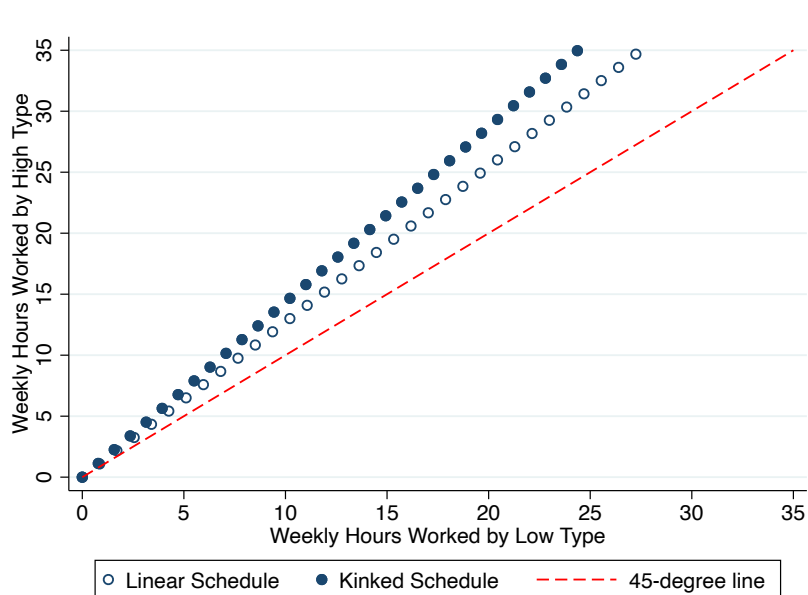
Graphical Illustration

FIGURE 2.C.1: THEORETICAL ADJUSTMENT OF LABOR DEMAND TO A SHOCK UNDER LINEAR AND KINKED STW SCHEDULE



Notes : This Figure illustrates the initial equilibrium (A) and the equilibria following a firm-level shock under both a linear (B) and a kinked (C) schedule. The x-axis (resp. y-axis) corresponds to the labor demand for the low (resp. high) type worker. Equilibria correspond to tangency points between isoquants and iso-cost curves. Each type of worker is characterized by its initial (contractual) labor demand (A). Each type of worker experiences a reduction in hours worked and is on STW for those reduced hours. Going from the linear to the kinked schedule tilts the iso-cost curve. The slope of the iso-cost curve goes from $-\omega_H/\omega_L$ to $-(1 - \rho * \tau) * \omega_H/\omega_L$. This induces a substitution of hours worked by the low type for hours worked by the high type as illustrated by the shift of the equilibrium from B to C. For this graphical illustration, the production function is a Cob-Douglas with parameter $\alpha = 2/3$. The initial production level is of 20 units and the demand shock is of -5 units. The low (resp. high) type worker earns an hourly wage of 35€ (resp. 55€). The kink is at 45.7€/hour, i.e. the low type is below the kink and the high type above. Contractual hours are set to 35hours per week as per the French standard.

FIGURE 2.C.2: THEORETICAL ADJUSTMENT OF LABOR DEMAND TO A SHOCK UNDER LINEAR AND KINKED STW SCHEDULE, BY INITIAL LEVEL OF PRODUCTION



Notes : This Figure illustrates the different equilibria obtained under the linear (circle) and kinked (dot) schedule following a shock for different initial levels of production. They correspond to equilibrium points B and C in Figure 2.C.1 for different initial levels of production. On the x-axis is the labor demand for the low type and on the y-axis the labor demand for the high type. The figure illustrates the distortion of labor demand towards the high type under the kinked schedule relative to a linear schedule. For this graphical illustration, the production function is a Cobb-Douglas with parameter $\alpha = 2/3$. Initial levels of production are set between 5 and 45 units and the shock is of -5 units. The low (resp. high) type worker earns an hourly wage of 35€ (resp. 55€). The kink is at 45.7€/hour, i.e. the low type is below the kink and the high type above. Contractual hours are set to 35hours per week as per the French standard.

C.3 Conceptual Framework with Reporting

In reality, the claiming process relies on employer reporting information on their characteristics as well as on their employees. For each worker on STW, employers report worker's gross hourly wage and the number of hours worked in the period of interest. This then determines the level of worker compensation as well as the level of employer contribution to the scheme.

Model In order to better match the claiming process, one should incorporate as a choice variable the gross hourly wage reported to the public administration upon claiming STW — denoted $\hat{\omega}_i$. Note that the worker still earns ω per hour worked but the employer reports $\hat{\omega}$. There is a cost $C(\cdot)$ to misreporting — i.e. reporting $\hat{\omega} \neq \omega$ — on which I remain agnostic for now. For each additional euro of gross hourly wage reported above the kink, the employer contributes by $\tau\text{€}$ per hour of STW.

The employer minimization program rewrites :

$$\text{Min}_{l_L, l_H, \hat{\omega}_H} \quad \omega_L l_L + \omega_H l_H + \underbrace{\tau \times (\hat{\omega}_H - \bar{\omega}) \times \mathbb{1}(\hat{\omega}_H > \bar{\omega}) \times (l_H^* - l_H)}_{\text{Tax liability, employer contribution to STW}} + \underbrace{C(\cdot) \times \mathbb{1}(\hat{\omega}_H \neq \omega_H)}_{\text{Cost of misreporting}}$$

$$\text{subject to } F(l_H, l_L) \geq \tilde{y}$$

$$\bar{y} > \tilde{y}$$

$$l_L^* \geq l_L \geq 0$$

$$l_H^* \geq l_H \geq 0$$

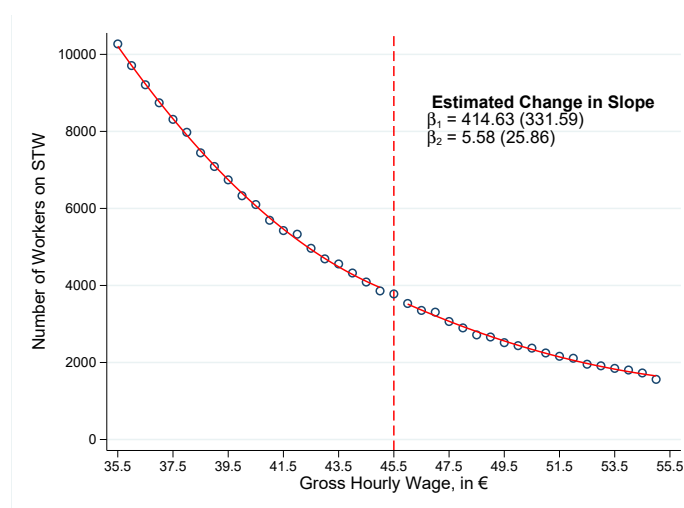
The first order condition with respect to $\hat{\omega}$ writes :

$$\underbrace{\frac{\delta C(\cdot)}{\delta \hat{\omega} - \omega}}_{\text{Marginal Cost of Misreporting}} - \underbrace{\tau \times \mathbb{1}\{\hat{\omega} \geq \bar{\omega}\} \times (L - l)}_{\text{Marginal Tax Saved on Reported Wages}} = 0$$

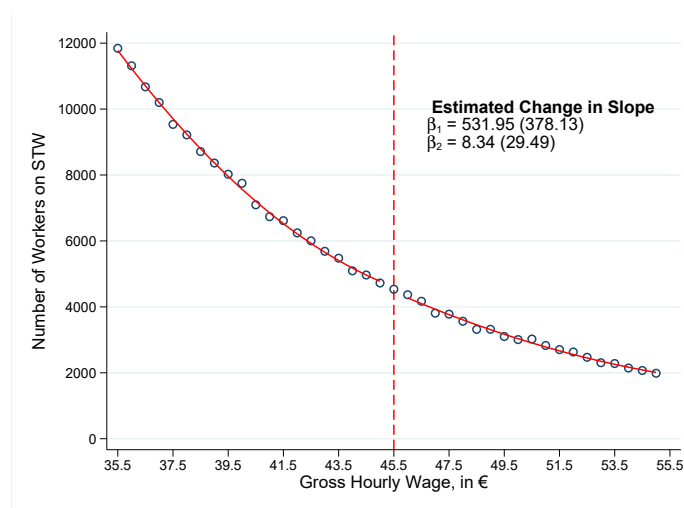
C.4 Cost Variation : Regression Kink Design Analysis of Demand Response

FIGURE 2.C.3: TEST FOR DISCONTINUITY IN STW TAKE-UP AROUND THE KINK

A. NUMBER OF WORKERS ON STW BASED ON 2019 EARNINGS



B. NUMBER OF WORKERS ON STW BASED ON 2020 EARNINGS



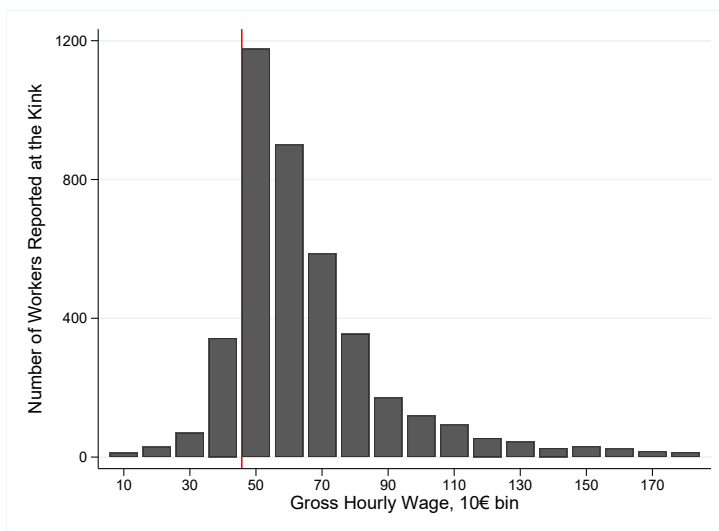
Notes : This Figure presents descriptive evidence on the evolution of STW take-up around the discontinuity in employer contribution to the program. The sample consists of all workers from our baseline sample. Panel A (resp. B) plots the number of workers on STW based on their 2019 (resp. 2020) administrative earnings in each .50€ bin. This corresponds to the raw count. The red dashed vertical line marks the discontinuity in employer contribution to STW (as illustrated theoretically in Figure 2.4.4). I report on the graph the quadratic fit (red lines) and the estimated change in slope using a bandwidth of 10€. In the regression, each observation is weighted by the number of workers in the wage bin. None of the estimated coefficients are significant suggesting no differential STW take-up response below and above the kink both from the perspective of 2019 and 2020 earnings.

C.5 Additional Elements on Reporting Response

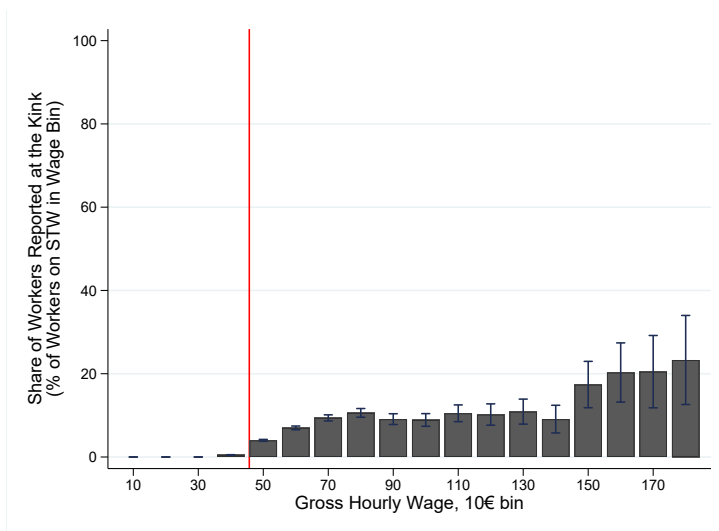
Location of Workers Compensated at the Kink

FIGURE 2.C.4: LOCATION OF WORKERS COMPENSATED AT THE KINK, BY TRUE GROSS HOURLY WAGE

A. NUMBER OF WORKERS REPORTED AT THE KINK



B. SHARE OF WORKERS REPORTED AT THE KINK



Notes : This Figure shows the repartition of workers with hourly STW compensation at the kink — bunchers — by origin in the observed wage distribution — *i.e.* by bins of 10€ of actual gross hourly wage in 2020. The sample consists of all individuals from our baseline sample. Panel A plots the number of workers with hourly STW compensation at the kink while Panel B plots the share of STW takers with hourly STW compensation at the kink among all STW takers in the wage bin. The red line corresponds to the kink in employer contribution. Most workers compensated at the kink have an actual wage above the kink. The share of workers compensated at the kink among all STW takers is invariant from a certain distance to the kink.

Hours and Earnings of Workers on STW by Distance of Reported Wage to the Kink

TABLE 2.C.1: DESCRIPTIVE EVIDENCE ON HOURS AND EARNINGS OF WORKERS ON STW, BY LOCATION OF REPORTED WAGE TO THE KINK

	Reported Gross Hourly Wage							p-value of difference	
	(1)		(2)		(3)				
	Below the Kink [44.5€-45.4€]		At the Kink [45.5€-45.9€]		Above the Kink [46.0€-46.9€]		(1)-(2)	(2)-(3)	
	Mean	(s.d.)	Mean	(s.d.)	Mean	(s.d.)			
I. Hours									
Hours worked in 2019	1,804	107	1,806	95	1,807	106	.265	.743	
Hours worked in 2020	1,615	224	1,644	198	1,605	237	.000	.000	
Hours of STW in 2020	198	194	176	167	210	215	.000	.000	
II. Earnings (in €)									
Gross Earnings in 2019	94,567	32,901	123,535	61,867	96,150	28,060	.000	.000	
Gross Earnings in 2020	88,788	32,201	119,285	71,045	89,867	29,524	.000	.000	
STW Compensation in 2020	6,243	6,097	5,621	5,354	6,825	6,974	.000	.000	
N	4,826		6,954		3,608				

Notes : This Table reports the mean and standard deviation of a set of worker-level variables for workers on STW in 2020. Column (1) corresponds to workers with reported wage below the kink ([44.5€,45.4€]). Column (2) to the sample of workers reported at the kink ([45.5€-45.9€]). Column (3) to workers with reported wage above the kink ([46€-46.9€]). The last two columns provide p-values from a Student test of difference in means between respectively columns (1) and (2) and (2) and (3). The idea is to test whether workers reported at the kink have a different usage of STW. The summary statistics come from the exhaustive employer-employee data. The sample is restricted to workers that use STW for more than 20 hours in 2020, aged between 20 and 65 years old, in Metropolitan France, with gross hourly wage between 10 and 80€.

Diagnosis Using Reported Information on STW Claiming Platform

Data This section uses information on gross hourly wage as reported by the employer on the STW claiming platform. The data corresponds to approved claims — i.e. that lead to a government transfer — and discards claims that were rejected by the public authorities.

Let us take a step back to think about what these two sources of information correspond to. The information used in this section corresponds to reported information by the employer on the STW claiming platform. This is the information public authorities receive and use to screen claims — i.e. determine whether they are legitimate or fraudulent. This is key to document employer reporting behavior in the context of a claiming a social program.

Information in the employer-employee data, used in the core of the paper, is independent from the claiming process. It comes from monthly social security reports from employers which determine social security contributions (from which short-time work is exempt). This information is aggregated at the yearly frequency and made available to researchers.

The two sets of information are currently not put into perspective with one another. The claiming process is isolated from the reporting in the social security reports.

Matching This section leverages information as reported in the STW claims data. There is no unique worker identifier for workers across the STW claims data and the employer-employee data. To circumvent this, I use a matching technique. I have information on the establishment identifier in both data sets. The matching is only required to identify workers within establishments. I use exact matching on gender and place of birth (*département*) and distance matching on age and total hours of STW in 2020.

TABLE 2.C.2: DESCRIPTIVE EVIDENCE ON WORKERS AND ESTABLISHMENT CHARACTERISTICS, BY SAMPLE

	(1) Employment Sample		(2) Matched Sample		(3) (Exact) Matched Sample		p-value of difference	
	Mean	(s.d.)	Mean	(s.d.)	Mean	(s.d.)	(1)-(2)	(1)-(3)
I. Worker Characteristics								
Prop. of female	.35	.48	.35	.48	.36	.48	.00	.00
Age	43.27	10.40	43.18	10.41	43.53	10.24	.00	.00
II. Establishment Characteristics								
Prop. in manufacturing	.26	.44	.26	.44	.28	.45	.00	.00
Prop. in construction	.13	.33	.13	.34	.12	.33	.00	.00
Prop. in services	.61	.49	.61	.49	.59	.49	.00	.00
III. Wage Measures								
Gross Hourly Wage (in 2019)	19.36	8.69	19.31	8.68	19.88	8.90	.00	.00
Gross Hourly Wage (in 2020)	19.73	8.97	19.69	8.97	20.27	9.16	.00	.00
Reported Gross Hourly Wage (in 2020)	17.31	6.86	17.31	6.86	17.73	7.10	.91	.00
IV. STW Take-Up, in 2020								
Hours Worked	1,591	261	1,585	261	1,634	219	.00	.00
Hours of STW	248	232	255	233	187	163	.00	.00
STW Compensation (in €)	2,890	2,897	2,971	2,913	2,235	2,152	.00	.00
N	3,224,330		2,836,886		1,203,656			

Notes : This Table reports the mean and standard deviation of a set of worker-level and establishment-level variables for workers on STW in 2020. Column (1) corresponds to workers on STW in the employer-employee data. Column (2) to the sample of workers matched across STW claims and the employer-employee data. Column (3) places additional restriction on the matching. The last two columns provide p-values from a Student test of difference in means between respectively columns (1) and (2) and (1) and (3). The summary statistics refer to year 2020 information, unless stated otherwise. The sample is restricted to workers that use STW for more than 20 hours in 2020, aged between 20 and 65 years old, in Metropolitan France, with gross hourly wage between 10 and 80€.

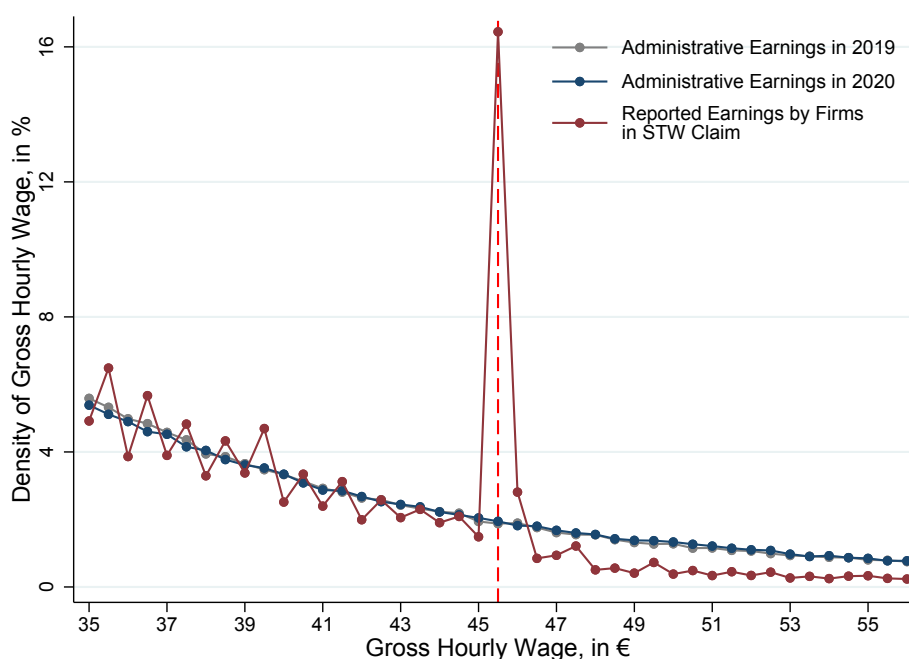
Bunching response Figure 2.C.5 reproduces the main analysis of 2.4.5 using information on reported information by the employer on the STW platform. I estimated a large bunching response at the kink.

One could argue that, to determine government transfer, the only relevant information is that the gross hourly wage meets or exceeds $\bar{\omega}$. Irrespective of the reported value on the platform, as long as it surpasses the cap, it triggers a government transfer of $\tau \times \rho \times \bar{\omega}$ per hour of STW. There are two aspects to consider in response to this.

First, this deviates from the instruction to report 70% of the worker's gross hourly wage and let the platform conduct its own computation of government transfer. Indeed, the instruction from the public authorities was consistently to report 70% of the worker gross hourly wage — her hourly compensation — irrespective of the split in contribution between the government and the employer — depending on the location with respect to the kink or on the industry code of the employer.

Second, Figure 2.C.5 is informative about the reporting behavior of firms as this is the information public authorities have to determine whether a claim is legitimate or fraudulent. There is a mass of workers reported exactly at the kink, which suggests that the perceived probability of audit is not increasing exactly at the kink. If an employer intends to top-up its worker STW compensation to meet the 70% replacement rate, then there is a cost to misreport (i.e. related to the probability of audit) and no real gain from misreporting.

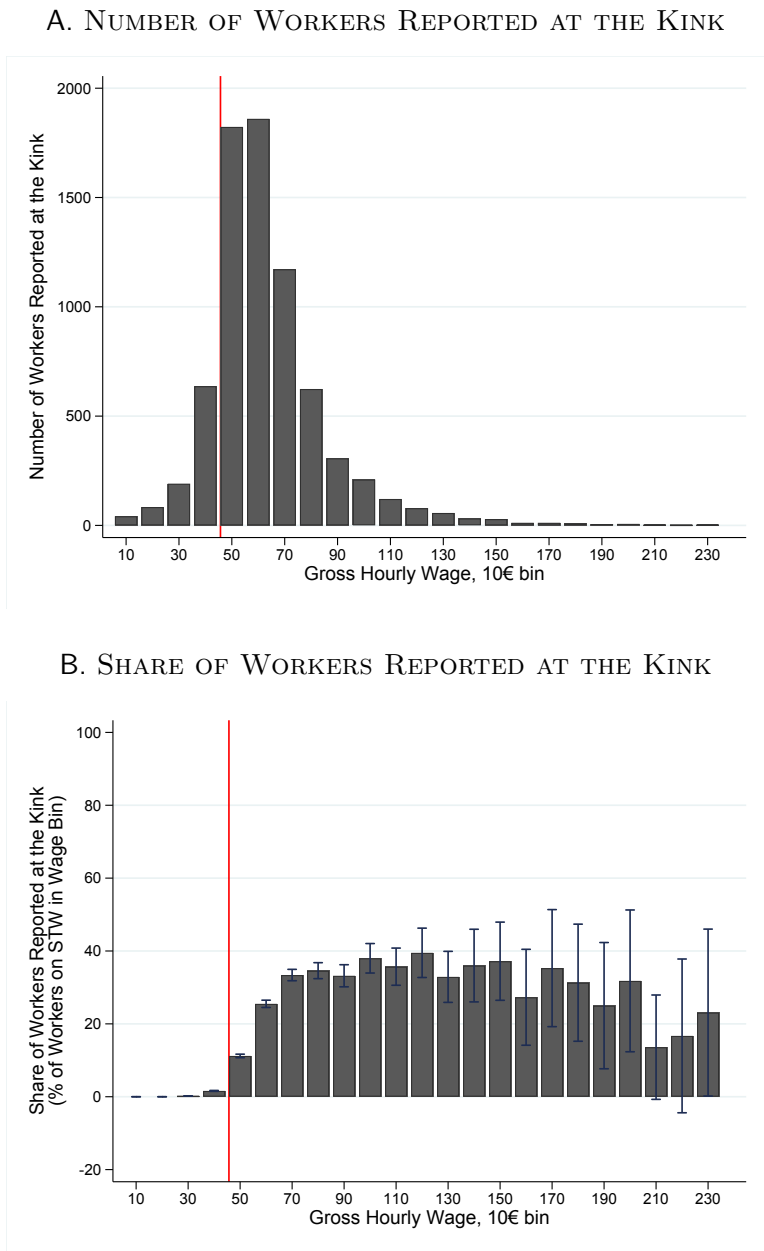
FIGURE 2.C.5: DENSITIES OF GROSS HOURLY WAGE MEASURES IN EMPLOYMENT AND SHORT-TIME WORK CLAIMS DATA, AMONG SHORT-TIME WORK TAKERS



Notes : This figure displays the densities of gross hourly wage measure using bins of $.1\text{€}$ / hour. The blue (resp. gray) curve corresponds to gross hourly wage in 2020 (resp. 2019). Both measures are defined as the ratio of gross earnings on number of hours worked and are derived from employment data. The red curve corresponds to reported gross hourly wage in short-time work claims data. The sample is held constant across the two data sources by using short-time work takers only — i.e. workers with at least 10 hour of STW in 2020. The red dashed line marks the discontinuity in government contribution. Beyond this line, government contribution is capped and employers cover all additional short-time work compensation. For every additional 1€ of gross hourly wage, employers pay $.70\text{€}$ of short-time work compensation to the worker. The sample is restricted to observations for which there is an exact matching in terms of total hours of STW in 2020. While the densities for hourly wage in 2019 and 2020 are almost indistinguishable, the density of reported gross hourly wage exhibits a large spike at the discontinuity in employer contribution. This is indicative of bunching as a response to changes in incentives.

Location of Workers Reported at the Kink

FIGURE 2.C.6: LOCATION OF WORKERS REPORTED AT THE KINK, BY TRUE GROSS HOURLY WAGE



Notes : This Figure shows the repartition of workers with hourly wage reported at the kink — bunchers — by origin in the observed wage distribution — *i.e.* by bins of 10€ of actual gross hourly wage in 2020. The sample consists of all individuals from our baseline matched sample. Panel A plots the number of workers reported at the kink while Panel B plots the share of STW takers reported at the kink among all STW takers in the wage bin. The red line corresponds to the kink in employer contribution. Most workers with a reported hourly wage at the kink have an actual wage above the kink. The share of workers reported at the kink among all STW takers is invariant from a certain distance to the kink.

2.D Discontinuity in Cost Across Industries

D.1 Announcement Timeline

May 2020 On May 14, 2020, the French Prime Minister met with representatives from the tourism industry during the 6th Inter-Ministerial Committee for Tourism. On that occasion, he announced that businesses in the hospitality, restaurant, cafe, tourism, events, sports, culture, and related sectors, which have experienced a significant decline in activity, will be subject to enhanced government support. He further announced that government support to short-time work would remain unchanged for the whole of 2020 for these industries.

June 2020 Following up on previous announcements, the Government issued a press release on June 10, 2020 entitled "*Le Gouvernement renforce les aides apportées aux secteurs de l'hôtellerie, restauration, cafés, tourisme, événementiel, sport, culture*". It provides a list of directly affected industries (S1) and related sectors (S1bis) subject to enhanced government support. This press release is referred to in the supporting document to the short-time work platform.

D.2 Descriptive Evidence on Protected and Non-Protected Industries

TABLE 2.D.1: DESCRIPTIVE EVIDENCE OF EMPLOYER CHARACTERISTICS IN THE MAIN SAMPLE, BY PROTECTED AND NON-PROTECTED INDUSTRY CODES (2019)

	(1) All Industry Codes		(2) Protected Industry Codes		(3) Non-Protected Industry Codes	
	Mean	(s.d.)	Mean	(s.d.)	Mean	(s.d.)
I. Establishment Characteristics						
Prop. in manufacturing	.09	.29	.01	.09	.11	.31
Prop. in construction	.14	.35	0	0	.17	.37
Prop. in services	.77	.42	.99	.09	.72	.45
Prop. below 1 year	.14	.34	.20	.40	.12	.33
Prop. below 2-9 years	.30	.46	.35	.48	.29	.45
Prop. over 10 years	.56	.50	.44	.50	.59	.49
II. Employment						
Employees (headcount)	12	64	8	61	13	63
Employees (FTE)	9	50	5	50	9	50
Prop. on open-ended contract	.92	.20	.91	.23	.93	.19
Prop. on fixed-term contract	.07	.19	.09	.23	.07	.18
N	1,240,664		212,048		1,028,616	

Notes : This Table reports the mean and standard deviation of a set of establishment-level variables for firms in our sample as of 2019. The summary statistics refer to year 2019, the year prior to the pandemic. Column 1 refers to all establishments with either protected and non-protected industry codes. Column 2 restricts the sample to establishments in protected industries and column 3 to establishments in non-protected industries. This empirical exercise is restricted to industries with a constant assignment throughout 2020. The sample comprises all establishments in metropolitan France with a tradable activity, in all industries apart from agriculture. Sample is restricted to workers with open ended and fixed term contracts.

D.3 Misreporting of Protected Status

Reporting Protected Status in Practice

FIGURE 2.D.1: REPORTING PROTECTED STATUS - SNAPSHOT OF CLAIMING PLATFORM

CRÉER UNE DEMANDE D'INDEMNISATION

Code de création de la DI

Code* :
d9vicy99ik

Mois sur lequel porte la demande d'indemnisation

Mois / Année* :
juin 2020

Taux éligible

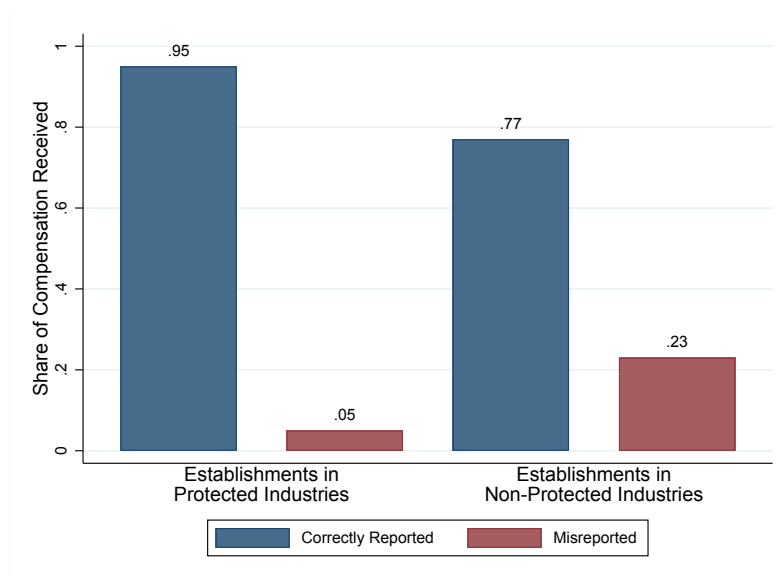
60% 70%

CRÉER ANNULER

Notes : This Figure is a snapshot of the instructions employers face to submit a new STW claim on the dedicated online platform. Employers first report their claim identifier (first line), then the month for which they want to submit a claim (second line), and lastly the rate of government contribution they are eligible to (third line, red rectangle). They can choose between a level of government contribution of 60% of the worker's hourly wage — i.e. with the employer covering the residual 10% — (non-protected industries) or of 70% — i.e. no employer proportional contribution — (protected industries). This snapshot is extracted from a supporting document provided to employers to help them in the claiming procedure through a step by step decomposition of the claiming process (Version 03 : August 3rd, 2020). The document contains a link to the Government press release of June 10, 2020 establishing the list of protected industries.

Misreported Outcome

FIGURE 2.D.2: SHARE OF COMPENSATION RECEIVED (€) UNDER EACH GENEROSITY REGIME, BY ASSIGNMENT



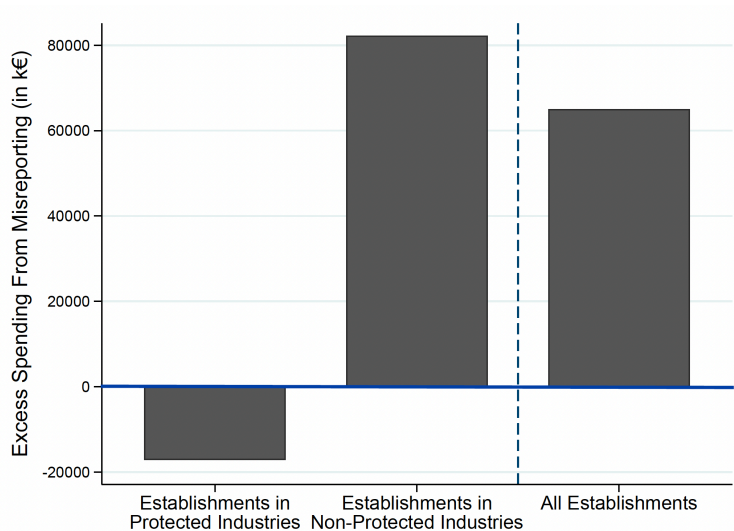
Notes : This Figure exhibits reporting errors of establishments in protected and non-protected industries. It uses as an outcome total compensation. The first (resp. last) two columns correspond to reporting behavior of establishments in protected (resp. non-protected) industries. Blue columns correspond to compensation in the assigned protected regime while red columns correspond to compensation in the other regime. Establishments in protected industries do not have to contribute to short-time work compensation below the cap while establishments in non-protected industries have to contribute by 10% of worker gross hourly wage. Column 2 corresponds to compensation received by protected establishments under a less generous regime than assigned. Establishments in non-protected industries are compensated relatively more under a more generous regime than assigned to (22%) than establishments in protected industries are under a less generous regime than assigned to (5%). The sample corresponds to short-time work compensation between June and October 2020

TABLE 2.D.2: ASSIGNED VS REPORTED PROTECTED STATUS AMONG STW COMPENSATION, BETWEEN JUNE AND OCTOBER 2020

Assigned Status	Reported Status		Share Misreported
	Non-protected	Protected	
I. Number of Firms			
Non-Protected	247,463	105,933	30%
Protected	22,015	155,392	12%
II. Number of Hours of STW (k)			
Non-Protected	172,362	47,366	22%
Protected	9,434	169,486	5%
III. Total Government Contribution to STW (k €)			
Non-Protected	1,858,760	527,223	22%
Protected	91,838	1,795,815	5%

Notes : This Table covers STW compensation between June and October 2020. During this period, employers in protected industries do not need to contribute to worker compensation below the threshold while employers in non-protected industries contribute proportionally to worker compensation by 10% of their gross hourly wage. When claiming STW, employers were asked to report their protected status. This table compares assignment to reported protected status. The rows corresponds to the assignment as per the legislation, based on establishments industry code. Column 1 and 2 corresponds to the reported status in STW compensation, that is STW claims that have been approved and for which a transfer has been made. Column 1 corresponds to STW compensation under protected regime while column 2 under non-protected regime. The last column computes the fraction of outcome compensated under the wrong protected regime as a share of total outcome. For establishments assigned to the non-protected (resp. protected) regime, this corresponds to the ratio of the outcome compensated under the protected (resp. non-protected) regime over the sum of the two columns.

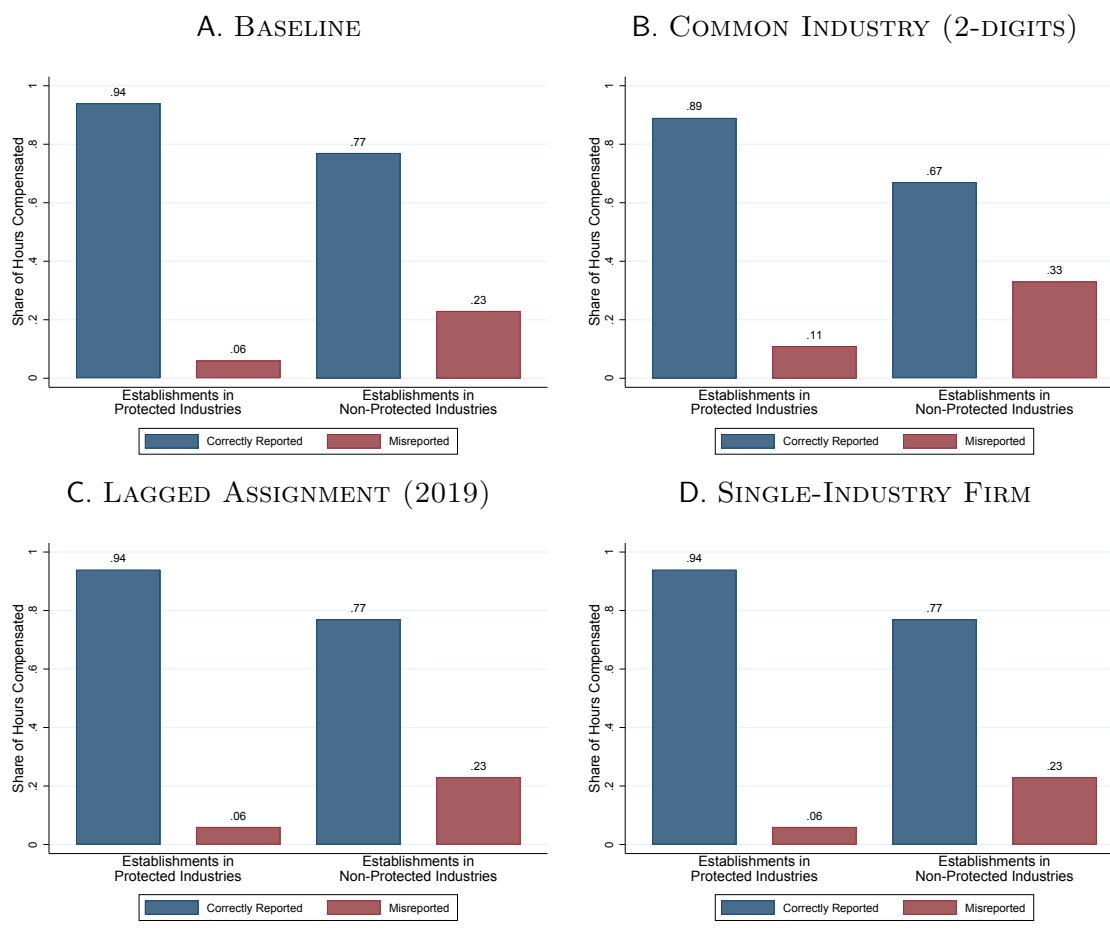
FIGURE 2.D.3: EXCESS SPENDING FROM MISREPORTING



Notes : This Figure decomposes government net excess contribution in thousand € due to misreporting between June and October 2020. During this period, employers in protected industries do not need to contribute to worker compensation below the threshold while employers in non-protected industries contribute proportionally to worker compensation by 10% of their gross hourly wage. When claiming STW, employers were asked to report their protected status. Column 1 corresponds to what the government saves from establishments assigned to protected industries but claiming as a non-protected industry. Column 2 correspond to excess spending due to establishments assigned to non-protected industries but claiming as a protected industry. Column 3 is equal to the difference between the two. Over the period of interest, the government spends more than €60 million in excess to what it should have spent absent the opportunity to misreport the protected status.

Robustness

FIGURE 2.D.4: ROBUSTNESS - SHARE OF HOURS COMPENSATED UNDER EACH GENEROSITY REGIME, BY ASSIGNMENT, FOR VARIOUS SAMPLES



Notes : These Figures reproduces the exercise of Panel B of Figure 2.4.6. It compare the reporting errors of establishments in protected industries to that of establishments in non-protected industries. Panel A reproduces the baseline results. Panel B restricts the sample to broad industry codes (2 digits) that comprise both protected and non-protected industry codes (5 digits). The thought experiment is to compare reporting behavior for groups for which "good faith" reporting errors are likely both ways. Panel C and D tackle robustness based on assignment definition. Panel C uses as an assignment industry code in 2019 rather than contemporaneous (2020). It makes the diagnosis immune to manipulation of the industry code as a response to policy design. Panel D is restricted to single-activity firms. Employers in multiple-establishments firms can claim STW via a single claim. To isolate potential misclassification due to this pooling of claims, I restrict the sample to single-activity firms. Interestingly, Panels C and D yield the exact same measure of excess misreporting. Panel B nuances the diagnosis slightly with both a higher baseline probability of reporting error among protected establishments (11% compared to 6%) and a greater difference in probability (22 p.p. compared to 17p.p.).

Heterogeneity by Establishment Characteristics

Method Due to the exhaustive nature of the sample, there is enough statistical power to conduct a rich analysis of heterogeneity of misreporting behavior by establishment characteristics. To analyse how heterogeneity along some dimension H affects the probability to misreport, I discretize H into bins. The baseline specification underlying the reduced form graphical evidence is :

$$Pr(\hat{\rho}_{it} \neq \rho_{it}) = \alpha + \beta \times \mathbb{1}\{s \in \mathcal{E}\} + \sum_h \gamma_h \times \mathbb{1}\{H = h\} + \epsilon_{i,s,t} \quad (D1)$$

with $Pr(\hat{\rho}_{ist} \neq \rho_{ist})$ the probability to misreport the generosity regime for establishment i , belonging to industry code s , in week t . An establishment is either assigned to the group of industry codes where employers contribute proportionally to STW ($s \in \mathcal{E}$) or to the group of industry codes that face no proportional contribution ($s \in \mathcal{E}^C$).

The coefficient of interest is β . It corresponds to the average difference in misreporting behavior across establishment assigned to the proportional contribution ($s \in \mathcal{E}$) relative to those who are not ($s \in \mathcal{E}^C$), controlling for differences in establishment characteristics H . Figure 2.D.5 reports this estimated coefficient as well as the corresponding standard errors.

Then, I decompose this average effect along the H dimensions of establishment heterogeneity. I fully interact assignment to the non-protected regime with all dimensions of heterogeneity (H). I estimate the following regression :

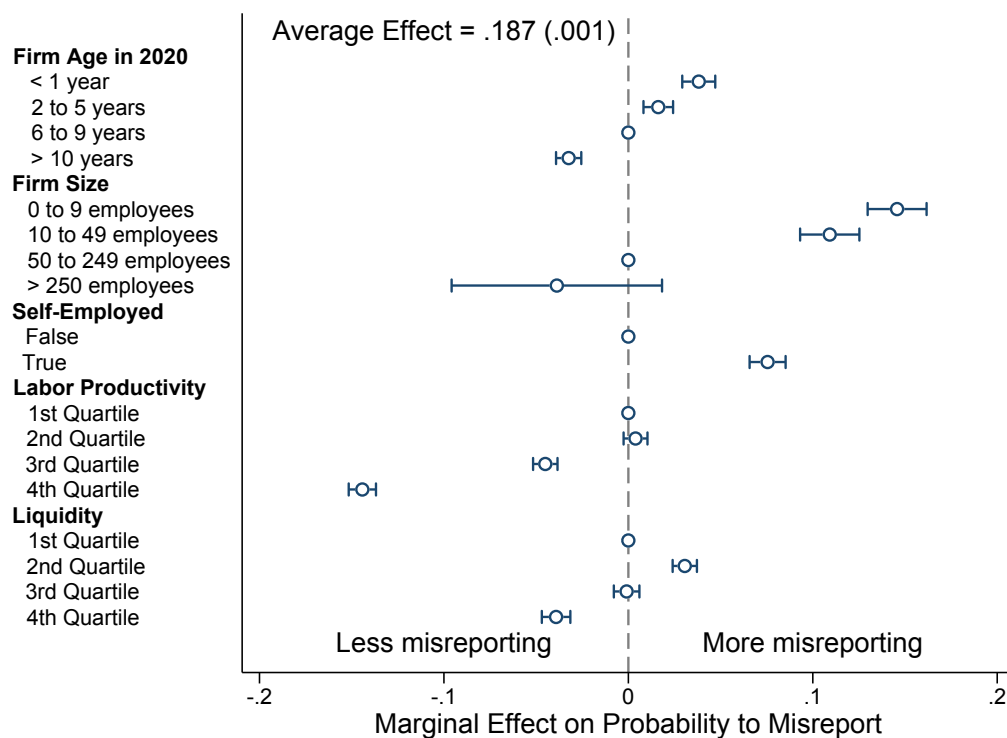
$$\begin{aligned} Pr(\hat{\rho}_{it} \neq \rho_{it}) = & \tilde{\alpha} + \sum_h \beta_h \times \mathbb{1}\{s \in \mathcal{E}\} \times \mathbb{1}\{H = j\} \\ & + \sum_h \tilde{\gamma}_h \times \mathbb{1}\{H = h\} + v_{i,s,t} \end{aligned} \quad (D2)$$

The coefficients of interest are the β_h . They correspond to the relative difference in misreporting behavior across the two groups along the dimension h of establishment characteristics, when all dimensions H are entered simultaneously into the specification.

In both regressions, standard errors are clustered at the establishment level. I focus on esta-

blishment characteristics (age, size, productivity) well as characteristics affecting the ability to mitigate the shock (liquidity) and characteristics usually associated with misreporting (self-employed status). Figure 2.D.5 reports the estimates of β_h as well as their 95% confidence intervals. All estimates are relative to the baseline category for each dimension.

FIGURE 2.D.5: EXCESS MISREPORTING BY NON-PROTECTED ESTABLISHMENTS, BY ESTABLISHMENT CHARACTERISTICS



Notes : The graph analyzes heterogeneity in misreporting behavior by establishment characteristics. The figure reports the estimate of the effect of having characteristic H interacted with assignment to the non-protected regime on the probability to misreport its generosity regime upon claiming STW. Estimates come from a linear regression of the probability to misreport the generosity regime upon claiming STW on an dummy for assignment to the non-protected regime, a set of establishment characteristics H (size, age, self-employed, labor productivity, liquidity, broad industry code) and their interaction terms. Note that all dimensions of heterogeneity are entered simultaneously in the regression. All estimates are relative to the baseline category for each dimension. For age, the baseline category is establishments aged between 6 and 9 years. For size, the reference category is establishments which comprise between 50 and 249 employees. For self-employed, the baseline category are the non-self-employed. Finally, for labor productivity, defined as value added per full-time employee and for liquidity, defined as the total level fo assets, results are relative to the bottom quartile of the distribution as per 2019. The estimated coefficient corresponds to the average effect of being assigned to the non-protected regime, relative to those assigned to the protected regime, on the probability to misreport the generosity regime upon claiming STW. Standard errors are clustered at the establishment level.

D.4 Event Study

Weekly Information on STW Take-Up

TABLE 2.D.3: WEEKLY AND MONTHLY INFORMATION ON SHORT-TIME WORK TAKE-UP

	Monthly Information	Weekly Information	Share Weekly
I. All Industries			
Establishments (k)	661	541	.82
Workers (k)	5,464	3,520	.64
Hours (k)	867,929	555,796	.64
II. Protected Industries			
Establishments (k)	117	98	.84
Workers (k)	881	571	.64
Hours (k)	227,851	145,381	.65
III. Non-Protected Industries			
Establishments (k)	544	443	.81
Workers (k)	4,583	2,950	.64
Hours (k)	640,078	410,415	.64

Notes : This Table compares the information on short-time work take-up from two variables. Both variables come from worker level data on STW take-up. The first column corresponds to monthly level information STW consumption while the second column corresponds to an aggregation, at the monthly frequency, of weekly level information. Monthly information is exhaustive, while weekly information is not. Information on weekly hours worked and of STW is not available for every worker due to flexible work arrangements that do not specify a split of hours worked across weeks. Working at the weekly frequency allows to isolate precisely policy changes. This table compares the coverage of the weekly sample to that of the monthly sample. The sample spans from April to July 2020, around the time of the first increase in proportional employer contribution among establishments in non-protected industries. The sample is restricted to establishments in industries whose protected status is constant over the period. The diagnosis is declined for the entire sample (I.) and by protected status of establishments (II. and III.). All outcomes are expressed in thousands. The loss of information is small in terms of number of establishments (18%) and slightly larger in terms of workers and hours of STW (36%). This holds in similar proportions in both sub-groups.

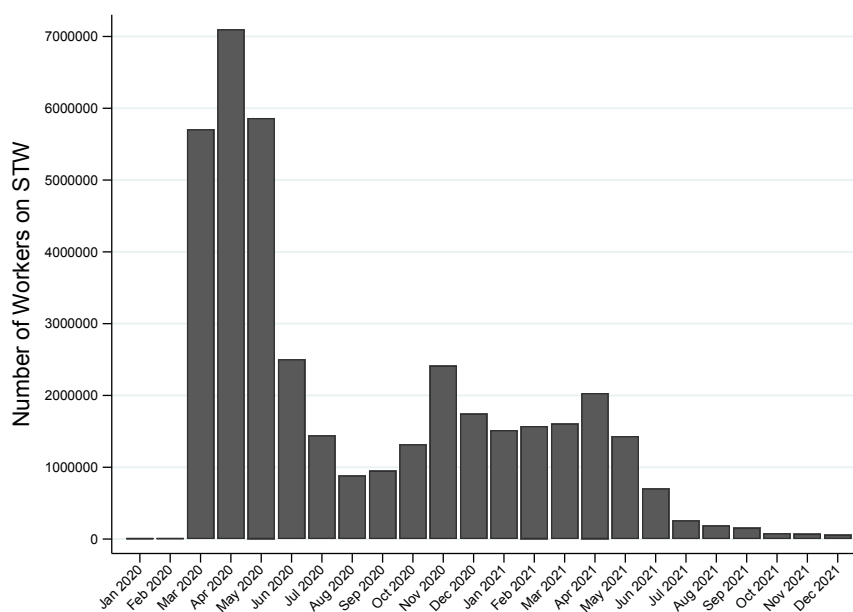
TABLE 2.D.4: WORKER CHARACTERISTICS IN WEEKLY AND MONTHLY SAMPLES

	Monthly Information		Weekly Information	
	Mean	(s.d.)	Mean	(s.d.)
I. Worker Characteristics				
Prop. of female	.40	.49	.41	.49
Age	40.98	11.43	40.82	11.57
Occupation				
Executive/Manager	.15	.36	.07	.26
Low qualified white collar	.49	.50	.52	.50
Manual Worker	.36	.48	.41	.49
II. Short-Time Work Take-Up				
Hours of STW	157.22	122.71	157.88	121.38
Compensation (in €)	1,766.41	1,636.53	1,655.95	1,458.25
Hourly Gov. Contribution	11.43	7.91	10.73	8.87
N	5,464,303		3,520,416	

Notes : This Table compares the characteristics of workers on STW for which information is available at the monthly frequency (columns 1 and 2) to the sub-set of workers for which information is also available at the weekly frequency (columns 3 and 4). For every worker on STW, information is available at the monthly frequency. For a large set of them, information is also available at the weekly frequency. Working at the weekly frequency allows to isolate precisely policy changes. This table compares the coverage of the weekly sample to that of the monthly sample. Information on worker characteristics comes from reported information by employers upon claiming short-time work. The sample spans from April to July 2020, around the time of the first increase in proportional employer contribution among establishments in non-protected industries.

Short-Time Work Take-Up at Weekly Frequency

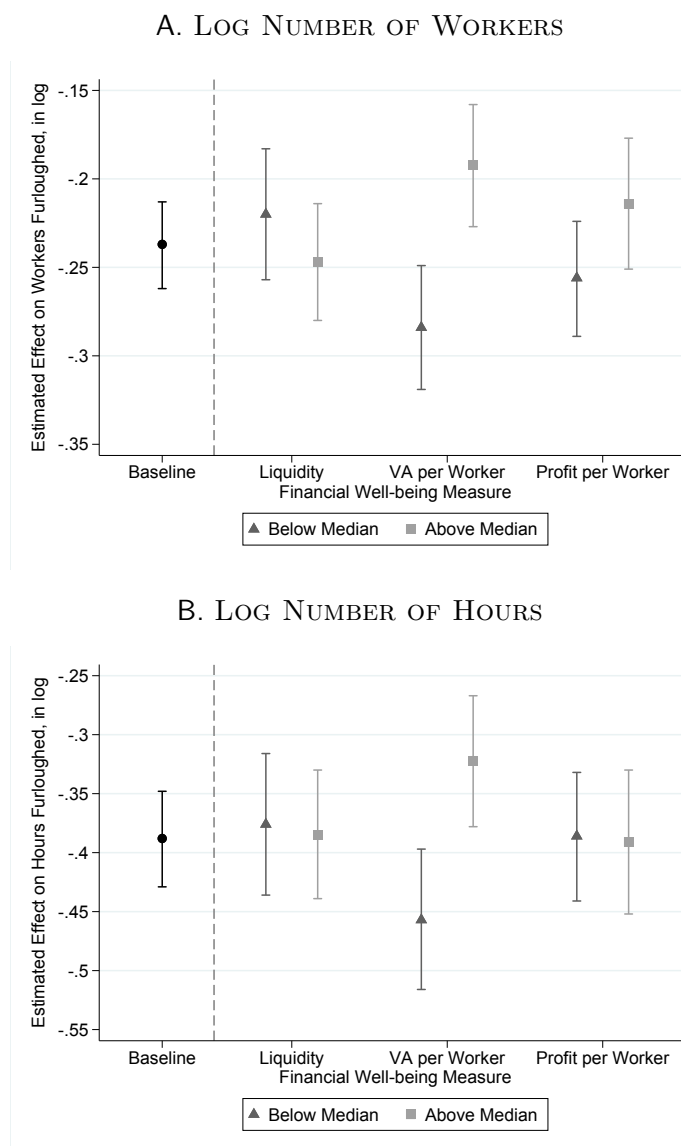
FIGURE 2.D.6: WEEKLY NUMBER OF WORKERS ON STW OVER TIME



Notes : This figure shows monthly short-time work utilization at the worker level. Sample is restricted to the main short-time work scheme — *activité partielle classique*. Sample is restricted to workers aged 20-65 in Metropolitan France and excludes trainees and subsidized jobs. Short-time work usage corresponds to validated claims and for which a compensation has been made in month m . The number of workers corresponds to the number of workers with at least one hour of STW in the month of interest. Figure 2.A.1 reproduces this graph using as outcome the number of firms taking-up the program and the number of hours compensated.

Heterogeneity by Establishment Characteristics

FIGURE 2.D.7: STW TAKE-UP RESPONSE TO AN INCREASE IN EMPLOYER CONTRIBUTION, BY ESTABLISHMENT CHARACTERISTICS



Notes : This figure reports the estimated IV coefficient β_{IV} of the effect of an increase of the cost of the program following the IV regression in specification (2.2). Panel A uses as an outcome the log number of workers on STW while Panel B uses as an outcome the log number of hours of STW conditional on claiming STW. The IV coefficient is estimated for the entire sample (baseline) and then subsequently by establishment characteristics. To do so, I interact the treatment dummy with establishment characteristics in the estimation. I use three measures of financial well-being : liquidity, value added per worker and profit per worker. Establishments are categorized based on their rank relative to the median in terms of each characteristics (above or below). Both panels suggest that more liquidity constrained firms respond more to the increase in the cost of the program in terms of STW usage and that more productive firms (higher value added or profits worker) respond less.

2.E Fiscal Externality

Setting The setting is inspired from [Giupponi and Landais \[2022\]](#). There is a unit mass of individuals. A share n of them are on STW, a share u of them are unemployed, and the remaining $(1 - n - u)$ are fully employed and not on STW. Let us define \bar{h} the contractual working hours. Fully employed workers work for \bar{h} hours and unemployed individuals receive unemployment insurance on this base too. Workers on STW work for h hours and are on STW for the remaining $(\bar{h} - h)$ hours.

The government raises taxes on earnings from work. Workers earn a gross hourly wage ω and are taxed at a rate t . The government raises $t \cdot \omega \cdot h \cdot n$ of revenue from hours worked of workers on STW (A) and $t \cdot \omega \cdot \bar{h} \cdot (1 - n - u)$ of revenue from the fully employed workers (B). The government spends $b \cdot \omega \cdot \bar{h} \cdot u$ on unemployed individuals (C), with b the replacement rate of unemployment insurance, and $\tau \cdot \omega \cdot (\bar{h} - h) \cdot n$ on workers on STW for their hours not-worked (D), with τ the replacement rate of STW.

The budget constraint writes :

$$\underbrace{t \cdot \omega \cdot h \cdot n}_{\substack{\text{Contrib. on hours worked} \\ \text{by worker on STW} \\ \text{(A)}}} + \underbrace{t \cdot \omega \cdot \bar{h} \cdot (1 - n - u)}_{\substack{\text{Contrib. Fully-Employed} \\ \text{(B)}}} = \underbrace{b \cdot \omega \cdot \bar{h} \cdot u}_{\substack{\text{Unemployment Benefits} \\ \text{(C)}}} + \underbrace{\tau \cdot \omega \cdot (\bar{h} - h) \cdot n}_{\substack{\text{STW compensation} \\ \text{for hours of STW} \\ \text{(D)}}$$

Derivation I fully differentiate the government constraint with respect to τ to isolate the effect of a marginal increase in transfer by €1 on government spending. I use the following simplifying assumptions : (i) $d\omega/d\tau = d\bar{h}/d\tau = 0$, no reaction of hourly wage and contractual hours (ii) $du/d\tau = -dn/d\tau$, i.e. (symmetric) flows between U and STW, and finally, (iii) $d(1 - u - n)/d\tau = 0$, an absence of reaction through the employment margin. These assumptions will be discussed later in this section, in light of the empirical findings of Sections [2.2](#) and [2.3](#). Then, I re-arrange and isolate the elasticities, and finally re-arrange to isolate $\frac{dt}{d\tau}$.

Detailed Derivation

1. Start from the budget constraint

$$\underbrace{t \cdot \omega \cdot h \cdot n}_{\substack{\text{Contrib. on hours worked} \\ \text{by worker on STW} \\ \text{(A)}}} + \underbrace{t \cdot \omega \cdot \bar{h} \cdot (1 - n - u)}_{\substack{\text{Contrib. Fully-Employed} \\ \text{(B)}}} = \underbrace{b \cdot \omega \cdot \bar{h} \cdot u}_{\substack{\text{Unemployment Benefits} \\ \text{(C)}}} + \underbrace{\tau \cdot \omega \cdot (\bar{h} - h) \cdot n}_{\substack{\text{STW compensation} \\ \text{for hours of STW} \\ \text{(D)}}$$

2. Differentiate with respect to τ

$$\underbrace{\frac{dt}{d\tau} \cdot h \cdot n + t \cdot \frac{dh}{d\tau} \cdot n + t \cdot h \cdot \frac{dn}{d\tau}}_{\text{(A)}} + \underbrace{\frac{d}{d\tau} \cdot \bar{h} \cdot (1 - n - u)}_{\text{(B)}} - \underbrace{t \cdot h \cdot \left(\frac{dn}{d\tau} + \frac{du}{d\tau} \right)}_{=0} =$$

$$\underbrace{b \cdot \bar{h} \cdot \frac{du}{d\tau}}_{\text{(C)}} + \underbrace{\tau \cdot (\bar{h} - h) \cdot \frac{dn}{d\tau} - \tau \cdot \frac{dh}{d\tau} \cdot n + (\bar{h} - h) \cdot n}_{\text{(D)}}$$

3. Re-arrange and isolate elasticities

$$\frac{dt}{d\tau} \cdot [h \cdot n + \bar{h} \cdot (1 - n - u)] = n \cdot (\bar{h} - h)$$

$$- [t \cdot n + \tau \cdot n] \cdot \underbrace{\frac{dh}{d\tau} \cdot \frac{\tau}{h}}_{= \epsilon_{h,\tau}}$$

$$+ [\tau \cdot (\bar{h} - h) - b \cdot \bar{h} - t \cdot h] \cdot \underbrace{\frac{dn}{d\tau} \cdot \frac{\tau}{n}}_{= \epsilon_{n,\tau} \cdot \frac{n}{\tau}}$$

4. Factorize by $n \cdot (\bar{h} - h)$ to isolate mechanical effect per unit of subsidy

$$\frac{dt}{d\tau} \cdot [h \cdot n + \bar{h} \cdot (1 - n - u)] = n \cdot (\bar{h} - h) \cdot \left[\underbrace{1}_{\substack{\text{Mechanical effect}}} \right.$$

$$\left. - \underbrace{\left[\frac{t \cdot h}{\tau \cdot (\bar{h} - h)} + \frac{\tau \cdot h}{(\tau \cdot \bar{h} - h)} \right]}_{\substack{\text{Behavioral response on hours margin}}} \cdot \epsilon_{h,\tau} \right.$$

$$\left. + \underbrace{\left[1 - \frac{b \cdot \bar{h}}{\tau \cdot (\bar{h} - h)} - \frac{t \cdot h}{\tau \cdot (\bar{h} - h)} \right]}_{\substack{\text{Behavioral response on STW margin}}} \cdot \epsilon_{n,\tau} \right]$$

5. Rescale to isolate $\frac{dt}{d\tau}$

$$\frac{dt}{d\tau} = \frac{n \cdot (\bar{h} - h)}{[h \cdot n + \bar{h} \cdot (1 - n - u)]} \cdot \left[\underbrace{1}_{\text{Mechanical effect}} - \underbrace{\left[\frac{t \cdot h}{\tau \cdot (\bar{h} - h)} + \frac{\tau \cdot h}{\tau \cdot (\bar{h} - h)} \right]}_{\text{Behavioral response on hours margin}} \cdot \epsilon_{h,\tau} + \underbrace{\left[1 - \frac{b \cdot \bar{h}}{\tau \cdot (\bar{h} - h)} - \frac{t \cdot h}{\tau \cdot (\bar{h} - h)} \right]}_{\text{Behavioral response on STW margin}} \cdot \epsilon_{n,\tau} \right]$$

Formula for Fiscal Externality

$$\frac{dt}{d\tau} = \underbrace{\frac{n \cdot (\bar{h} - h)}{[h \cdot n + \bar{h} \cdot (1 - n - u)]}}_{\text{Rescaling factor}} \cdot \left[\underbrace{1}_{\text{Mechanical effect}} - \underbrace{\left[\frac{t \cdot h}{\tau \cdot (\bar{h} - h)} + \frac{\tau \cdot h}{\tau \cdot (\bar{h} - h)} \right]}_{\text{Behavioral response on hours margin}} \cdot \epsilon_{h,\tau} + \underbrace{\left[1 - \frac{b \cdot \bar{h}}{\tau \cdot (\bar{h} - h)} - \frac{t \cdot h}{\tau \cdot (\bar{h} - h)} \right]}_{\text{Behavioral response on STW margin}} \cdot \epsilon_{n,\tau} \right]$$

The structure of the formula is relatively standard : a rescaling parameter which multiplies a mechanical cost plus some additional cost due to behavioral responses. The rescaling factor has a similar structure to the standard Baily-Chetty formula for UI. It corresponds to the relative weight of beneficiaries (hours of STW for workers on STW) over the weight of contributors (taxes raised on contractual hours by fully employed individuals and hours worked by workers on STW).

The cost due to behavioral responses can be decomposed along two dimensions : an intensive margin response — hours worked by workers on STW — and an extensive margin response — along the STW margin. A reduction of hours worked by STW takers by one hour, translates

into lower revenues from one less hour of work and increased spendings from one more hour of STW to compensate. An increase in the share of workers on STW (from the pool of unemployed) can be decomposed into (i) one more worker to compensate under STW schedule for hours of STW (first element, 1), (ii) savings on UI compensation (second element) and (iii) increased revenues from taxes on hours worked by the STW worker (third element). All of these are rescaled by the elasticity of hours of work (resp. STW take-up) to STW generosity.

In order for the formula to fully match the French context, one would have to incorporate a non-linear schedule, to make the kink appear, and to allow for a reporting margin.

2.F Additional Elements on Misreporting and Fraud

Reporting margin There are strong arguments in favor of using the reporting margin in the context of COVID. Allowing for reporting can be desirable as (i) it allows for expediency — i.e. if the match with other administrative records is not available, and (ii) if there are lags in retrieving/updating information (new firms/hires, changes in economic circumstances). There are however costs associated with this. First, there is a mechanical cost — misreporting affects the level of government contribution. Second, there is a cost due to behavioral responses — firms face different incentives than the ones intended (lower levels of contribution, etc).

Elements on audits and fraud This Appendix section provides elements on audit threats, realised audits, and sanctions. The goal is (i) from an *ex ante* perspective, to understand the information available to firms to form their beliefs on audit probability and expected sanctions (ii) from an *ex post* perspective, to understand how these audit threats materialised. The section first covers France – which is the context of the paper – and then the United Kingdom for which extensive information on the topic is available.

F.1 France

Communication The government advertised extensively STW programs on traditional media – press, television, or radio – and on social media. They put forward the simplified procedures, the absence of eligibility conditions and the increased generosity from both the worker and the employer perspectives. The goal was to push for labor adjustment on the intensive margin – through hours reductions – rather than on the extensive margin – through separations.

While promoting STW usage, it also asserted its intent to mitigate fraud. A good illustration of this is a press release from September 2020 joint between the then Minister of Labor, Elisabeth Borne, and deputy Minister of Public Action and Accounts, Olivier Dussopt.³⁴ The Minister of Labor states that : *"We stand by our choice of a simple program to quickly*

34. The press release is available here : [link](#).

support businesses and employees. (...) State services are mobilised to protect and insure French people, but also to identify fraudsters. More than 270,000 checks have been carried out (...) We will continue these checks and will be uncompromising with those who commit fraud." The deputy Minister of Public Action and Accounts further adds : *"Our aim is for every penny spent on social assistance to help support businesses (...) We are more than ever ensuring to detect and punish all attempts of fraud, and in the coming days, we will further strengthen the performance of our tools."*

Sanctions Sanctions ranged from repaying government contributions, to ineligibility to government subsidy for 5 years, and legal sanctions.

Initially, information on sanctions were hard to find. They were progressively incorporated to government communication. For example, there is now a dedicated section on sanctions faced in case of fraud and one on voluntary repayment of STW contribution in the Q&A section dedicated to STW on the Labor Ministry webpage and on the public services webpage.³⁵ At the bottom of the section dedicated to government transfer to employers, one can find : *"in case of fraud or fraudulent reporting, the employer faces up to 2 year of imprisonment and 30,000€ of fines"*.

Information on audits I leverage four sources :

- A press release from the Minister of Labor and deputy Minister of Public Action and Public Accounts from September 2020 entitled "Strengthening of the Fraud Control System for Short-Time Work"
- A press release from the Minister of Labor from May 2023 entitled "Assessment of the Control and Anti-Fraud Actions Carried Out by Government Services Since 2020"
- An intermediary report from the Committee on the Monitoring and Evaluation of Financial Support Measures for Companies Confronted with the Covid-19 Epidemic (Comité Coeuré) published in April 2021

35. See for example : <https://travail-emploi.gouv.fr/emploi-et-insertion/accompagnement-des-mutations-economiques/activite-partielle-chomage-partiel/faq-chomage-partiel-activite-partielle#sanctions> and <https://entreprendre.service-public.fr/vosdroits/F23503>

- A report from the Ministry of Labor published in January 2023 entitled "Short-Time Work Take-Up During the Pandemic : the Role of Employer Contribution"

Audit methods The 2020 Press Release states that many safeguard against fraud are in effect. *Ex ante*, there is a detection of inactive firm or of multiple claims and progressive cross-checking of information with administrative records. Additionally, in October 2020, the government reverted to a 15 days delay before tacit agreement of the STW claim back from 2 days since the start of the pandemic. This gave public authorities more time to process claims and made *ex ante* checks possible. *Ex post*, they proceed to (i) inspections on-the-spot or on the basis of documents and (ii) identification of fraudulent email addresses. Among tools that will be deployed to prevent fraud are the development of an IT tool for fraud detection, extended linkages across data sets. All documents point to an unprecedented cooperation across government agencies — information sharing and coordinated actions.

Audits were performed either on-documents or on-site. On-documents audits consist in cross-checking reported information with information available in pay-slips, employment contracts, and union consultation reports. On-site audits involve workplace inspection to check whether workers are present. Indeed, initially the focus was on "illegal work", i.e. workers reported as on STW while actually working – and then progressively shifted towards fraud.

Targeted claims Initially, fraudulent claims were flagged based on a set of indicators : (i) recently created firms, (ii) multiple establishments linked to a single bank statement, (iii) suspect email addresses, (iv) retroactive claims (accounts created over the summer 2020), and (v) suspicion by one of the agency involved. [Coeuré \[2021\]](#) states that initially the main targets were STW claims for workers in tele-workable occupations or compensated at a high hourly rate. Audits were targeted in sectors with high STW take-up – e.g. construction, public administration, economic consulting, .. — and based on knowledge of local economic conditions. Audits could also be initiated by a complaint or a report to the work inspection. The second press release suggests that significant effort has been put on refining the tools used to detect fraud and the targeting of the investigations.

Frequency of audits

TABLE 2.F.1: FREQUENCY AND OUTCOMES OF AUDITS

Time Period	Frequency of Audits	Outcome of Audits	Information Source
May-Aug. 2020	220,000 <i>ex ante</i> 50,000 <i>ex post</i>	Estimated fraud : 225m € (7.5% spendings) 50% already stalled or recovered	Press Release 2020
2020-2021	> 1 million <i>ex ante</i> >89,000 <i>ex post</i>	Stalled/Rejected claims : 319m € STW claims to recover : 217m € 41.8m € voluntary repayment or withholding	Press Release 2023
2020 - June 2021	61,000 audits initiated 47,700 cases closed	62% cases conform 31% required financial regularisation (9 in 10 unfavourable to employer) 7% fraud suspicion	Comité Coeuré

Notes : This Table documents figures available on audits and fraud in the documents available to the public.

Misreporting of protected status In the fall of 2020, local authorities were asked to investigate a sample of claims in the sectors most affected by misreporting of the generosity regime they were eligible to. The investigation concludes that a very large share of claims (87%) corresponded to claims where the employer claimed under a more generous regime than the one they were eligible to ("fraud"). For the remaining 13%, they found that the actual economic activity of the firm did not match their reported industry code but actually corresponded to a sector eligible to the more generous regime. Among those who misreported, they conclude that 90% of employers were either not aware of the policy change, or uncertain on the list of sectors affected by the change in generosity, or confused between government contribution and worker compensation. Finally, 10% of employers who misreport were considered as outright fraud and further investigation took place. I have asked the authors of the report of the Ministry of Labor for further information on this investigation but they were told not to communicate beyond what was available in the policy note.

F.2 United Kingdom

Program at glance The United Kingdom did not have a pre-existing STW scheme and set up two schemes from scratch at the onset of the pandemic : the Coronavirus Job Retention Scheme (CJRS) for businesses and their employees, and the Self-Employment Income Support Scheme (SEISS) for the self-employed. The main scheme entailed $\frac{1}{2}$ 69.2 billion of STW payments, covering 1.3 million employers and 11.7 million jobs. The self-employed scheme gave rise to £28.1 billion of compensation to £2.9 million self-employed people. While initially, the main scheme corresponded to most of the spendings (£61,507m against £19,745m) between 2020 and 2021, both schemes accounted for similar amounts in the following period (respectively £8,727m and £8,372m).

Anticipating fraud and errors Early into the pandemic, the National Audit Office (NAO) was commissioned to document the anticipated risks of fraud ([National Audit Office \[2020\]](#)). The focus was opportunistic fraud. In the main scheme, this corresponds to employer claiming STW while their employees work, employer not passing on STW payments to their employees, and employers inflating claims. In the self-employed scheme, the concern was inflated reported profit.

To identify fraud, the HMRC — *His Majesty's Revenue and Customs* — conducted two random enquiry programs : one between March and October 2020 and another between March 2020 and September 2021. Several reports were made available to the public, this section relies on the 2023 version ([Revenue and Customs \[2023\]](#)).

Fraud Out of the £97 billion disbursed, it is estimated that £5.0 billion were the result of error and fraud (£3.5 billion in the main scheme and £1.5 billion in the self-employed scheme). The average error and fraud is constant for the main scheme over time (5.1% in 2020-2021 and 4.9% in 2021-2022) while the fraud rate increases in the self-employed scheme, from 3% in 2020-2021 to 10% in 2021-2022. This is suggestive of dynamic selection into claiming the programs.

Reason for fraud In the main scheme, between March and June 2020, *illegal work* was a major cause of fraud. This was a consequence of the initial rigidity of the program. It was initially conditional on a 100% reduction in hours worked ; and later relaxed to allow for part-time STW. Over the period, employers claiming for employees who are working account for £2,270 million of compensation (3% of total compensations).

In the self-employed scheme, initially organised crime corresponded to a third of fraudulent claims (36%) and opportunistic fraud to an additional quarter (26%). In 2021-2022, the former represented a much smaller share of fraudulent claims (4%) while opportunistic fraud accounted to 29% of them.

Recovering the money As of March 2022, HMRC had issued £3.5 million of penalties to those who over-claimed self-employed grants (7% of overpayments). For the main scheme, the figure was £1.1 million (0.5% of overpayments). This suggests substantial frictions in recovering overpayments.

Chapitre 3

Employed In-House or Outsourced - Where Do Workers in Services Stand ?

Abstract

Using exhaustive French administrative data on workers and firms, I document the evolution of the provision of food, cleaning, security and logistics — henceforth FCSL — services to firms. First, I find that around 47% of the workers providing these services are employed by external contractors, suggesting a large recourse to outsourcing. Second, I offer different strategies to identify domestic outsourcing events based on previous work by [Goldschmidt and Schmieder \[2017a\]](#) and on a descriptive analysis of the French labor market. Third, I examine the effect of outsourcing on wages. Outsourced workers earn on average 15% less annually than workers employed in-house, with workers characteristics playing a large role in this difference in earnings. Finally, I find some evidence for rent-sharing and a positive correlation with the probability of outsourcing events.

Keywords : Firm Employment Decisions, Contracting-Out, Labor Contracting Devices, Segmented Labor Markets, Wage Differentials

JEL-codes : J21, J31, J42, L24, M51, M55 ¹

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Introduction

Domestic outsourcing has become a prevalent practice. Firms are increasingly focusing on their core activities, leaving other tasks to specialized service providers. Despite the magnitude of the phenomenon, there is no clear diagnosis of the prevalence and evolution of domestic outsourcing of services to firms in the context of France. Domestic outsourcing affects both workers and firms. For workers, being hired by a service contractor rather than in-house often translates into wage loss and reduced amenities. For firms, we need better insight into their motivation to outsource and the impact of domestic outsourcing on their organizational structure.

This paper addresses the following questions : How did domestic outsourcing evolve over the last twenty years? What is the effect of domestic outsourcing on the wages of outsourced workers? What drives firms to outsource? How relevant is the rent-sharing – and exclusion from firm-rent – channel?

Method This paper studies the incidence and effects of domestic outsourcing using exhaustive employer-employee data for France over nearly two decades (2002-2018).

First, I document the prevalence of domestic outsourcing in France, assessing the extent to which service workers are still employed in-house or by external contractors. I focus on the provision of food, cleaning, security, and logistics services – henceforth referred to as FCSL.² I find that a significant proportion of FCSL workers are employed by business service firms or temp agencies. The proportion of 'outsourced' workers increases progressively over the period of interest, despite starting from high levels in 2002 (nearly 50%). As a mirror image, I document that a considerable share of non-business service establishments no longer employ any workers in FCSL occupations, even though they likely still benefit from such services.

Second, I study outsourcing events. This section builds on [Goldschmidt and Schieder \[2017a\]](#), which identifies 'on-site' outsourcing events based on worker flows. These events correspond

2. There are three reasons for this. First, the content of these jobs has remained stable over the period of interest. Second, they correspond to services from which all firms unambiguously benefit – especially cleaning and security. Third, they correspond to well-defined occupations and industry codes.

to situations where a group of workers, formerly employed in-house, moves to a business service provider or temp agency. The underlying assumption is that, despite the change in the employer, they continue to provide the same services locally. I use exhaustive employer-employee data to track worker flows between establishments. I evaluate the definition of 'on-site' outsourcing events and propose amendments. Taking advantage of a unique feature in French data – information on the filiation between establishments and firms – I assess whether these outsourcing events occur within the boundaries of a single firm or between different firms. Later in the paper, I use these events, combined with other outsourcing events, and correlate them with firm characteristics to address reasons for outsourcing.³

Third, I study the effect of outsourcing on earnings. I retrieve the average difference in earnings between FCSL workers employed in-house and those outsourced. On average, outsourced FCSL workers earn 15% less than their in-house counterparts. Subsequently, I conduct a wage decomposition à la [Abowd et al. \[1999\]](#) – hereinafter referred to as AKM – breaking down differences in wages into establishment and worker pay premia (AKM fixed effects). Initially, I observe that the average establishment pay premium for in-house FCSL workers is higher than that for outsourced workers, consistent with a systematic outsourcing penalty.

Finally, I investigate the role of rent-sharing in the decision to outsource. I assess whether exclusion from firm rent motivates firms to outsource the provision of FCSL services, retaining only core competencies on the payroll. Using an AKM decomposition, I find that : (i) FCSL workers benefit from an establishment pay premium similar to their non-FCSL counterparts when in the same establishment, suggestive of rent-sharing ; (ii) outsourcing establishments – i.e., those with no FCSL workers on the payroll – exhibit higher pay premia than those with in-house provision. Subsequently, I estimate a positive correlation between the probability to outsource and various measures of establishment pay premium, further supporting the exclusion from firm-rent channel.

Literature review There is a growing literature on outsourcing in France. [Bilal and Lhuillier \[2022\]](#) study the welfare effects of domestic outsourcing, putting into perspective its impact

3. I combine 'on-site' outsourcing events with 'layoff' events, which correspond to situations where a firm separates from its last workers in a given FCSL occupation.

on the wages of outsourced workers and on aggregate productivity. [Bergeaud et al. \[2024\]](#) investigate the role of technological change on outsourcing, using broadband expansion as an exogenous shock to identify outsourcing and its effect on earnings. Both papers use direct measures of outsourcing expenditures on the user-firm side (respectively, a survey of firms in [Bilal and Lhuillier \[2022\]](#) and firm-level transactions in high-turnover firms in [Bergeaud et al. \[2024\]](#)). This paper leverages exhaustive data at the establishment level, allowing for a more comprehensive diagnosis and capturing within-firm (and across establishments) adjustments. In the U.S. context, [Dorn et al. \[2018\]](#) examine whether an economic downturn triggers more outsourcing and find limited evidence supporting this during the Great Recession. This paper does not rely on an exogenous shock to identify outsourcing events.⁴

This paper relies extensively on [Goldschmidt and Schmieder \[2017a\]](#), which examines domestic outsourcing in the context of Germany from 1975 to 2009. They find that firms increasingly turn to outsourcing and establish a causal relationship between outsourcing and increased wage inequalities in Germany. Few replications exist in other contexts. [Dorn et al. \[2018\]](#) replicate the analysis for the United States, expanding the set of occupations. There is a tentative replication for the Swedish context, which plays around the definition of on-site outsourcing events ([Wartin \[2019\]](#)). I replicate their main analyses, adapting the framework to the French context.

The paper delves into the literature on rent-sharing and exclusion from firm rent. In this regard, it is closely related to the work of [Drenik et al. \[2023\]](#) on temporary workers. I replicate some of their analyses, providing context for FCSL and non-FCSL workers. Outsourcing serves as a means to exclude workers from establishment-specific pay policies and other amenities, such as pensions and health insurance ([Houseman et al. \[2003\]](#), [Houseman \[2001a\]](#)). I do not address the loss of non-wage amenities.

The study of firms' outsourcing decisions is closely related to the literature on organisational economics ([Gibbons and Roberts \[2012\]](#)). Following [Coase \[1937\]](#)'s seminal paper and the impulse of the 1970s, organisational economics questioned the rationale behind firm exist-

4. The advantage of this approach is that it is potentially more exhaustive and allows for a diagnosis over a large period (rather than being constrained by survey availability or the timing of the shock). The downside is that it is subject to selection into outsourcing.

tence, the nature of tasks performed within firm boundaries, and the impact of organizational structure on firm performance.⁵ Firms cite various reasons for outsourcing portions of their workforce, including adaptability to fluctuations (Abraham and Taylor [1996]), reduced managerial complexity, fairness perception, and labor cost savings (Houseman [2001b]). Berlingieri [2015] establishes a causal link between globalization – an increase in a firm's export destinations – and domestic outsourcing. Legislative restrictions also influence firm activities (e.g., Coase [1988], Autor [2003]). Outsourcing enables firms to sidestep some legal obligations typically found in employment contracts or collective agreements. In France, Perraudin et al. [2006] shows that establishments tend to outsource more below the 50-employee threshold, beyond which worker representation becomes mandatory. I present evidence of a positive correlation between generous collective agreements (proxied by AKM effects) and the probability of outsourcing. Additionally, I observe that one in four outsourcing events occur within firms, underlining the importance of establishment boundaries.

The remainder of the paper proceeds as follows. Section 1 offers a description of the data and the sample. Section 2 studies the dynamics of business services establishments in the FCSL sectors and of temp agencies. Section 3 identifies on-site outsourcing events. Section 4 examines the wage penalty associated with outsourcing. Section 5 discusses the role of rent sharing in the decision to outsource. Section 6 offers a discussions of the findings. Section 7 concludes.

3.1 Data and Sample

3.1.1 French Employer-Employee Data

Employer-Employee Data I use exhaustive French administrative data on workers and establishments. In France, all employers are required to fill in the Annual Declaration of Social Data (DADS) for each of their employees. The compulsory nature of the DADS makes it an

5. Williamson [1971], Williamson [1975], Williamson [1979], Lucas [1978], and others.

exhaustive source of information. There is detailed information on establishments — establishment identifier, main economic activity, number of employees, and labor costs. For each employee, employers provide information on job characteristics — occupation, duration of employment, type of contract, hours worked, and wage — as well as on individual characteristics — gender, age, and place of residence. The data comes in different formats.

Job-Level Data In the job-level data (*fichier postes*), each observation is uniquely identified by a triplet of identifiers (worker, establishment, year). There is detailed information on job characteristics — hours worked, type of contract, gross earnings, duration of the contract. For a given year N , the data contains information on positions over two consecutive years — N and $N-1$. Individual identifiers are renewed each year. As such, it is not possible to follow individuals over time. The present paper mainly uses the job position data.

I sometimes leverage a reconstructed pseudo-panel using this data and the methodology of [Babet and Palladino \[2023\]](#).⁶ This enables to exploit statistically a full panel of wage-earners in France. I use the pseudo-panel to run event-study at the worker-level.

Establishment-Level Data The establishment-level format — *fichier établissements* — provides information at the establishment level such as total employment, industry code, location. Similarly to the job-level data, information is available for the current year N and lagged year $N-1$.

3.1.2 Sample

The analysis covers the years 2003-2017. The choice of time span is mainly driven by changes in data structure. Prior to 2002, the various jobs of a single individual are not linked

6. They use the fact the job-level data contains information on current and lagged year. They overlap information from a given year, say year N , using its occurrence in the file corresponding to year N — as current information — and in the file corresponding to year $N+1$ — as lagged information. They create a pseudo-identifier for wage-earners in France between 1994 and 2020. More specifically, and this is key in our context, they are able to recover the pseudo panel between 2002 and 2020 for both stayers and movers. Due to a different data structure prior to 2002, they can only construct the pseudo-panel for stayers.

through an individual identifier. As such, it is not possible to follow one worker through different employers, even in the course of one year.

Over the course of the paper, two samples are used :

- the 'one job' sample which keeps one observation per worker per year,
- the 'multiple-jobs' sample which allows for multiple job holding patterns.

One Full-Time Job Sample In order to maximize the comparability of my findings with those of [Goldschmidt and Schmieler \[2017a\]](#), similar sample restrictions are implemented.⁷ The sample is restricted to workers in metropolitan France between 21 and 59 years old.⁸ I drop triplets with (1) missing values in the person identifier, gross salary, hours worked, duration of employment, and age; (2) self-employment (pseudo-siren) or unemployment (3) wages considered as outliers. I keep workers with valid occupation outside the public sector, agriculture, and clergy. I also exclude from the sample trainees and apprentices. If the worker has multiple spells, I keep the spell with the higher gross wage. The sample comprises around 15 million observations each year (+/- 3 million).

Multiple Job Sample Based on the literature on workers in food, cleaning, security, and logistics occupations in France, I relax the restriction on the number of jobs. This amendment is driven by two elements of diagnosis. The first one is that part-time jobs are prevalent in the food and cleaning sectors where part-time jobs account for respectively 56% and 35% of jobs in these occupations. On the contrary, in the logistics and security sectors, most jobs are full-time jobs (respectively 82% and 88%). It is possible that workers in part-time jobs actually combine two part-time jobs to make for a full-time contract. Among workers with a FCSL occupation, more than 10% are multiple job holders relative to 6% in the general population. This proportion is even higher for workers in the cleaning sector, where 1 in 3 worker holds multiple jobs. I use this sample to document whether there are configurations where a worker holds multiple jobs in year N-1 — say a cleaner cleaning two different establishments — and

7. More specifically, [Goldschmidt and Schmieler \[2017a\]](#) restrict their sample to full-time male workers for descriptive evidence on general outsourcing and for analyses related to wage (which require an estimated of AKM effects).

8. To study on site outsourcing events, the sample is further restricted to workers aged 25 to 55.

then joins a business services establishment in N — which constitutes her sole employment — while still performing her services for the two establishments she used to work at — i.e. still cleaning the same establishments. In that case, business services establishments would aggregate multiple jobs into a single one.

In order to compare the findings to those of [Goldschmidt and Schmieder \[2017a\]](#), the 'one job' sample is used for the descriptive analysis and estimation strategy. Then, I provide a similar analysis using the 'multiple-jobs' sample. The multiple job sample is also used to characterise multiple job holding patterns in these sectors.

3.1.3 Workers and Establishments in FCSL Services

As in [Goldschmidt and Schmieder \[2017a\]](#), the focus is on the provision of food, cleaning, security, and logistics services to firms. They correspond to occupations whose content has not changed much over time. They were little subject to technological change while workers in human resources might have been affected by the development of online platforms. Moreover, the share of workers in these occupations in total population is stable over time.

First, one needs to identify occupations — for workers — and main economic activities — for establishments — that correspond to the provision of food, cleaning, security, and logistics services to firms. For comparability reasons, I stick as closely as possible to [Goldschmidt and Schmieder \[2017a\]](#) definition of FCSL occupations and business services establishments.

Workers in FCSL Occupations To identify workers with FCSL occupations, I map these occupations to the French socio-occupational nomenclature.⁹

Appendix Figure [3.A.1](#) plots the number of workers in each of the occupation of interest over time. In 2017, there are 1,315,000 full-time workers in FCSL occupations. Among them, workers in logistics occupations are by far the most numerous (742,000, orange line). Full-time workers are respectively 50,000 in food, 82,000 in security, and 99,000 in cleaning.

9. For more details, see Appendix Table [3.A.1](#).

Figure 3.7.1 rescales the previous graph by the population of full-time workers in our sample. It provides a sense of the relative magnitude of these occupations compared to the general population of full-time workers aged 21 to 59. Workers in food, cleaning, and security occupations represent a constant share of all full-time workers. There is a slightly increasing trend for workers in logistics occupations. Workers in logistics occupation account for 10% of the population, while workers in food, security, and cleaning occupations between 0.5% and 2% of the population. In terms of dynamics, all four occupations are following a rather flat, if not increasing (for logistics), dynamic.

Finally, the gender composition of these occupations exhibit large differences across occupations. Appendix Figure 3.A.2 plots the average share of women in each of these occupation groups over the period. Women constitute a large share of workers in food and cleaning occupations. They constitute nearly half of cleaning workers in our sample (Column 2) and 40% of food workers (Column 1).¹⁰ On the contrary, they constitute slightly more than 10% of workers in logistics and 15% in security. Allowing for both men and women in our sample allow to cover these occupations more thoroughly.

Establishments in FCSL Industries For establishments, I establish two classifications : establishments that are (potential) daughter establishment — i.e. towards which workers can be outsourced — and business services establishments — i.e. that provide FCSL services to other establishments.¹¹ To identify them, I use establishment's main economics activity based on the activity classification of INSEE. In the next section, I provide more descriptive statistics on business services establishments in FCSL industries.

10. This is less than what INSEE accounts for – nearly 80% in 2016 (DARES Analyses, 2019, "*Les métiers du nettoyage : quels types d'emploi, quelles conditions de travail ?*"). There are two reasons for this. First, in the paper, the sample focuses on the private sector, where women tend to be under-represented compared to the general population of cleaners. Second, for the descriptive statistics, I only include full-time workers while in France more than half of cleaners work part-time. If women are over-represented among part-time workers, then they will be under-represented in our full-time sample.

11. For more details, see tables 3.A.2 and 3.A.3 in the Appendix section.

3.2 General Outsourcing

In this section, I present descriptive evidence on outsourcing of food, cleaning, logistics, and security services to firms. First, I assess the dynamics of establishments specialized in the provision of FCSL services – ‘business services’ establishments – and temporary agencies. Then, I examine what [Goldschmidt and Schmieder \[2017a\]](#) term as ‘general outsourcing’ – the share of workers in FCSL occupations working for business services establishments or temp agencies. Finally, I provide some descriptive evidence about the presence (or rather absence) of FCSL workers in-house in three large industries : finance, manufacturing, and retail.

3.2.1 The Dynamics of FCSL Business Services Establishments

Establishments and Employment I first consider the characteristics of establishments specialized in the provision of FCSL services. Figure [3.7.2](#) plots the growth rate of the number of establishments and total employment in business services establishments. The growth rate is relative to the 2005 level.¹² This normalization allows to neutralize differences in levels, as business services establishments in the logistics sector outnumber establishments specialized in the provision of other services (see Figure [3.A.1](#)).

A growth rate of 0 would indicate no growth in the number of establishments, while a growth rate of 1 would suggest a doubling of the number of establishments in the sector. Panel A of Figure [3.7.2](#) plots the growth rate in the number of establishments in each industry relative to the 2005 level. The number of establishments in the cleaning, logistics, and security sectors increases by 35% to 55% over the period. The dynamics in the provision of food services to firms are slightly different, showing an initial increase followed by a decline from 2010 onwards. Panel B of Figure [3.7.2](#) plots the growth rate of the total workforce in these establishments. The measure of employment is the headcount of employees on December 31st of a given year. Employment in business services firms follows a similar pattern to the number of establishments, although at a different pace. The number of establishments grows rapidly

12. The following transformation is applied : $(Y_{i,t} - Y_{i,2005})/Y_{i,2005}$. The classification of establishments into a business services establishment is held constant over the entire period.

and then becomes stable, while total employment increases more continuously. This suggests a change in the composition of establishments providing these services in terms of size.

Service Provision Concentration Next, I examine the level of concentration in the provision of these services. I present statistics on the number of establishments and total employment by establishment size. Appendix Figure 3.B.1 plots the share of workers and establishments by establishment size in 2014. In all four sectors, employment is mainly driven by small to medium establishments, ranging from 10 to 249 employees. Larger establishments, with more than 250 employees, also employ a significant share of workers in cleaning and security occupations – nearly 40%. As a matter of comparison, at the national level in France, total employment is equally distributed between micro (less than 10 employees), small to medium (10-249 employees), and intermediate (more than 250 employees) establishments.¹³

Additionally, by comparing 2007 to 2014, one can confirm the earlier diagnosis regarding the dynamics of food business services establishments (Figure 3.7.2). There is an increase in the share of small establishments (2-9 employees) and a rise in the share of employment in establishments of medium size (10-249 employees).

3.2.2 General Outsourcing of FCSL Services

Outsourced Workers This section studies trends in general outsourcing. I examine the extent to which workers in FCSL occupations are still employed in-house – within the establishment they provide the service for – or outsourced – employed by business services firms or temp agencies. I define 'general outsourcing' as the share of workers employed by business services firms or temp agencies in a given occupation or group of occupations.

Figure 3.7.3 plots the share of workers in food, cleaning, security, and logistics occupations who are employed in business services establishments or temp agencies between 2003 and 2015. First, I consider a static, cross-occupations, diagnosis. There are stark initial differences in the level of general outsourcing across occupations. Workers in logistics occupations (in

13. For more details, refer to the "2007 Small Business Act for France" by the European Central Bank.

orange) are mainly employed in-house, with less than 40% of them working in a business services firm or temp agency. However, in food (in maroon), cleaning (in blue), and security (in green) occupations, the level of domestic outsourcing is high, ranging between 65% and 80%.

Next, I examine the dynamics within each occupation. As mentioned earlier, the nomenclature for industry codes changes in 2008 (shaded gray area). While the correspondence across industry codes for the logistics and security sectors is straightforward, it is less so for the cleaning and food sectors. Figure 3.7.4 exhibits a break in the level of general outsourcing for food and cleaning occupations around the change in nomenclature, despite additional data treatment.¹⁴ However, one can examine the dynamics in these occupations piece-wise. In cleaning occupations, general outsourcing increases between 2008 and 2017, with more workers employed in business services firms or temp agencies. In food occupations, general outsourcing remains flat before 2008 and slightly decreases after 2008 – although it is rather flat.

The change in classification leaves the logistics and security industries categories nearly unchanged. As such, one can be more confident about the interpretation of trends over the entire period. Gradually, workers in logistics work more in business services firms. The trend is decreasing in the security sector.

As a point of comparison, in Germany, the share of workers employed in business services establishments varied between 8% and 38% over the 1975-2009 period – depending on the occupation. This is much less than in France, where most of the outsourcing probably occurred before 2002.

In-House Provision Appendix Figure 3.B.2 examines the share of large establishments – those with more than 100 employees – with at least one worker in food, cleaning, security, or logistics. It further breaks down logistics workers into drivers (in orange) and warehouse workers (in brown). This complements the initial diagnosis and provides insight into whether these services are still performed in-house or outsourced. Panel A considers large establishments

14. For more details, see Appendix A.1.

in the finance sector, while Panels B and C respectively examine manufacturing and retail establishments.

In Panel B, less than 10% of large manufacturing establishments employ a worker with a food (in maroon) or security (in green) occupation. However, these establishments are likely to receive regular cleaning services and security monitoring. Most large manufacturing establishments rely on external providers for cleaning and food services throughout the entire period of interest. This is further evidence that domestic outsourcing of FCSL services in large establishments likely occurred before 2002. It would be interesting to compare the characteristics of large establishments that still employ FCSL workers in-house to those that outsourced the provision of these services.

Summary In France, establishments providing FCSL services to firms have grown over the 2002-2017 period. A substantial share of workers in FCSL occupations (50%) are employed by business services establishments. Many large establishments no longer employ workers in FCSL occupations. In the next section, I shift to a worker-flow design to identify 'on-site' outsourcing events.

3.3 On-site Outsourcing Events

In this section, I identify what [Goldschmidt and Schmieder \[2017a\]](#) define as 'on-site' outsourcing events. These events occur when workers in service occupations, who were initially employed in-house, are outsourced to a business service establishment or temp agency while still presumed to perform the same service for their former employer — hence the 'on-site' dimension. Initially, I examine the frequency of outsourcing events in France using a similar definition. Subsequently, I assess what this definition truly captures and make adjustments to the method and sample restrictions.

3.3.1 On-site Outsourcing Events à la [Goldschmidt and Schmieder \[2017a\]](#)

Method

I consider joint mobility flows of workers from a non-business establishment (mother) to a business services establishment or temp agency (daughter). For a flow to be characterised as an on-site outsourcing event it has to satisfy the following conditions :

- the flows is made of 10 workers or more
- the mother establishment has more than 50 employees in the year prior to the outsourcing event, in $t - 1$
- the mother establishment has not shrunk by more than 50% between $t - 1$ and t .
- the flow of workers accounts for less than 30% of total employment in the mother establishment in $t - 1$
- the mother establishment is not a business services establishment
- the daughter establishment is a business services establishment or a temp agency

Results

Figure 3.7.5 illustrates the number of outsourcing events identified between 2003 and 2017. I capture 752 on-site outsourcing events over the period. This corresponds to an average of 50 outsourcing events per year. As a matter of comparison, [Goldschmidt and Schmieder \[2017a\]](#) identify around 100 events each year over the same period.

Figure 3.7.6 further decomposes these outsourcing events by the industry of the daughter establishment — i.e. the business service firm which receives the flow of workers. On-site outsourcing events towards temp agencies (in light blue) and logistics establishments (in orange) are the most frequent. They each account for around 40% of all on-site outsourcing events. Note however that while outsourcing events in logistics are more frequent than towards other sectors, the logistics sector is also relatively larger to begin with compared to food,

cleaning, and security. The method appears to capture fewer events in food (in maroon), cleaning (in blue), and security (in green) — respectively 37, 60 and 21.

The findings align with the descriptive evidence on general outsourcing from the previous section. While in Germany, the share of large firms with at least one food worker is larger than 20% in retail, finance, manufacturing, and hospitals, it ranges between 5% and 10% in France. This calls for two remarks : (i) either the sample restrictions are less relevant in the French context or (ii) outsourcing of FCSL services occurred earlier than in Germany (and prior to the period considered in the paper). To address the former assumption, the next section provides an augmented sample that allows for multiple job-holding patterns. Before doing so, I provide additional evidence on these on-site outsourcing events.

Additional Characterization

I offer two sets of empirical evidence to further characterize these 'on-site' outsourcing events. First, I leverage information on the filiation of establishment to firms to determine whether these 'on-site' outsourcing events occur within the boundaries of firms or across firms. Second, I consider the effect of placing restrictions on the occupation of the workers involved in the outsourcing flow on the number of events captured.

Within-Firm Events I leverage information on the filiation of establishments to firms. This is a unique feature of French data compared to the German data — we know to which firm an establishment belongs. Consequently, I can determine whether a given outsourcing event occurred within the boundaries of a firm or across different firms.

Figure 3.7.7 plots the share of on-site outsourcing events occurring within firm among all on-site outsourcing events on a given year between 2002 and 2017. On average, over the period, one in four (25%) of 'on-site' outsourcing events occur within the boundaries of a firm. There is some variation in the share of *within-firm* events across years.

This is an important diagnosis. These worker flows meet the definition of 'on-site' outsourcing events of [Goldschmidt and Schmieder \[2017a\]](#) — large flows of FCSL workers from a

non-business service establishment to a business service establishment. But, the fact that a significant share of them occur within firms has implications on the interpretations of the effects and of the mechanisms at play.

In practice, these *within-firm* events may reflect a form of firm reorganisation — of reallocation of labor across plants. This is reminiscent of [Kehrig and Vincent \[2019\]](#). They examine dispersion in marginal revenue products of inputs across plants and find that, in a multi-plant firm framework, such dispersion reduces frictions. Following this reasoning, domestic outsourcing changes the boundaries of establishments and can segment service workers from core competency workers.

It could be interesting to investigate further two things. First, the mechanisms at play. One could assess whether this pattern is more prevalent among larger firms rather than smaller ones, or depending on its monopoly power in the local labor market or depending on the local supply of FCSL services to firms. Second, the differential effects on workers. It would be interesting to consider whether *within-firm* and *between-firms* events affect differentially earnings and/or employment stability.

Appendix Figure [3.C.12](#) decomposes this statistics by daughter establishment. The share of *within-firm* events is statistically different from 0 for events towards business service firms in food, logistics or security. The share is the largest in events towards logistics (46%), security comes second (24%), and food comes third (22%). Among outsourcing events towards cleaning business services firms, the share of within-firm events is very small (3%) and not statistically different from zero.

Final Occupation I explore the sensitivity of the findings to restrictions on the final occupation of workers involved in the outsourcing flows. While it is plausible that a joint flow of workers from an industrial establishment to a cleaning establishment might predominantly involve cleaners or related occupations, it is less clear when considering outsourcing events to temp agencies. Outsourced workers to temp agencies could hold positions in FCSL, accounting, or sales occupations.

As a first element of diagnosis, I decompose the number of 'on-site' outsourcing events based

on the occupation composition of the workers involved in the flow. The objective is to assess whether these flows capture domestic outsourcing of some FCSL workers or not. Appendix Figure 3.C.2 classifies events based on the fraction of FCSL workers in the flow of workers : [0-25%], [25-50%], [50-75%], [75-100%] (from light to dark gray). A majority of outsourcing events comprise at least 50% of FCSL workers among the outsourced workers.

An alternative approach is to consider the effect of using alternative definitions of 'on-site' outsourcing of FCSL workers on the number of events identified. I consider two alternative definitions. The first one constrains the final occupation of outsourced workers to be in either food, security, cleaning, or logistics.¹⁵ The second one constrains the final occupation of all outsourced workers to be in a single FCSL occupation. Appendix Figure 3.C.3 shows the number of on-site outsourcing events identified, placing no constraint on the final occupation (solid line), constraining outsourced workers to hold any of the FCSL occupations (dashed line), and constraining outsourced workers to belong to a single FCSL occupation (dotted line). Placing no restriction on final occupation, one captures 752 events. With additional restrictions, 247 on-site outsourcing events are identified holding a restriction on workers holding any of the FCSL occupations, and 234 a single FCSL occupation. Interestingly, the residual variation in the number of events captured depending on whether the constraint is on holding any FCSL or a single FCSL occupation is quite small.

Appendix Figure 3.C.4 further decomposes this reduction in the number of events by type of daughter establishments — FCSL business service firms and temp agencies. The largest reduction is observed for temporary agencies, where the number of events shrinks to nearly 0. While the baseline definition captured 319 events, placing a restriction on the final occupation of workers brings this number down to respectively 32 and 25 events. This confirms the intuition that outsourcing towards temporary agencies are not restricted to FCSL workers but encompass a broader set of outsourcing events. There is also a reduction in the number of events captured for service provider firms but to a smaller extent going from 433 to 215 and 209 events.

15. Note that no restriction on the initial occupation of workers is imposed.

3.3.2 On-site Outsourcing Events in the Multiple-Jobs Sample

Proposed Extension

In this section, I make one main amendment to my sample. I allow for workers to hold multiple jobs. This is motivated by descriptive evidence on the French labor market. Workers with cleaning occupations predominantly work part-time (61%), and more than a third of them hold at least two jobs (37%).¹⁶

The intuition behind this section is the following. By allowing workers to hold multiple jobs, we accommodate configurations where workers employed in multiple non-business service establishments could be outsourced to a single business service establishment or temp agency while still performing the same tasks in these different establishments.

In practice, I define a multiple-job holder as follows : in a given year, a worker is considered a multiple-job holder if there is a lapse of time during which she combines at least two jobs. There is no restriction on the minimum duration of the overlap across two jobs. Workers are allowed to combine up to three jobs simultaneously, either concurrently or with an overlap of two at a time.

Before delving into the identification of on-site outsourcing events on this 'multiple-jobs' sample, I provide descriptive statistics on FCSL workers in this new sample. I examine multiple job-holding patterns.

Descriptive Evidence

Multiple-Job Holders Multiple job-holders are more prevalent among workers with at least one job in a food, cleaning, security, or logistics occupation than among other workers. Appendix Figure 3.C.5 plots the share of workers with multiple jobs over time for FCSL and for the general population.¹⁷ In 2015, workers with multiple occupations constitute around 6% of the sample (solid line). This share is twice as large among workers with at least one FCSL

16. In France, it is possible to hold multiple jobs, conditional on working less than 48 hours a week

17. Workers are classified as FCSL if they hold at least one job with an occupation in one of the four occupation categories.

occupation (dashed line) than among workers outside FCSL occupations (10.7% and 4.8%, respectively). Multiple job-holders account for a larger share of the population over time.

Appendix Figure 3.C.6 plots the occupation mix of FCSL multiple job holders in our sample. It decomposes multiple-job holding into workers with a single FCSL occupation across their different jobs, workers with at least two FCSL occupations, and workers with one FCSL occupation and a non-FCSL occupation. Roughly 40% to 60% of multiple job holders with at least one FCSL occupation hold all jobs with the same FCSL occupation (dark gray). A small fraction hold jobs in two different FCSL occupations (medium gray) (6% to 10%). Another significant share holds a job with a non-FCSL occupation (32% to 52%). This decomposition is highly sensitive to the porosity among occupations.

Part-Time Work Finally, I assess whether the sample captures more workers with part-time jobs. Appendix Figure 3.C.7 plots the share of workers in FCSL occupations that work part-time by occupation group over the period of interest. Full-time jobs correspond to most jobs in logistics (88%) and security (82%), while they only account for 65% of jobs in food and 44% of jobs in cleaning.

This alternative sample — the 'multiple-jobs' sample — captures the diversity of job-holding patterns in FCSL occupations. Multiple job holders are more prevalent among FCSL workers than in the general population (8 to 10.5% of the population).

General Outsourcing

Appendix Figure 3.C.8 provides a diagnosis of the level of general outsourcing similar to the previous section but on the 'multiple-jobs' sample. It plots the share of FCSL jobs that are outsourced — i.e., where the employer is a business service establishment or a temp agency (solid line). It also further isolates the share of jobs held by workers employed by a temporary agency. Overall, over the period, 50% to 60% of jobs held by FCSL workers are employed in a business services establishment or temp agency.

This proportion is higher than in the main sample — one-job sample — where the average lies closer to 45% (see Figure 3.7.3). Similarly, the importance of temporary agencies in FCSL employment is also higher (close to 0 in the 'one-job' sample, around 5% in the 'multiple-jobs' sample).

On-Site Outsourcing Events

On-Site Outsourcing Events Using this multiple-jobs sample, more on-site outsourcing events are captured. Appendix Figure 3.C.9 plots the number of on-site outsourcing events identified over the period of interest in this augmented sample. In this sample, 1,900 on-site outsourcing events are captured between 2003 and 2015. This is consistent with this sample being more representative of the population of workers in FCSL occupations.¹⁸ There are on average 145 outsourcing events per year, with significant variations across years.

Appendix Figure 3.C.10 decomposes these outsourcing events by industry of the daughter establishment — i.e., toward which workers are outsourced. As in the 'one-job' sample, most on-site outsourcing events are towards temp agencies and logistics business services establishments. However, in this sample, we capture a relevant number of outsourcing events towards cleaning (197), a sector characterized by a high recourse to part-time jobs. The ability to capture on-site outsourcing events towards food and security business services establishments remains limited (resp. 69 and 51 events over the period).

Within-Firm Events Then, I consider whether these outsourcing events occur within the boundaries of the firm or across firms. Appendix Figure 3.C.11 plots the share of on-site outsourcing events that occur within firms among all outsourcing events. At the beginning of the period, roughly 1 in 5 events occurred within the boundaries of firms. From 2010 onwards, within-firm on-site outsourcing events account for 1 in 10 events. This is lower than in the 'one-job' sample. This is consistent with the fact that most daughter establishments are temp agencies, and they are rarely affiliated with industrial firms.

18. For more descriptive evidence on workers in FCSL occupations, by gender and by part-time or full-time status, see Section 3.1.2.

Joint Mobility Flows Lastly, I examine whether joint mobility flows are captured. I assess whether there are workers involved in two outsourcing flows simultaneously — ideally towards the same daughter establishment. Over the period, 3,101 workers were involved in 'on-site' outsourcing events. Nearly 50% of them were engaged in a joint mobility flow — i.e. simultaneously involved in at least two outsourcing flows on a given year. However, few of these flows corresponded to the aggregation mechanism of going from two establishments to a single one (136 workers).

Summary Using the 'one-job' sample, I identify 752 on-site outsourcing events between 2003 and 2015. Around 25% of these outsourcing events took place across establishments within firms while the remainder occur across firms. Imposing a constraint on the final occupation, specifically requiring it to be in FCSL, results in a slight reduction in the number of identified events. By employing the 'multiple-jobs' sample, more comprehensive set of outsourcing events (1,9000 over the period), especially towards temp agencies, is captured. Interestingly, only a few of these correspond to joint mobility flows (i.e. from multiple-job holding to single-job holding). I now investigate the impact of outsourcing on the wages of outsourced workers and explores establishment-specific wage premia both between and within establishments.

3.4 The Effect of Outsourcing on Wages

Overview In this section, I delve into the impact of outsourcing on wages through a multi-faceted approach. First, I use an event study approach and leverage the on-site outsourcing events identified in the previous section (in progress). Second, I estimate the average difference in earnings among FCSL workers based on whether they are employed in-house or are outsourced. For this analysis, I adopt a broad definition of outsourcing - i.e. a worker is considered outsourced if she is employed by a business services establishment or a temp agency. Third, I examine differences in average establishment pay premium depending on outsourcing status. I run an AKM decomposition of wages into worker and establishment effects. I assess whether

outsourced workers are employed in establishments with lower pay premia (AKM effects). I compare the distribution of establishment pay premia for in-house FCSL workers with that of workers employed in business services establishments or temp agencies.

Sample This section uses the pseudo-panel version of the DADS, constructed from job-level data for the years 2002-2017.¹⁹ I restrict the sample to full-time workers in establishments with more than 50 employees.

3.4.1 Evidence from On-Site Outsourcing Events (in progress)

3.4.2 Estimating the Average Outsourcing Pay Penalty

Average Difference in Earnings Between In-house and Outsourced FCSL Workers

Estimation In this section, I present evidence regarding the impact of outsourcing on wages for workers in FCSL occupations. Employing a methodology akin to [Dube and Kaplan \[2010\]](#), I estimate wage differentials for outsourced workers. Outsourced workers are defined as those employed by service contractors — establishments primarily providing services to firms, identified by their industry code — while non-outsourced workers are those employed in non-business services firms, i.e., *in-house*. I estimate the following equation for the sample of workers with an FCSL occupation :

$$Y_{i,t} = \delta Outsourced_{it} + \alpha_i + \theta_t + x'_{it}\beta + \epsilon_{i,t} \quad (3.1)$$

where the explained variable, $Y_{i,t}$, is a measure of earnings for worker i at time t . $Outsourced_{it}$ is an indicator variable with a value of one if the worker is employed in a business services establishment or temp agency, and zero if the worker is employed in-house. The regression incorporates year fixed effects, θ_t , to accommodate year-level shocks affecting all workers, and individual fixed effects, α_i , to capture systematic differences across workers. Furthermore, the regression includes time-varying individual characteristics (x'_{it}), such as sex, age (in cubic

19. The pseudo-panel construction follows the methodology outlined in [Babet and Palladino \[2023\]](#).

form), education dummies, and interactions between age and education dummies. Standard errors, $\epsilon_{i,t}$, are clustered at the worker level. The coefficient of interest is δ . It tracks the impact of outsourcing on wages, using the transition of FCSL workers between employed in-house and outsourced.

Note that, despite the rich set of controls, there could be selection into outsourced and non-outsourced status. There are many reasons to outsource that are potentially also correlated with the outcome of interest. In that case, it would bias our estimate. For example, outsourcing could be correlated with wage levels or dynamics (or levels) in the establishments where FCSL workers were initially employed in-house.

I estimate these regressions using two measures of earnings. I leverage the fact that I have information both on annual earnings and hours worked. I decompose differences in earnings along the hours and hourly earnings dimension. I first use as an outcome variable gross annual earnings. It provides insight into total differences in earnings between workers employed in-house and outsourced. Second, I use as an outcome the logarithm of gross hourly wage. This nets out differences in hours worked and focuses solely in differences in compensation per hour of work.

Results Table 3.7.1 presents the estimated δ coefficient from equation (3.1). Columns (1) to (3) use the logarithm of gross annual earnings as the outcome variable, while columns (4) to (6) use the logarithm of gross hourly wage. For each outcome of interest, I estimate the raw difference in earnings, initially controlling solely for year fixed effects (column 1), and progressively adding controls for worker characteristics (column 2), and individual fixed effects (column 3). To maintain focus on the comparison between workers employed in-house (non-business services establishments) and those outsourced (business services establishments), I exclude workers employed in temporary agencies from the sample.

FCSL workers employed in a business service firm earn, on average, 15.3% less annually than FCSL workers employed in non-business service establishments (column 1). Controlling for worker characteristics slightly affects the estimated average difference (-12.4%) (column 2). Incorporating worker fixed effects, leveraging within worker variation in outsourcing status,

reduces the residual difference in earnings to -2.8%, remaining significant at the 1% level (column 3).

Then, I turn to similar estimations using this time as an outcome variable the logarithm of hourly wage. This allows to net out differences in hours worked. I estimate a statistically significant difference in hourly earnings between FCSL workers employed in-house and outsourced. FCSL workers outsourced earn on average 15.5% less in hourly wage, roughly similar in magnitude to the total earnings. Finally, incorporating worker fixed effects reduces the difference in hourly earnings to -2.8%, still significant at the 1% level.

These findings suggest systematic differences in average earnings between FCSL workers employed in-house and those outsourced. While worker characteristics have little effect on the magnitude of the disparity, worker fixed effects neutralize the majority of the difference. Using as an outcome the logarithm of total earnings or of hourly wage yields similar conclusions, suggesting little differences in hours worked. If anything, workers employed in business service establishments work slightly more hours.

This align with existing literature which documents a negative wage penalty associated with outsourcing : [Goldschmidt and Schmieder \[2017a\]](#) for Germany (-9 percent) and [Dube and Kaplan \[2010\]](#) for janitors and security guards in the US (-24 to -4 percent). In the Argentinian context, [Drenik et al. \[2023\]](#) estimate a -14 percent wage loss for workers employed through a temp agency rather than internally.

Differences in Workplace Premia between In-House and Outsourced FCSL Workers

Method I employ a wage decomposition approach following [Abowd et al. \[1999\]](#) to disentangle the pay premia originating from establishments' wage policies (defined as establishment fixed effects). In an extension of this framework, I estimate establishment fixed effects separately for workers in FCSL occupations and workers with non-FCSL occupations. This method is commonly used to discern differences in pay premiums across groups of workers within establishments (e.g., for gender gaps [Card et al. \[2016\]](#), for temp agency workers [Drenik et al. \[2023\]](#)). I assign pseudo-establishment identifiers to workers in FCSL occupations and those

outside FCSL occupations, and estimate their respective pseudo-establishment fixed effects in a single regression. I create a pseudo-establishment identifier corresponding to the true establishment identifier, with an additional letter at the end indicating the occupation status ("S" for workers in *service* — FCSL — occupations and "I" for workers in *industry* — non-FCSL — occupations). Note that this is a movers design. This approach works only if there are flows of workers between FCSL and non-FCSL occupations. More precisely, for the connected set of workers in FCSL occupations to be connected to that of workers with non-FCSL occupations, there must be at least a transition (a link) between the two. Hence, at least one worker needs to have moved from a FCSL to a non-FCSL occupation (or conversely).²⁰

I estimate the following equation :

$$\ln(w_{i,j,t}) = \alpha_i + \Psi_{jt}^{W_{i,t}} + \theta_t + x'_{it}\beta + \epsilon_{i,t} \quad (3.2)$$

where $\ln(w_{i,j,t})$ is the logarithm of the gross hourly wage of worker i , employed in establishment j , in year t . $\Psi_{jt}^{W_{i,t}}$ corresponds to occupation group-specific establishment fixed effects. The superscript $W_{i,t} \in \text{FCSL, non-FCSL}$ indicates whether the worker holds a FCSL or a non-FCSL occupation. α_i corresponds to individual fixed effects, and θ_t to year fixed effects. x'_{it} is a vector of time-varying worker characteristics, such as age (in cubic form). Finally, standard errors $\epsilon_{i,t}$ are clustered at the worker level.

Results Figure 3.7.8 is a histogram of AKM establishment effects estimated on FCSL workers using equation (3.2). It provides a more systematic decomposition of differences in wages between FCSL workers depending on their outsourcing status. The distribution of AKM establishment effects for workers in FCSL occupations is plotted separately for workers employed in-house (in light gray) and those outsourced at a business services establishment (excluding temporary agencies) (in dark gray). Values are centered around the average establishment effect for FCSL workers employed in-house. The distribution of AKM effects for workers em-

20. The approach is more akin to Drenik et al. [2023], who estimated pseudo-establishment effects in a single regression, than Goldschmidt and Schmieder [2017a], who estimated sub-regressions on the sample of FCSL workers and then one on the sample of non-FCSL workers. Finally, to fully round the exercise, one would need to perform an exogeneity test of movers as in Card et al. [2013].

ployed in business services establishments is shifted to the left compared to that for workers employed in-house, indicating that outsourced workers benefit from lower establishment pay premia. The dashed vertical line marks the average firm pay premium in outsourcing establishments relative to the average of in-house establishments (dashed line, centered at 0). The difference in means across the two groups (Δ) is -0.08 and is statistically significant.

3.5 Testing Rent Sharing Channel

3.5.1 Motivating Evidence

Which Firms Hire FCSL Workers In-House ? I investigate the selection of establishments into outsourcing FCSL services — i.e. not directly employing workers in FCSL occupations. I compare the pay policy of establishments that outsource to those that hire FCSL workers in-house. Panel A of Figure 3.7.9 is a histogram of AKM establishment effects estimated on non-FCSL workers using equation (3.2). The distribution of AKM establishment effects for workers in non-FCSL occupations is plotted separately for establishments with in-house provision of some FCSL services (in light gray) and establishments that fully outsource the provision of these services (in dark gray). Values are centered around the average establishment effect in in-house provision establishments. The distribution for outsourcing establishments is to the right of the distribution for establishments with some in-house provision. Establishments with no in-house FCSL provision exhibit higher pay premia. The dashed vertical line marks the average firm pay premium in outsourcing establishments relative to the average of in-house establishments (solid line, centered at 0). The difference in means across the two groups (Δ) is 0.03 and is statistically significant at the 1% level. This provides further evidence of high-wage establishments not employing FCSL workers in-house.

Within-Establishment Difference in Pay Policy for FCSL and non-FCSL workers I assess whether FCSL workers and non-FCSL workers, when employed in the same establishments, benefit from the same establishment pay premia. I compare the average establishment

fixed effects estimated for FCSL workers with the one estimated on non-FCSL workers employed in the same establishment. Panel B of Figure 3.7.9 plots the distribution of establishment fixed effects estimated separately for FCSL and non-FCSL workers in establishments where both groups of workers are present at some point. The density of the AKM establishment fixed effects for FCSL workers (in dark gray) is to the left of the density of AKM establishment fixed effects for non-FCSL workers (in light gray). This indicates that FCSL workers extract a smaller rent than non-FCSL workers within the same establishments.

3.5.2 Do High-Wage Firms Share Pay Premia with FCSL Workers ?

Method I investigate whether FCSL workers employed in-house benefit from the same establishment-specific wage premium as their non-FCSL counterparts when employed in the same establishment. If this is the case, it is reasonable to assume that part of firms' decisions to outsource is driven by their desire to reshape their boundaries to avoid passing on this establishment wage premium. When in-house, FCSL workers are integrated into the pay, pension, and health insurance schemes of the establishment. In this sub-section, I examine rent-sharing purely from a compensation perspective. To do so, I assess the correlation in the establishment pay premia estimated separately for FCSL workers and non-FCSL workers for *the same establishments*, as per equation (3.2). I estimate the following regression on the sample of establishments with in-house FCSL workers :

$$\Psi_J^{FCSL} = \alpha + \gamma \times \Psi_J^{non-FCSL} + \mu_J \quad (3.3)$$

where Ψ_J^{FCSL} is the establishment effect of establishment J estimated on FCSL workers, and $\Psi_J^{non-FCSL}$ the establishment effect of establishment J estimated on non-FCSL workers. α is the intercept, and γ is the slope coefficient, which is the coefficient of interest. Each observation is weighted by total employment in the establishment.

Conceptual Framework As a benchmark, a slope of 0 would indicate that the establishment pay premium for FCSL and non-FCSL workers is uncorrelated. A slope of 1 would correspond to a perfect pass-through of the establishment pay premium across the two groups. A slope between 0 and 1 would indicate a positive but imperfect correlation between the establishment pay premia. A slope above one would indicate a higher pay premium for FCSL workers than for non-FCSL workers.

Results Figure 3.7.10 is a binned scatter plot of AKM establishment effects estimated using FCSL (y-axis) and non-FCSL (x-axis) workers. Each bin corresponds to 1/20th of the observations. There is a positive correlation between the establishment pay premia for FCSL and non-FCSL workers in the same establishment. The two benchmarks of no correlation and perfect correlation are marked by the dashed lines. The solid line corresponds to the estimated linear fit in an OLS regression where each observation is weighted by the number of workers in the establishment. The estimated slope is 0.899 (0.004). For comparison, [Goldschmidt and Schmieder \[2017a\]](#) estimate a positive correlation with a slope coefficient of 0.68 using an OLS regression and 0.77 using an IV split-sample strategy.

Split Sample IV (in progress) I complement the OLS evidence using a split-sample instrumental variable approach to correct for measurement error in the estimation of the establishment pay premia. I instrument the establishment pay premia as estimated in a first sub-sample with the establishment pay premia for the same establishment estimated in a second sub-sample. For each establishment, I randomly split workers into two groups.²¹ One group will be used to estimate the establishment wage premia used as an instrument, and the other group will be used to estimate the establishment wage premia that are instrumented. Specification (3.4) illustrates this instrumental variable approach, with specification (3.5) corresponding to the first stage :

21. Note that assignment to a group is constant within a worker. That is, for a given worker, all observations (corresponding to years) will be in a single group.

$$\Psi_J^{FCSL} = \alpha + \beta_{IV} \times \Psi_{J,1}^{non-FCSL} + \mu_J \quad (3.4)$$

$$\Psi_{J,1}^{non-FCSL} = \kappa_1 + \kappa_2 \times \Psi_{J,0}^{non-FCSL} + \nu_J \quad (3.5)$$

3.5.3 Firm Rent and the Decision to Outsource

Motivation This section explores one potential driver behind the decision to outsource part or all of its FCSL workers. It investigates whether establishments with higher pay premia are more likely to outsource FCSL workers. In this section, and in line with [Goldschmidt and Schmieder \[2017a\]](#), I adopt a more comprehensive definition of outsourcing events. Outsourcing events encompass both 'on-site' outsourcing events, as in the previous section, and 'general' outsourcing events, defined as follows : a general outsourcing event occurs when an establishment loses the last of its employees in a given occupation o , conditional on having employed at least 5 workers in said occupation o , without downsizing by more than 50%, and without specializing in the provision of the services that workers in occupation o provide.²² The definition is successively applied for each occupation group — food, cleaning, security, and logistics — and the earliest occurrence is retained for each establishment. General outsourcing events capture configurations where an establishment lays off all workers providing a particular service, abstracting from restrictions on the destination firm of workers involved in the outsourcing flow.

Method I estimate the following regression at the establishment j , year t , and region s level :

$$Pr(Outsource)_{j,s,t} = \gamma PayPremia_{jt} + \alpha_s + \theta_t + x'_{it} \beta + \epsilon_{i,t} \quad (3.6)$$

22. More specifically, an establishment is considered to have experienced a general outsourcing event in year t if : it does not employ any workers in occupation o in t ; employed at least 5 workers in occupation o at some point in the 5 years prior to the event; it has at least employees in $t - 1$, and does not shrink by 50% or more between $t - 1$ and t .

where $Pr(Outsource)_{j,s,t}$ is a dummy variable equal to 1 if the establishment experiences an on-site or general outsourcing event in the following year. $PayPremia_{jt}$ is a proxy for establishment pay premia, respectively the logarithm of establishment size in $t - 1$ (column 1), the logarithm of average hourly wage (column 2), the estimated AKM effect (column 3), collective agreement presence and stringency (columns 4 to 6), and a combination of proxies (column 7). All regressions include region, year, and 2-digits industry fixed effects. Standard errors are clustered at the establishment level. I restrict the sample to establishments with more than 50 employees in $t - 1$.

Results Table 3.7.2 displays the estimated γ using various proxies for establishment rent. The probability of an outsourcing event is positively correlated with establishment size (column 1) and the logarithm of the average wage in the establishment (column 2). Both coefficients are significantly different from 0 at the 1% level. I also leverage another proxy for pay premia — the estimated AKM effect from equation (3.2) estimated pooling all workers to estimate the establishment pay premium. I also find a positive correlation between AKM pay premium and the probability to outsource.

Next, I examine the effect of collective agreements on the probability of outsourcing. Being covered by a collective agreement is negatively correlated with the probability of outsourcing (column 3). Note that the majority of workers are covered by a collective agreement (96%).

To refine the utilization of information on collective agreements, I estimate collective agreements' pay premium through an AKM decomposition.²³ I rank collective agreement pay premia and group agreements based on whether their AKM effect lies above/below the median AKM effect and by quartile. Both exercises are consistent, suggesting a higher probability of outsourcing when collective agreement are associated with higher pay premia (above average (column 5) or in higher quartiles (column 6)).

Finally, I simultaneously control for the logarithm of establishment size, the logarithm of average establishment wage, the establishment estimated AKM effect, and the presence of a

23. I run an AKM decomposition regressing the logarithm of hourly wage on a set of controls for worker age (in cubic form), year, and individual fixed effects, as well as collective agreement code (4 digits). I retrieve the estimated AKM effect for each collective agreement.

collective agreement (column 6). Here, the results are more challenging to interpret. I find a positive and significant correlation between establishment size and average wage and the probability to outsource. The coefficient for the presence of a collective agreement remains negative and significant. Surprisingly, the coefficient for the AKM effect becomes negative. To try to make sense of this, one needs to put into perspective what the AKM effect captures holding constant differences in size, average wage, and presence of a collective agreement.

Summary I study whether exclusion from firm rent serves as a partial mechanism to explain the outsourcing of FCSL workers. The findings indicate that, on average, establishments outsourcing FCSL services tend to have higher establishment pay premia compared to those with in-house provision of FCSL services. Moreover, when FCSL workers are employed in-house, they share a substantial portion of the establishment pay premium enjoyed by non-FCSL workers. Additionally, the probability of an outsourcing event is positively correlated with proxies for pay premia. Specifically, there is a positive association between establishment size, wages, AKM effect, and the likelihood of an outsourcing event. Surprisingly, the presence of a collective agreement is associated with a lower probability of outsourcing. Further analysis reveals that collective agreements associated with higher pay premia also exhibit a positive correlation with the probability of outsourcing.

Discussion The earlier diagnosis on within-firm events raises the question of the relevant unit of analysis to think about rent sharing. Is this at the firm-level or at the establishment-level? If it is the firm-level, then exclusion from firm rent motive is likely to matter less. In terms of effects, we might anticipate a smaller penalty earnings as they are still (potentially) exposed to the same firm-level pay premium. I could not find a lot of evidence on this. [Hazell et al. \[2024\]](#) offer some insights on this in the context of the United States. Using posted vacancy data, they study wage policies of firms across establishments in different locations. They find that some firms adopt a national wage policy, i.e. identical wages for workers in a given occupation across locations. Interestingly, the decision to adopt a national wage policy is not uniform within firms and is determined at the occupation level. This is more common

in occupations with high-wages, high geographic mobility, and where remote work is possible. These are not necessarily characteristics associated with FCSL occupations.

3.6 Discussion

Time Frame The paper covers the period 2003-2018. At the beginning of this timeframe, 45% of FCSL workers were employed by a business services establishment, indicating that domestic outsourcing was already well underway. While it would be interesting to incorporate earlier years, this is not feasible from a data perspective. Prior to 2002, the various jobs of a single individual are not linked through an individual identifier. As such, it is not possible to follow one worker through different employers, even in the course of one year.

On the flip side, 55% of workers remain employed in-house. In this sense, this paper offers valuable insights into in-house provision versus outsourcing.

Type I and Type II errors It is key to understand what these worker-flows capture and whether they do correspond to outsourcing events or not. This is key to then understand the mechanisms and effects of outsourcing on workers.

Regarding type-I errors (false positive), which would amount to a characterize a worker-flow as an on-site outsourcing event when in fact this is not one. To address this, I perform two sets of empirical diagnoses. First, I play a bit with the definition of 'on-site' outsourcing events – e.g. placing restrictions on the occupation of workers involved in the event – and assess how this affects the number of events identified. Second, the diagnosis on the within-firm vs between-firms nature of outsourcing events is also important. I discuss whether we should think of them as outsourcing events or a form of firm reorganisation and whether they are likely to affect outsourced workers differently.

In terms of missing outsourcing events (type II errors). In Section [3.4.2](#), I extend the definition of outsourcing and leverage 'general' outsourcing events — e.g. an establishment separating from its last cleaners or security persons — to encompass more events and different ways to capture outsourcing.

To complement the analysis of 'on-site' outsourcing events, one could also explore a different type of event. Plant closure events, for instance, could be used to examine the fate of FCSL workers employed in non-business services establishments when closure occurs. This could reveal whether their subsequent employer is still a non-business establishment or a business service establishment. It is plausible that some outsourcing of FCSL workers occurs during displacement events.

Alternatively, one could contextualize 'on-site' outsourcing events with the method used by [Bilal and Lhuillier \[2022\]](#) to identify outsourcing. They employ reported expenditures on 'external workers' from an annual survey of French firms as a proxy for expenditures on outsourced workers. Cross-validating these two methods could be enlightening, by checking if firm expenditures on outsourced workers increase around 'on-site' outsourcing events.

Mechanisms To delve deeper into the drivers/mechanisms, it could be interesting to explore further within-firm outsourcing events. A first step would be to document the types of establishments engaging in within-firm 'on-site' outsourcing events, considering factors like firm size, unionization, etc. Second, one could explore heterogeneity in the effects of outsourcing on wages depending on whether the event occurred between firms or within a firm.

Related to this, further studying the role of collective agreements could be beneficial. For example, does outsourcing lead to changes in the collective agreements under which workers are covered ?

Finally, this paper does not address the role of the supply of FCSL services by services providers and temporary agencies in the decision to outsource. It might be valuable to account for the local supply of FCSL services, as well as other local labor market characteristics.

3.7 Conclusion

Using extensive employer-employee data for France, I document the evolution of the provision of food, cleaning, security, and logistics (FCSL) services to firms between 2002 and 2018. [Goldschmidt and Schmieder \[2017a\]](#) and [Drenik et al. \[2023\]](#) serve as foundations for

this paper. As such, findings can be put into perspective with theirs (and the German and Argentinian context).

First, I examine the evolution of business services establishments in FCSL sectors and of temp agencies. The 2002-2017 period is characterized by a steady increase in the number of establishments specialized in the provision of FCSL services and in their workforce. This growth is mainly driven by medium-sized establishments - those with 10 to 249 employees. A large share of FCSL workers are outsourced, i.e., employed by service contractors or temp agencies, slowly increasing from 45% to 50%. At the beginning of the period, the level of 'general' outsourcing is higher in France than in Germany.

Second, I identify 'on-site' outsourcing events. They correspond to joint mobility flows of workers from a non-business services establishment to a business services establishment or temp agency where workers presumably still perform the same service for their former employer. I capture 752 outsourcing events over the period. I document that one in four occur within firms, hinting at a reshuffling of firm boundaries. This supports the idea that outsourcing is a way for firms to change the boundaries of their establishments, excluding specific workers from establishment rent. Then, I consider a broader sample ('multiple-jobs sample'), more representative of workers in FCSL occupations, which now incorporates multiple-job holders. Using this augmented sample, I identify around 1,900 on-site outsourcing events.

Third, I estimate the wage penalty associated with being outsourced. I find a sizeable average difference in earnings between FCSL workers employed in-house or outsourced (-15%), which is mainly driven by differences in worker characteristics. I use an AKM decomposition to document differences in establishment pay premia across the two groups. FCSL workers employed in-house are employed in establishments that exhibit higher pay premia than outsourced FCSL workers — i.e. those employed in business services establishments.

Finally, I study the motivations behind outsourcing and focus on the rent-sharing channel. I document that establishments that fully outsource FCSL services exhibit, on average, a higher establishment pay premium than those with some in-house provision, as proxied by AKM effects. I also find that, when employed in-house, workers in FCSL occupations benefit from an establishment pay premium similar to non-FCSL workers in the same establishments.

Exclusion from establishment rent could be a motivation for firms to outsource. Then, I correlate the probability of an outsourcing event with proxies of establishment pay premium and find a positive correlation between the two.

Overall, I find evidence that domestic outsourcing of FCSL services to firms is an earlier phenomenon in France than in Germany. I provide an assessment of how the boundaries of establishments and firms change around those outsourcing events. I consider exclusion from firm rent as a possible motivation for outsourcing.

Tables

TABLE 3.7.1: OUTSOURCING PAY PENALTY

	Outcome : Log Earnings			Outcome : Log Hourly Wage		
	(1)	(2)	(3)	(1)	(2)	(3)
Outsourced	-0.153*** (0.001)	-0.124*** (0.001)	-0.027*** (0.002)	-0.155*** (0.000)	-0.144*** (0.000)	-0.028*** (0.001)
Year	X	X	X	X	X	X
Gender		X			X	
Education		X			X	
Age Cubic		X	X		X	X
Educ. x Age		X	X		X	X
Worker FE			X			X
N	7,612,062	7,612,062	6,876,390	7,612,062	7,612,062	6,876,390
R ²	0.054	0.185	0.708	0.162	0.2404	0.847

Notes : The Table reports coefficients for outsourcing pay penalty δ in Mincer equations following regression specification (3.1). Robust standard errors clustered at the worker-level reported in parenthesis. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

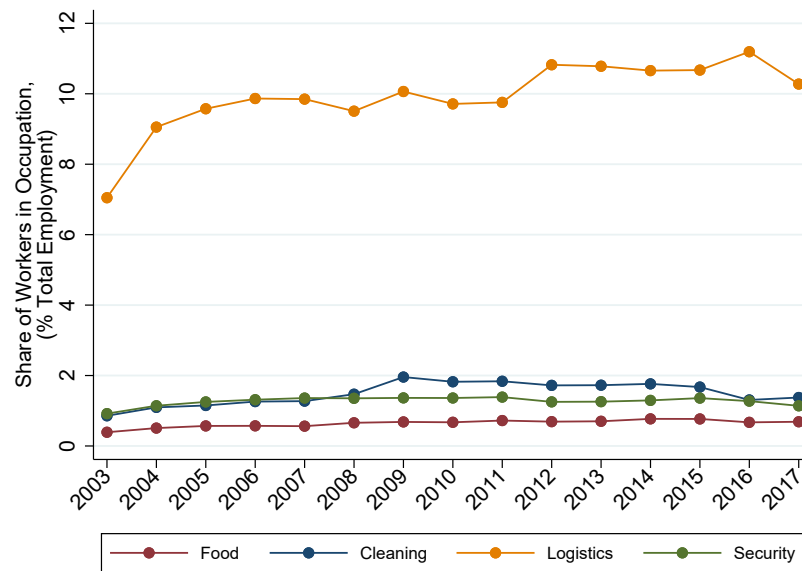
TABLE 3.7.2: THE EFFECT OF PROXIES FOR WAGE PREMIA ON THE PROBABILITY OF OUTSOURCING

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log Estab. Size	0.008*** (0.000)						0.008*** (0.000)
Log Avg Estab. Wage		0.006*** (0.001)					0.003*** (0.001)
AKM Effect						0.002** (0.001)	-0.007*** (0.001)
Collective Agreement Indicator			-0.011*** (0.001)				-0.011*** (0.001)
Above Median				0.003*** (0.000)			
Q2					0.005*** (0.001)		
Q3					0.006*** (0.001)		
Q4					0.009*** (0.001)		
Constant	-0.028*** (0.001)	-0.005** (0.002)	0.021*** (0.001)	0.008*** (0.000)	0.005*** (0.001)	0.011*** (0.000)	-0.024*** (0.003)
N	594,355	595,588	474,236	463,964	463,964	583,590	465,757
Mean Dep. Var	0.011	0.011	0.011	0.010	0.010	0.010	0.010
Mean Indep. Var	4.707	2.797	-0.020	0.968	-	-	-
R-squared	0.014	0.011	0.012	0.012	0.012	0.011	0.015

Notes : This Table reports the estimated coefficient for the proxy for wage premia γ following regression specification (3.6). The outcome variable is a dummy variable equal to 1 if the establishment experiences an on-site or general outsourcing event in the following year. Column (1) use as a proxy for wage premia the logarithm of establishment size. Column (2) uses the logarithm of the average wage in the establishment. Column (3) the AKM effect, estimated pooling all workers together. Column (4) uses a dummy variable for the presence of collective agreement. Column (5) and (6) control for the pay premia associated with the collective agreement (resp. above median for (5) and quartiles in (6)). Finally, Column (7) controls simultaneously for the proxies used in Columns (1) to (4). Standard errors clustered at the establishment-level reported in parenthesis. Information on collective agreement is available for 2006-2018.

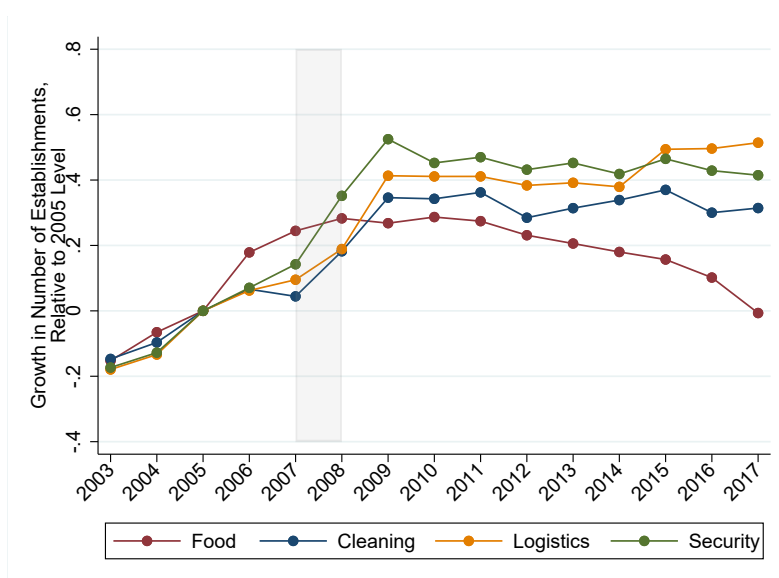
Figures

FIGURE 3.7.1: SHARE OF WORKERS IN FOOD, CLEANING, SECURITY, AND LOGISTICS OCCUPATIONS OVER TIME

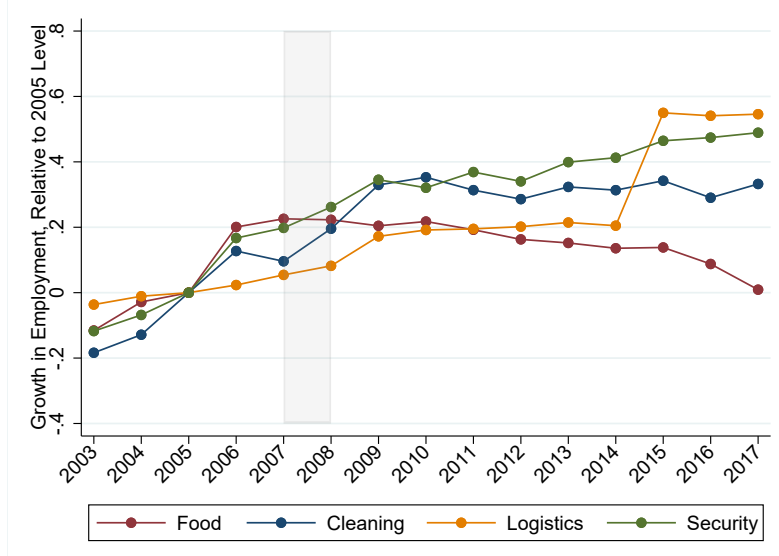


Notes : This Figure reports the share of workers in food, cleaning, security, and logistics occupations as a fraction of total employment between 2003 and 2017. The sample is restricted to full-time workers and to establishments with more than one employee. Workers in food occupations who are employed in restaurants, hotels, and air travel establishments, are not incorporated in the food category. This Figure illustrates the fact that these occupations account for a stable share of the employed population.

FIGURE 3.7.2: DYNAMICS OF ESTABLISHMENTS AND EMPLOYMENT IN BUSINESS SERVICES ESTABLISHMENTS AND TEMP AGENCIES, BY ECONOMIC ACTIVITY



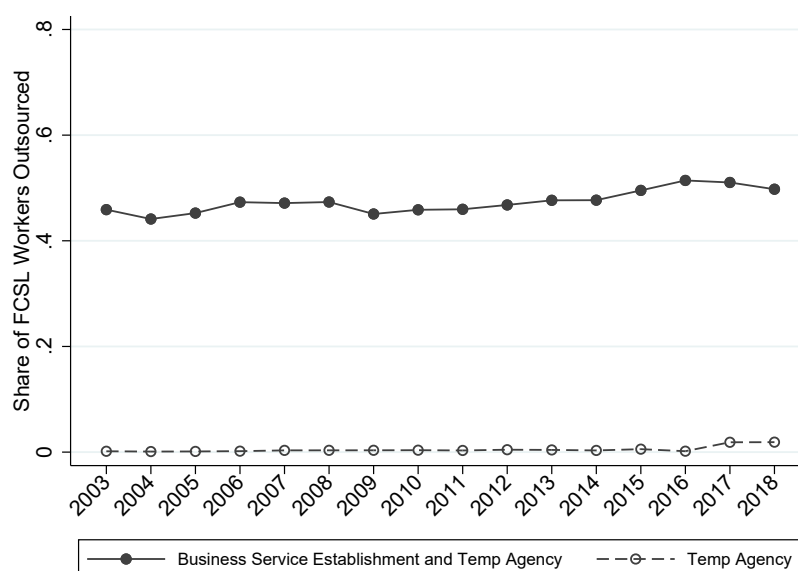
A. Growth in Number of Establishments, Relative to 2005



B. Growth in Total Employment, Relative to 2005

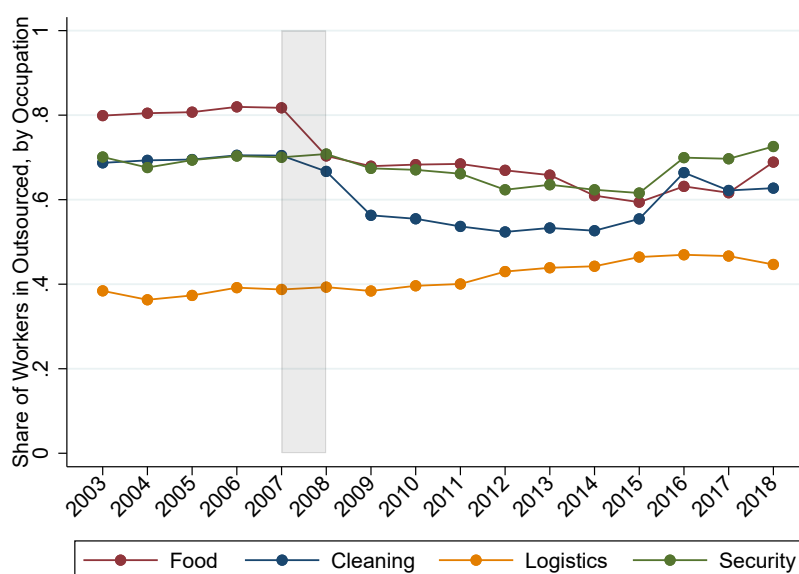
Notes : This Figure provides evidence on the dynamics of business services establishments specialized in the provision of food, cleaning, security and logistics services. Panel A plots the growth rate of the number of establishments with industry codes corresponding to the provision of these services, relative to 2005 level. Panel B plots the growth rate in total employment in these establishments (in thousand employees), again relative to 2005 level. Total employment is defined on Dec 31st of each calendar year. The sample is restricted to establishments with more than one employee. The shaded area corresponds to a change in the nomenclature of industries. Establishment classification is held constant over the period and corresponds to the assignment as per the first occurrence of the establishment or 2005, whichever is the latest. All four sectors have grown over time, with the number of establishments growing more rapidly than its total employment. This is suggestive of a change in the composition of establishments in these industries in terms of their size.

FIGURE 3.7.3: SHARE OF FCSL WORKERS EMPLOYED IN BUSINESS SERVICES ESTABLISHMENTS OR TEMP AGENCIES



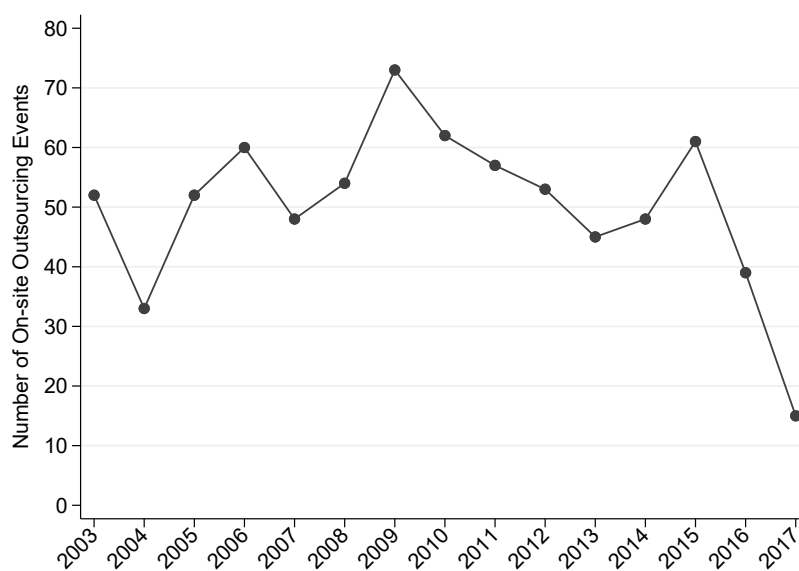
Notes : This Figure reports the share of workers with occupations in the provision of food, cleaning, security and logistics services that are employed in business services establishments or temp agencies over time as a fraction of total employment in these occupations. The solid line corresponds to the share of FCSL workers employed in a specialised business services establishment or temp agency. The dashed line isolates temporary agencies. The sample is restricted to full-time workers and to establishments with more than one employee. Workers in food occupations who are employed in restaurants, hotels, and air travel establishments, are not incorporated in the food category. This Figure provides a sense of the general level of outsourcing in these occupations. The level of general outsourcing is quite high at the beginning of the period (46%) and is mainly driven by business services establishments. Temporary agencies account for a small fraction (less than 2%) of employment in FCSL occupations. General outsourcing slowly grows over the period and reaches 50% of FCSL workers in 2018.

FIGURE 3.7.4: SHARE OF WORKERS EMPLOYED IN BUSINESS SERVICES ESTABLISHMENTS OR TEMP AGENCIES, BY OCCUPATION



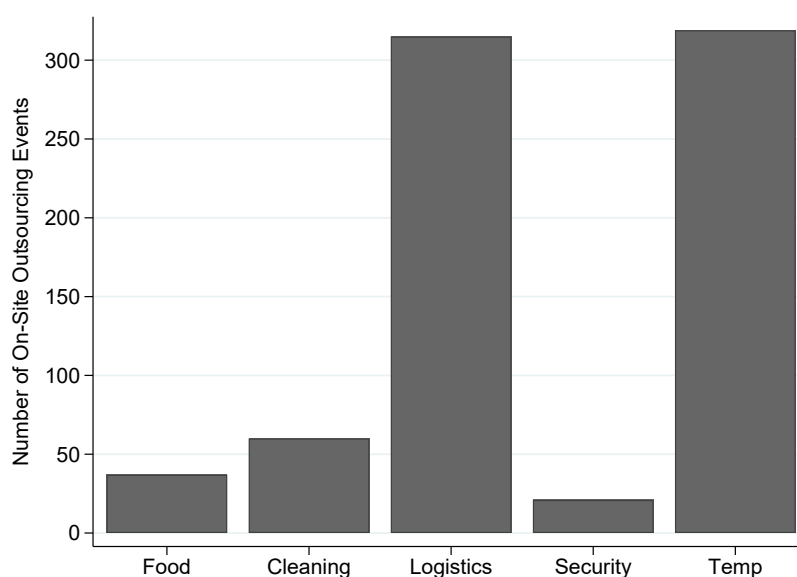
Notes : This Figure reports the average fraction of workers with occupations in the provision of food, cleaning, security and logistics services that are employed in business services establishments or temp agencies over time as a fraction of total employment in these occupations. The sample is restricted to full-time workers and to establishments with more than one employee. Workers in food occupations who are employed in restaurants, hotels, and air travel establishments, are not incorporated in the food category. It provides a sense of the general level of outsourcing in these occupations. Workers with occupations corresponding to the provision of food services are mainly employed by business services establishments or temp agencies. This holds true over the period of interest, suggesting that outsourcing may have occurred in the years prior. The level of general outsourcing is lower for workers with logistics occupations. Workers in occupations related to cleaning and security exhibit in-between levels of outsourcing. The shaded area corresponds to a change in the nomenclature of industries, making trends difficult to examine. However, one can look at dynamics piece-wise. Workers in the logistics sector tend to exhibit an increasing trend of general outsourcing.

FIGURE 3.7.5: NUMBER OF ON-SITE OUTSOURCING EVENTS



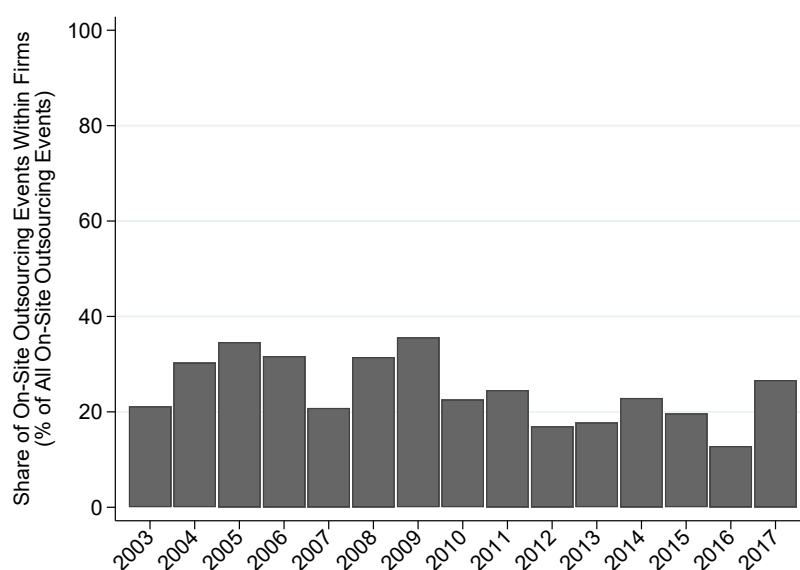
Notes : This Figure reports the yearly number of on-site outsourcing events identified in the main sample – the 'one-job' sample. On-site outsourcing event are defined as per [Goldschmidt and Schmieder \[2017a\]](#). They correspond to a joint flow of at least 10 workers leaving a large establishment (50 employees or more) and moving to a business services firm or temp agency. The number of on-site outsourcing events exhibits some variations over time and revolves around on average 50 events per year.

FIGURE 3.7.6: NUMBER OF ON-SITE OUTSOURCING EVENTS BY DESTINATION INDUSTRY



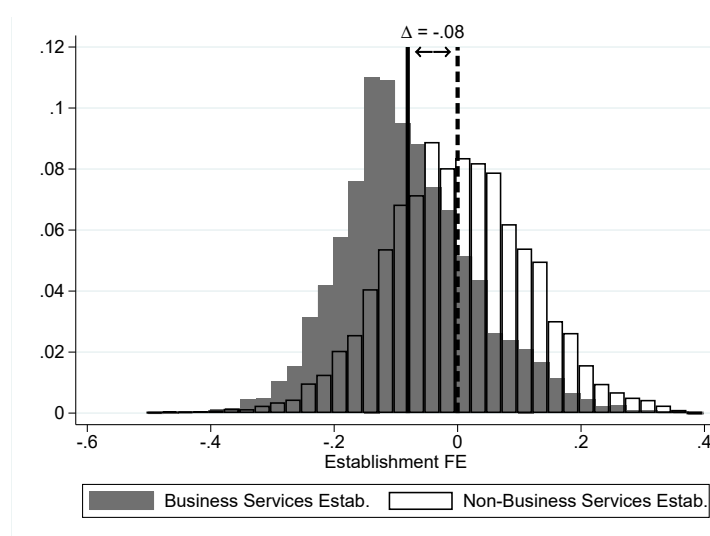
Notes : This Figure plots the yearly number of on-site outsourcing events identified in the main sample — the 'one-job' sample — by type of daughter establishment — i.e. destination establishment. On-site outsourcing event are defined as per [Goldschmidt and Schmieder \[2017a\]](#). They correspond to a joint flow of at least 10 workers leaving a large establishment (50 employees or more) and moving to a business service firm or temp agency. On-site outsourcing events towards temp agencies (in light blue) and logistics establishments (in orange) are the most numerous and account for 40% each of all on-site outsourcing events. The methodology captures fewer on-site outsourcing events in food (in maroon), cleaning (in blue), and security (in green).

FIGURE 3.7.7: SHARE OF ON-SITE OUTSOURCING EVENTS WITHIN FIRM



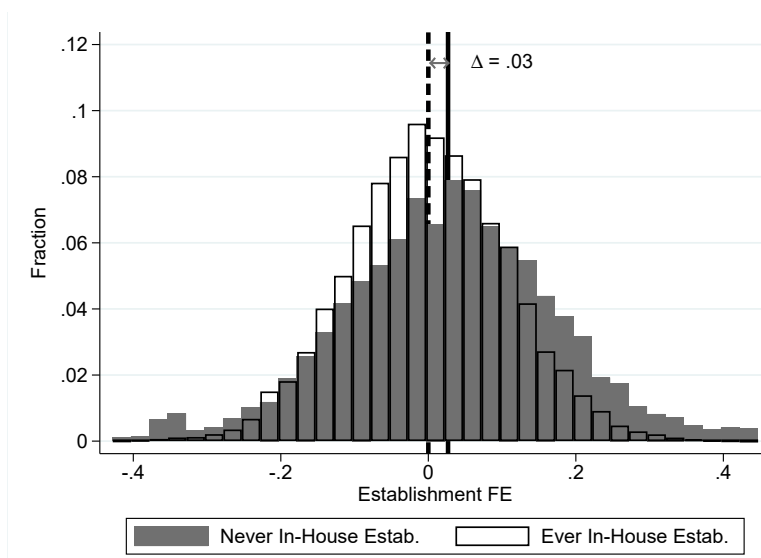
Notes : This Figure plots the share of yearly on-site outsourcing events identified in the main sample — the 'one-job' sample — that occur within the boundaries of a firm — i.e. the mother and daughter establishment share the same firm identifier — rather than between different firms. On-site outsourcing event are defined as per [Goldschmidt and Schmieder \[2017a\]](#). They correspond to a joint flow of at least 10 workers leaving a large establishment (50 employees or more) and moving to a business services firm or temp agency. On average, one in four (25%) on-site outsourcing event occur within the boundaries of a firm.

FIGURE 3.7.8: ESTABLISHMENT PAY PREMIA (AKM EFFECTS) FOR IN-HOUSE AND OUTSOURCED FCSL WORKERS

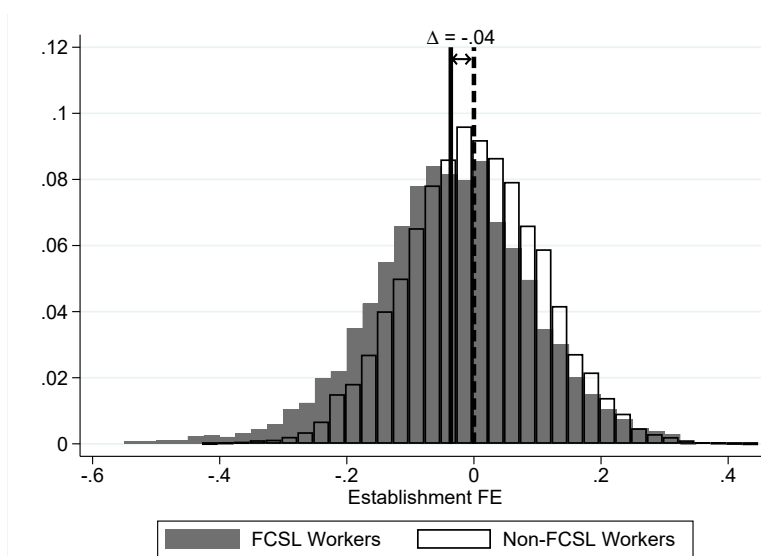


Notes : This Figure reports histograms of estimated AKM establishment effects estimated on FCSL workers using equation (3.2). The distribution of AKM establishment effects for workers in FCSL occupations is plotted separately for workers employed in-house (in light) and outsourced at a business services establishment (in dark gray). Note that business services establishments do not incorporate temporary agencies. Values are centered around the average establishment effect for FCSL workers employed in-house. The distribution of establishments fixed effects for workers employed in business services establishments is shifted to the left compared to that for workers employed in-house, indicating that when employed outsourced workers benefit from lower pay premia. The dashed vertical lines marks the average firm pay premium in outsourcing establishments relative to the average of in-house establishments (dashed line, centered in 0). The difference in means across the two groups (Δ) is of $-.08$ and is statistically significant. Temporary agencies are excluded from the sample. All observations are weighted by the number of workers on which the establishment fixed effect has been estimated.

FIGURE 3.7.9: ESTABLISHMENT PAY PREMIA (AKM EFFECTS) FOR IN-HOUSE AND OUTSOURCING ESTABLISHMENTS AND BY OUTSOURCING STATUS



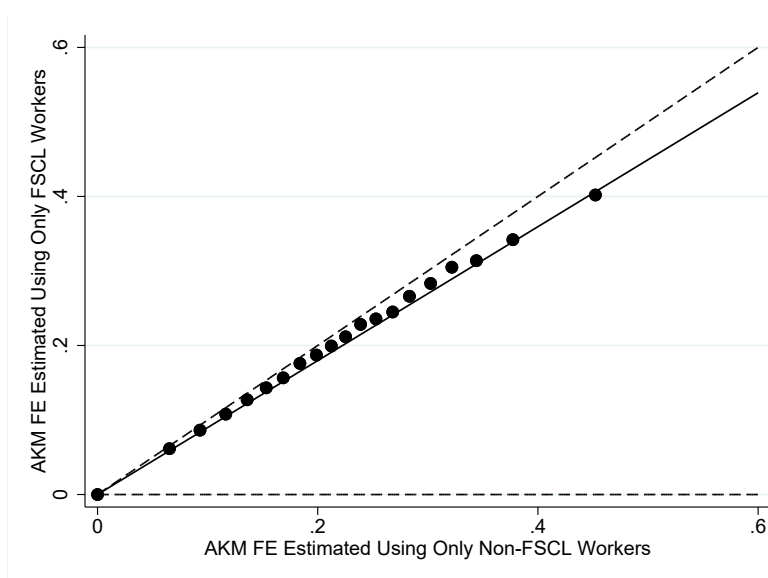
A. Non-FCSL Workers Establishment Effects of In-House and Outsourcing Establishments



B. Establishment Effects for FCSL and Non-FCSL Workers (for Establishment with In-House Provision)

Notes : This Figure plots histograms of estimated AKM establishment effects using equation (3.2). Panel A studies selection of establishments into outsourcing FCSL services (i.e. not employing workers in FCSL occupations). It plots the distribution of AKM effects for workers in non-FCSL occupations separately for establishment with in-house provision (in light) and those that outsource (in dark gray). Values are centered around the average AKM effect in establishments with in-house provision. The distribution for outsourcing establishment is to the right of those with in-house provision, suggestive of higher pay premia in outsourcing establishments. Panel B tests the rent-sharing channel. It overlaps the distribution of AKM effects estimated separately for FCSL workers and non-FCSL workers for the same establishments. Sample is restricted to establishment which hire both types of workers, i.e. with some in-house provision. The reference group is non-FCSL workers (in light) and values are centered around the average AKM effect in this group. The distribution for FCSL workers (in dark gray) is slightly to the left of that for non-FCSL workers, suggestive of FCSL workers reaping lower pay premia than their non-FCSL counterparts, when employed in-house. All observations are weighted by the number of workers in the establishment.

FIGURE 3.7.10: ESTABLISHMENT PAY PREMIA (AKM EFFECTS) FOR FCSL AND NON-FCSL WORKERS, WITHIN ESTABLISHMENTS



Notes : This Figure is a binned scatter plot of AKM establishment effects estimated separately on FCSL (y-axis) and non-FCSL (x-axis) workers using equation (3.2). Sample is restricted to establishment with more than 50 employees and which employ both types of workers. Each dot correspond to 1/20th of the observations. I normalize both AKM effects in the lowest vingtile to 0. There is a positive correlation between the estimated pay premium for FCSL and non-FCSL workers within establishments. The two benchmarks of no correlation (null slope) and perfect correlation (slope of 1) are marked by the dashed lines. The solid line corresponds to the estimated linear fit in an OLS regression where each observation is weighted by the number of workers in the establishment. Note that the normalization has no effect on the estimated slope as the initial difference in level would be absorbed by the constant. The estimated slope is of .899 (.004) and is statistically different from 0 and from 1 at the 5% level.

Appendix

3.A FCSL Workers and Business Services Firms

A.1 Identifying FCSL Occupation Codes and Industry Codes

Food I adopt a broad definition, from cooks (636D) to waiters (561B/C). I am particularly interested in occupations related to catering. In the descriptive analysis, food workers employed in the restaurant, hotel, and air travel industries are excluded from the sample.

In terms of economic activity, I include restaurants, canteens, bars and catering as (potential) daughter establishments. However, I only consider establishments providing catering and canteen services as business services establishments. This distinction only matters for the identification of outsourcing events and is specific to the food industry.

Cleaning I include cleaners (648A), service agents (525A to 525D), household cleaners (536B and 536) and floor staff in hotels (561F). The first three categories match the definition of cleaning occupations of the French statistical agency.²⁴ The fourth category is incorporated for consistency with [Goldschmidt and Schmieder \[2017a\]](#). Except for cleaners, the other categories are slightly broader than solely cleaning tasks.

For firms in the cleaning sector, categories are well-defined in the nomenclature. Both maintenance cleaning – *nettoyage courant* – and specialized cleaning services – *nettoyage spécialisé* – are included (respectively 81.1 and 81.2 in NAF rev2).

Security I incorporate workers watching over buildings, bodyguards, private investigators, and related occupations (534A). For firms, I flag "investigation and security activities" – which encompasses private security (80.10), security systems (80.20) and investigation (80.30).

Logistics Logistic occupations and business services firms are identified using the INSEE classification — transportation, storage, and mailing services. For transportation, I focus on

24. See for example "Le secteur du nettoyage", INSEE Première, March 2018

freight transportation. Low-skilled warehouse occupations are also included.

Changes in nomenclature

Both nomenclatures evolved over time. The socio-occupational nomenclature changes in 2003. The main economic activity nomenclature (NAF) changes in 2008, with more reshuffling. In some cases, one new category aggregates two former categories or conversely. It can be the case that a distinction disappears in the new nomenclature or conversely. To prevent discontinuities over time, I flag all establishments identifiers in the broad category but not in the more refined one and no longer classify them as food, cleaning, security or logistics business services firms (depending on the context).

For example, in the logistics sector, the new nomenclature distinguishes passenger transportation from freight transportation while they used to be pooled. [Goldschmidt and Schmieder \[2017a\]](#) put an emphasis on excluding passenger transportation. I flag all establishments identifiers associated with passenger transportation and exclude them from the logistics sector prior to the nomenclature change.

The method is quite effective. To assess its performance, I consider establishments identifiers associated with logistics activities before and after the change in nomenclature. I check whether establishments classified as logistics business services firms in 2007 are still identified as such in 2009 and conversely. Among establishments present in both periods and identified as providing logistics services in 2009 (resp. 2007), 96.1% (resp. 98.5%) were also classified in the same way in 2007 (resp. 2009).

This approach proves less efficient in settings where establishments are short-lived. This is particularly relevant for the food industry. The new nomenclature distinguishes restaurants from canteen/self-service while this was not the case before. Restaurants are also more numerous than canteens and self-services. I adopted a conservative approach and used the reverse correction. I flag establishment classified as canteens and self-service after 2008 and retroactively classify them as food business services firms in 2002-2007.

Cleaning, Food, Security, and Logistics Occupation Codes

TABLE 3.A.1: Cleaning, Food, Security, and Logistics Occupation Codes

Occupation Category	Occupation code		Label
	PCS_ECE 2003	PCS_ECE 1982	
Food	488a, 488b	4893	Catering manager
Food	561b, 561c	5612, 5613	Waiter
Food	561d	5613	Kitchen assistants, kitchen apprentices and multi-skilled agent in the food industry
Food	636d	6354	Cooks and commis chefs
Cleaning	525	5216, 5222	Service agents in schools, hospitals, public administration
Cleaning	561f	5616	Floor staff in hotels
Cleaning	563b, 563c	5632	Household cleaners
Cleaning	684a	6891	Cleaners
Security	564a	5633	Caretakers, doormen
Security	534b	5317	Cash escorts, bodyguards, private investigators and related jobs
Security	534a	5317	Security guards and security officers
Logistics	653a	6515	Warehousemen
Logistics	641a	6411	Lorry drivers
Logistics	651a, 651b, 652a, 654b	6512, 6511, 6514	Lifting equipment drivers
Logistics	643a	6415	Delivery driver and courier
Logistics	655a	6521	Transit operation agents
Logistics	676a, 676b, 676c, 676d	6792, 6793	Other warehouse workers

Source : INSEE, Nomenclature des Professions et Categories Socioprofessionnelles (PCS)

Daughter Establishment Industry Code

TABLE 3.A.2: Daughter Establishment Industry Code

Type	Valid Years	Industry Code	Label
Food	2002-2008	553a	Restaurants
Food	2009-2015	5610a	Restaurants
Food	2009-2015	5610b	Canteen and self-service
Food	2002-2008	158b, 553b	Snack bars, bakery
Food	2009-2015	5610c	Snack bars
Food	2002-2008	555a, 555c, 555d	Catering
Food	2009-2015	5621Z, 5629Z	Catering
Food	2002-2008	554a, 554b	Bars, cafes and refreshment stalls
Food	2009-2015	5630	Bars, cafes and refreshment stalls
Cleaning	2002-2008	703C, 703D, 751G	Building maintenance
Cleaning	2009-2015	8110	Building maintenance
Cleaning	2002-2008	747Z, 900G	Cleaning
Cleaning	2009-2015	8121Z, 8122Z, 8129A, 8129B	Cleaning
Security	2002-2008	746Z	Investigation and security
Security	2009-2015	8010Z	Private security activities
Security	2009-2015	8020Z	Security system activities
Security	2009-2015	8030Z	Investigation activities
Logistics	2002-2008	601Z, 602L, 602M, 602N, 602P, 603Z, 632A, 634A, 712A, 713A	Land-side logistics
Logistics	2009-2015	4941A, 4941B, 4920Z, 4941C 4950Z, 5221Z, 5229A, 7712Z 7731Z	Land-side logistics
Logistics	2002-2008	621Z, 622Z, 623Z, 632E, 712E	Air logistics
Logistics	2009-2015	5121Z, 5223Z, 7735Z	Air logistics
Logistics	2002-2008	611A, 611B, 612Z, 631A, 632C, 712C, 713A	Maritime logistics
Logistics	2009-2015	5020Z, 5040Z, 5222Z, 5224A 7734Z	Maritime logistics
Logistics	2002-2008	634B, 634C	Charter and transport organization
Logistics	2009-2015	5229B	Charter and transport organization
Logistics	2002-2008	511P, 511U, 631B, 631D, 631E, 748D	Storage and packaging
Logistics	2009-2015	5210B, 4617A, 4619A, 5210A 5224B, 8292Z	Storage and packaging
Logistics	2002-2008	602N, 641A, 641C	Mailing and relocation services
Logistics	2009-2015	5310Z, 4942Z, 5320Z	Mailing and relocation services
Temp	2002-2008	745B	Temp agencies (short term)
Temp	2009-2015	7820Z	Temp agencies (short term)
Temp	2002-2008	745A	Provision of personnel
Temp	2009-2015	7830Z	Provision of personnel

Source : INSEE, Nomenclature d'activités française (NAF rev.2)

Business Service Firm Industry Codes

TABLE 3.A.3: Business Service Firm Industry Codes

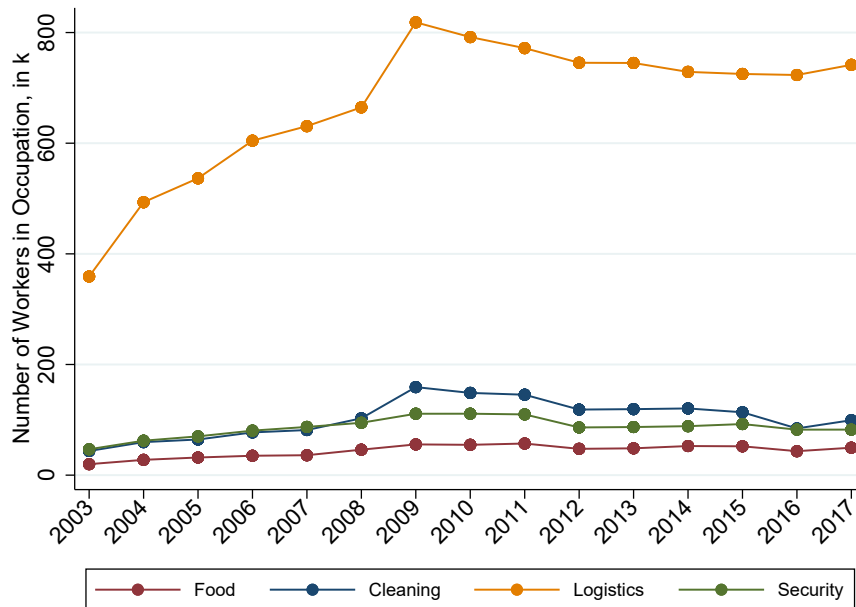
Type	Valid Years	Industry Code	Label
Food	2009-2015	5610b	Canteen and self-service
Food	2002-2008	555a, 555c, 555d	Catering
Food	2009-2015	5621, 5629	Catering
Cleaning	2002-2008	703C, 703D, 751G	Building maintenance
Cleaning	2009-2015	8110	Building maintenance
Cleaning	2002-2008	747Z, 900G	Cleaning
Cleaning	2009-2015	8121Z, 8122Z, 8129A, 8129B	Cleaning
Security	2002-2008	746Z	Investigation and security
Security	2009-2015	8010Z	Private security activities
Security	2009-2015	8020Z	Security system activities
Security	2009-2015	8030Z	Investigation activities
Logistics	2002-2008	601Z, 602L, 602M, 602N, 602P, 603Z, 632A, 634A, 712A, 713A	Land-side logistics
Logistics	2009-2015	4941A, 4941B, 4920Z, 4941C 4950Z, 5221Z, 5229A, 7712Z 7731Z	Land-side logistics
Logistics	2002-2008	621Z, 622Z, 623Z, 632E, 712E	Air logistics
Logistics	2009-2015	5121Z, 5223Z, 7735Z	Air logistics
Logistics	2002-2008	611A, 611B, 612Z, 631A, 632C, 712C, 713A	Maritime logistics
Logistics	2009-2015	5020Z, 5040Z, 5222Z, 5224A 7734Z	Maritime logistics
Logistics	2002-2008	634B, 634C	Charter and transport organization
Logistics	2009-2015	5229B	Charter and transport organization
Logistics	2002-2008	511P, 511U, 631B, 631D, 631E, 748D	Storage and packaging
Logistics	2009-2015	5210B, 4617A, 4619A, 5210A 5224B, 8292Z	Storage and packaging
Logistics	2002-2008	602N, 641A, 641C	Mailing and relocation services
Logistics	2009-2015	5310Z, 4942Z, 5320Z	Mailing and relocation services
Temp	2002-2008	745B	Temp agencies (short term)
Temp	2009-2015	7820Z	Temp agencies (short term)
Temp	2002-2008	745A	Provision of personnel
Temp	2009-2015	7830Z	Provision of personnel

Source : INSEE, *Nomenclature d'activités française (NAF rev.2)*

A.2 Descriptive Evidence on Workers with FCSL Occupations

Number of Workers

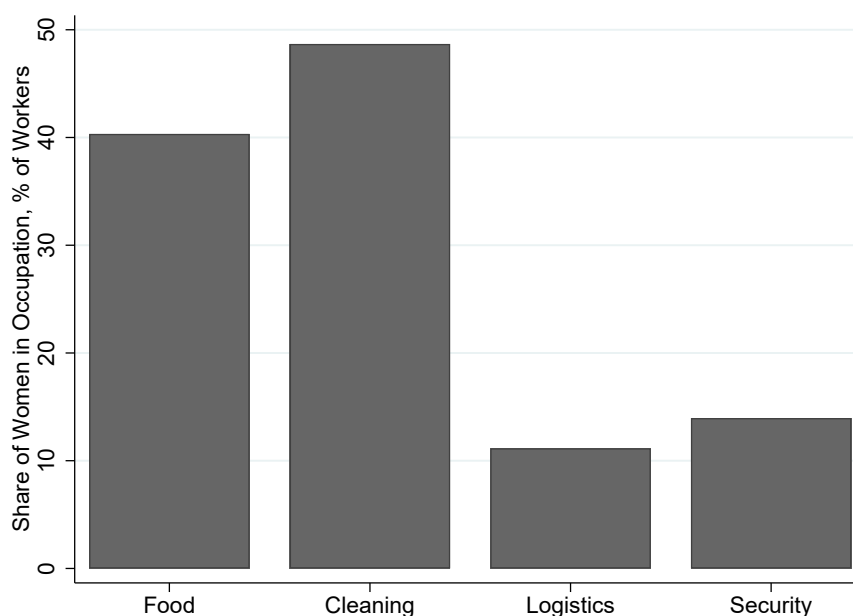
FIGURE 3.A.1: NUMBER OF WORKERS IN FCSL OCCUPATIONS



Notes : This Figure plots the number of workers in food (in red), cleaning (in blue), logistics (in orange), and security (in green) over the period 2003-2017. The sample is restricted to full-time workers and to establishments with more than one employee. Workers in food occupations who are employed in restaurants, hotels, and air travel establishments, are not incorporated in the food category.

Gender Composition

FIGURE 3.A.2: SHARE OF WOMEN IN FOOD, CLEANING, SECURITY, AND LOGISTICS OCCUPATIONS

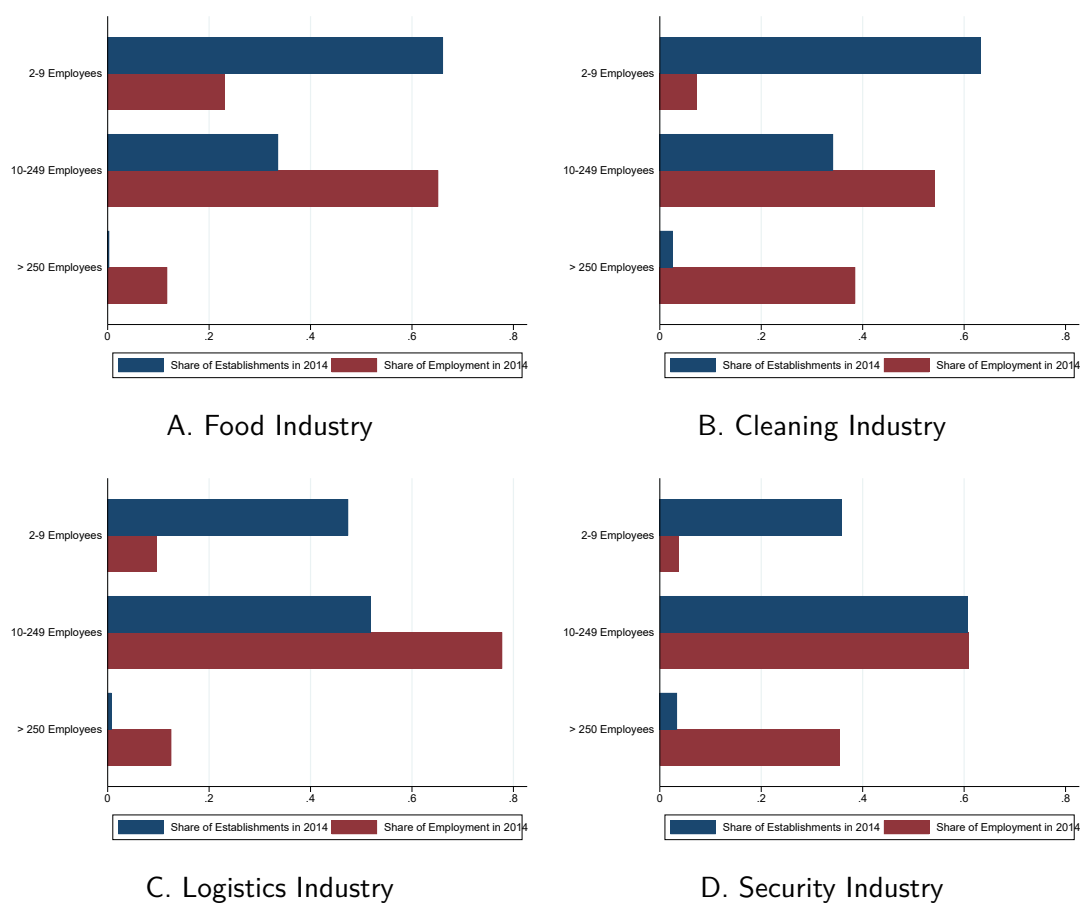


Notes : This Figure reports the share of women in workers in food, cleaning, security, and logistics occupations as a fraction of all workers in these occupations. The sample is restricted to full-time workers, aged 21 to 50, in metropolitan France and to establishments with more than one employee. Workers in food occupations who are employed in restaurants, hotels, and air travel establishments, are not incorporated in the food category. There are large differences in the gender composition of occupations. Women are over-represented in cleaning occupations while they account for a small share of workers in security and logistics. Women account for roughly a third of workers in occupations related to the provision of food services. The average is taken over the years 2003 and 2015. There is large persistence in these shares over time, with the average over the period being close to the shares in each year.

3.B General Outsourcing

B.1 Heterogeneity in Employment Concentration across FCSL Services

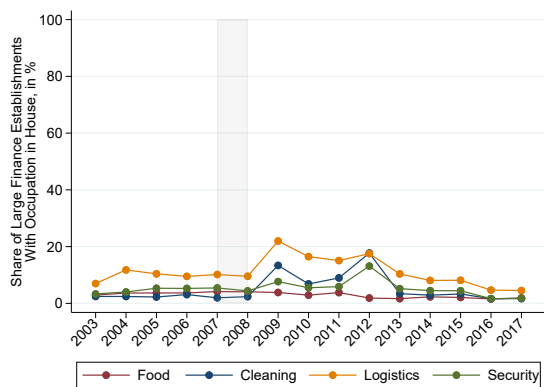
FIGURE 3.B.1: SHARE OF ESTABLISHMENTS AND EMPLOYMENT IN FCSL BUSINESS SERVICE ESTABLISHMENTS IN 2014, BY ESTABLISHMENT SIZE



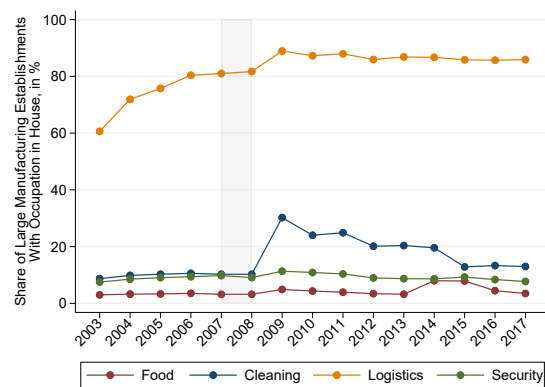
Notes : This Figure decomposes the total number of establishments (in blue) and total employment (in red) in establishments specialized in the provision of food, cleaning, logistics, and security services by establishment size in 2014. Establishments are divided in three groups (i) micro-entreprises — 2 to 9 employees, (ii) small to medium — 10 to 249 employees, and (iii) intermediate to large — > 250 employees. Employment is defined as the headcount of employees on Dec 31st of each year. The blue (resp.) columns correspond to the share of establishments (resp. employment) in each size category. This Figures gives a sense of the concentration in the provision of these services to firms. In all four panels, employment is mainly driven by small to medium establishments (10-249 employees). In the cleaning (Panel B) and security (Panel D) industries, employment is also largely driven by intermediate establishments (> 250 employees). They account for 35-40% of total employment while only accounting for a small proportion of establishments.

B.2 In-House Provision of FCSL Services in Finance, Manufacturing, and Retail Establishments

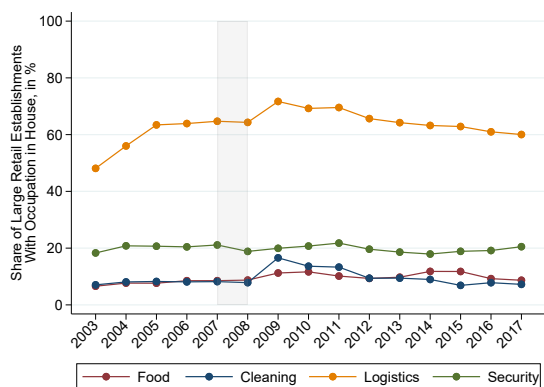
FIGURE 3.B.2: SHARE OF ESTABLISHMENT WITH IN-HOUSE WORKERS IN FCSL OCCUPATIONS, BY INDUSTRY



A. Finance



B. Manufacturing



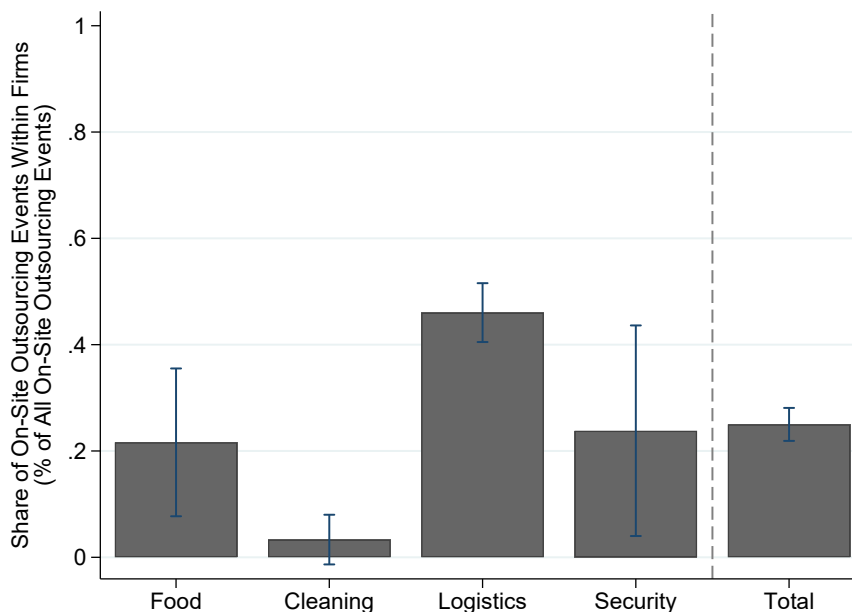
C. Retail

Notes : This Figure plots the share of large establishments in an industry with at least one worker with a food, cleaning, logistics or security occupation over time. It further decomposes logistics occupation into drivers and warehouse. Panel A focuses on establishments in the finance sector, while Panel B focuses on manufacturing and Panel C on retails. Large establishments are defined as establishments with more than 100 employees on Dec 31st of a given year. This graph gives a sense of the proportion of large establishments with FCSL occupations in house — as opposed to outsourced. The higher the share of establishments with a given occupation in house, the lower the level of domestic outsourcing.

3.C On-Site Outsourcing

C.1 On-Site Outsourcing Events Within Firm

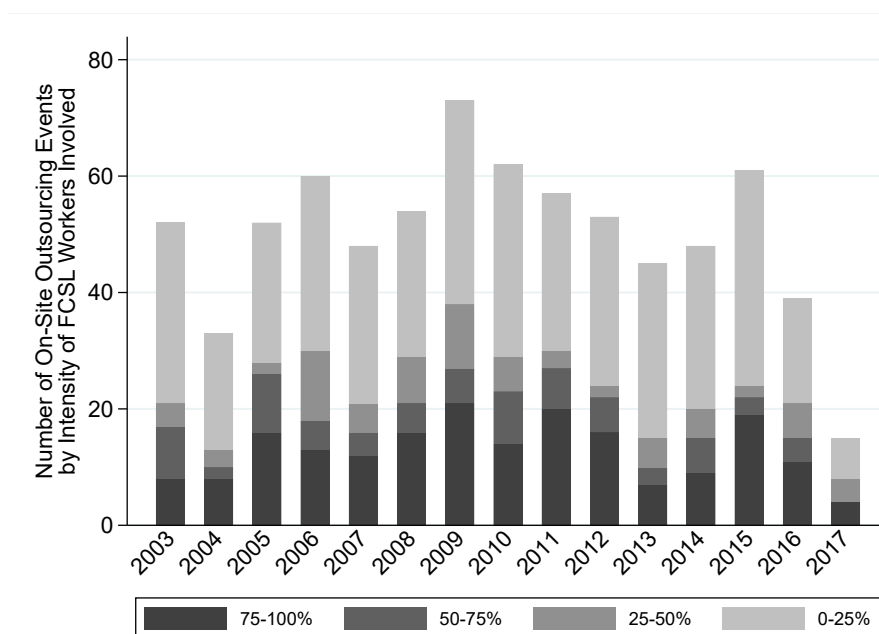
FIGURE 3.C.1: SHARE OF ON-SITE OUTSOURCING EVENTS WITHIN FIRM, BY DESTINATION INDUSTRY



Notes : This Figure plots the share of on-site outsourcing events identified in the main sample — the 'one-job' sample — that occur within the boundaries of a firm — i.e. the mother and daughter establishment share the same firm identifier — rather than between different firms. The diagnosis is decomposed by type of daughter establishment — food, cleaning, security, or logistics business service firm. All years are pooled. On-site outsourcing event are defined as per [Goldschmidt and Schmieder \[2017a\]](#). They correspond to a joint flow of at least 10 workers leaving a large establishment (50 employees or more) and moving to a business services firm or temp agency. On average, one in four (25%) on-site outsourcing event occurred within the boundaries of a firm. There is significant variation in the share of *within-firm* events. This is a more frequent phenomenon in outsourcing events towards logistics firms. This is not very frequent in events towards cleaning firms.

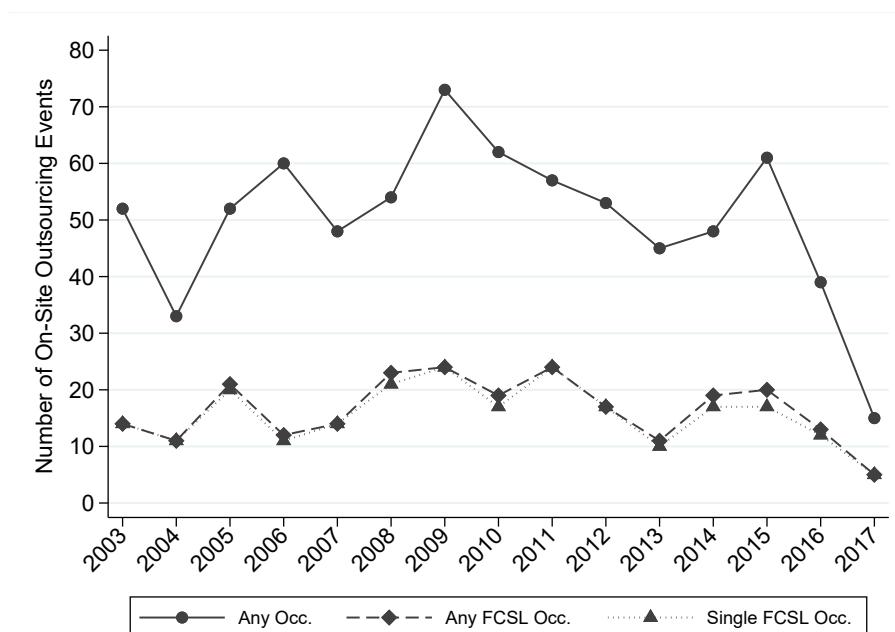
C.2 On-Site Outsourcing Events Placing Condition on Final Occupation

FIGURE 3.C.2: NUMBER OF ON-SITE OUTSOURCING EVENTS, BY INTENSITY OF FCSL WORKERS IN THE FLOW



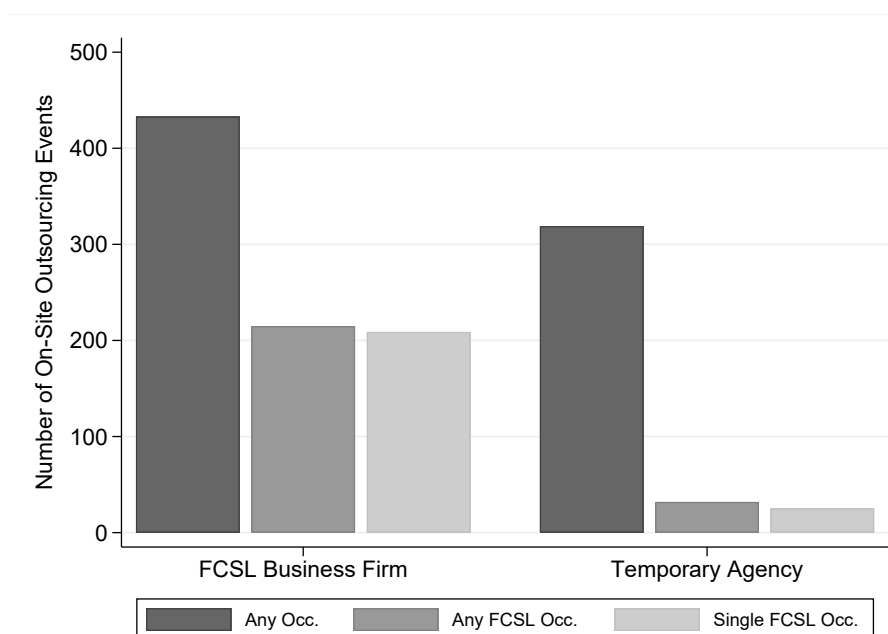
Notes : This Figure decomposes the count of on-site outsourcing events depending on the composition of the workers involved in the flow. On-site outsourcing event are defined as per [Goldschmidt and Schmieder \[2017a\]](#). They correspond to a joint flow of at least 10 workers leaving a large establishment (50 employees or more) and moving to a business service firm or temp agency. The idea is to check whether these flows do capture domestic outsourcing of some FCSL workers or not. Events are classified according to the fraction of FCSL workers in the flow of workers : [0-25%], [25-50%], [50-75%], [75-100%] (from light to dark gray). A majority of outsourcing events comprise at least 50% of FCSL workers among outsourced workers.

FIGURE 3.C.3: NUMBER OF ON-SITE OUTSOURCING EVENTS, BY CONDITION ON FINAL OCCUPATION, 2003-2017



Notes : This Figure reports the number of on-site outsourcing events captured over time depending on the definition used to define an event. On-site outsourcing event correspond to a joint flow of at least 10 workers leaving a large establishment (50 employees or more) and moving to a business service firm or temp agency. The solid line corresponds to the baseline definition which places no constraint on the final occupation of outsourced workers. The dashed line corresponds to the number of events when placing a restriction on workers in the on-site outsourcing flow having as occupation an FCSL occupation. Finally, the dotted line corresponds to the number of events captured when all workers are constrained to belong to a single FCSL occupation.

FIGURE 3.C.4: NUMBER OF ON-SITE OUTSOURCING EVENTS, BY CONDITION ON FINAL OCCUPATION, BY ESTABLISHMENT TYPE

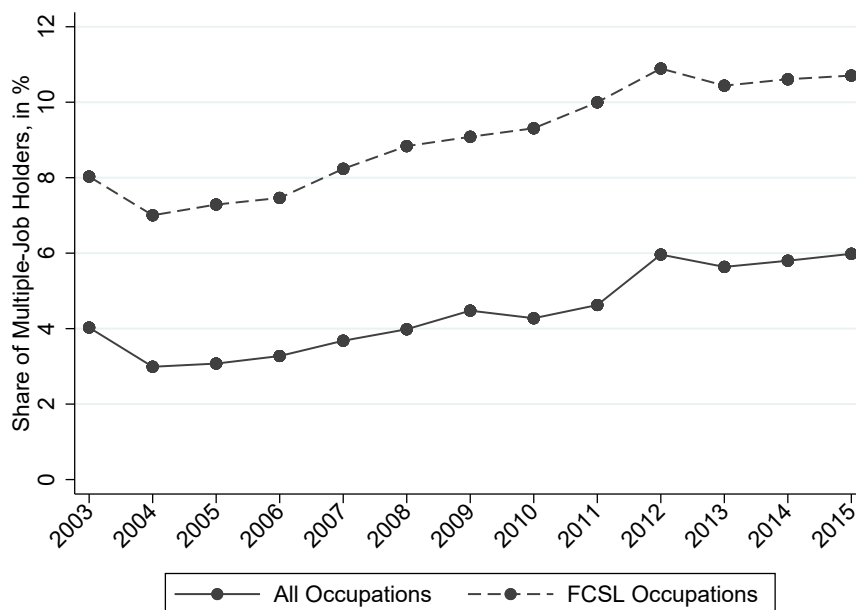


Notes : This Figure reports the number of on-site outsourcing events captured depending on the definition used to define an event for FCSL business services firms and for temporary agencies. On-site outsourcing event correspond to a joint flow of at least 10 workers leaving a large establishment (50 employees or more) and moving to a business service firm or temp agency. The dark gray bars correspond to the baseline definition which places no constraint on the final occupation of outsourced workers. The medium gray bars correspond to the number of events when placing a restriction on workers in the on-site outsourcing flow having as occupation an FCSL occupation. Finally, the lighter gray bars correspond to the number of events captured when all workers are constrained to belong to a single FCSL occupation. Each bar corresponds to the sum over 2002 and 2017. The largest reduction is observed for temporary agencies, where the number of events shrinks to nearly 0. While the baseline definition captured 319 events, placing a restriction on the final occupation of workers brings this number down to respectively 32 and 25 events. This confirms the intuition that outsourcing towards temporary agencies are not restricted to FCSL workers but encompass a broader set of outsourcing events. There is also a reduction in the number of events captured for service provider firms but to a smaller extent, going from 433 to 215 and 209 events.

C.3 Multiple-Jobs Sample

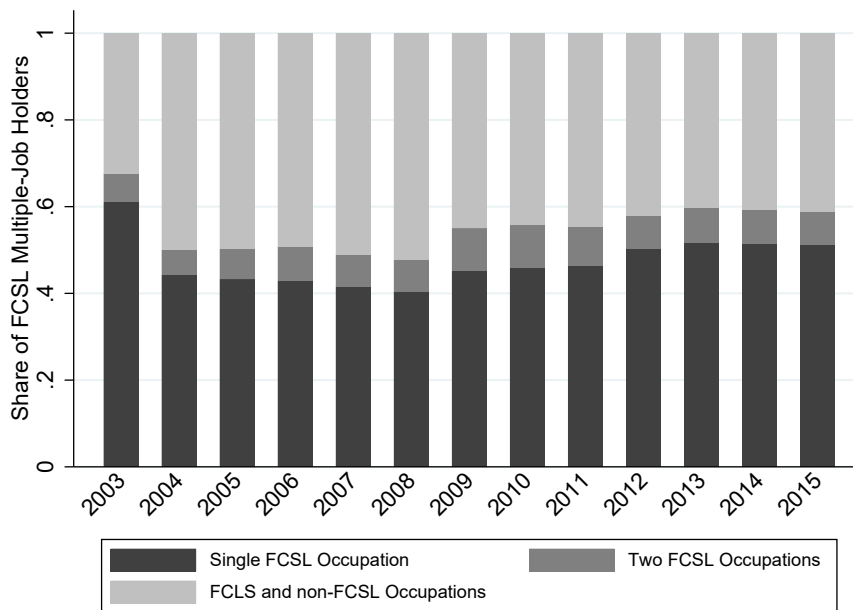
Descriptive Facts on Multiple-Jobs Sample

FIGURE 3.C.5: SHARE OF MULTIPLE JOB HOLDERS IN FCSL OCCUPATIONS AND IN GENERAL POPULATION



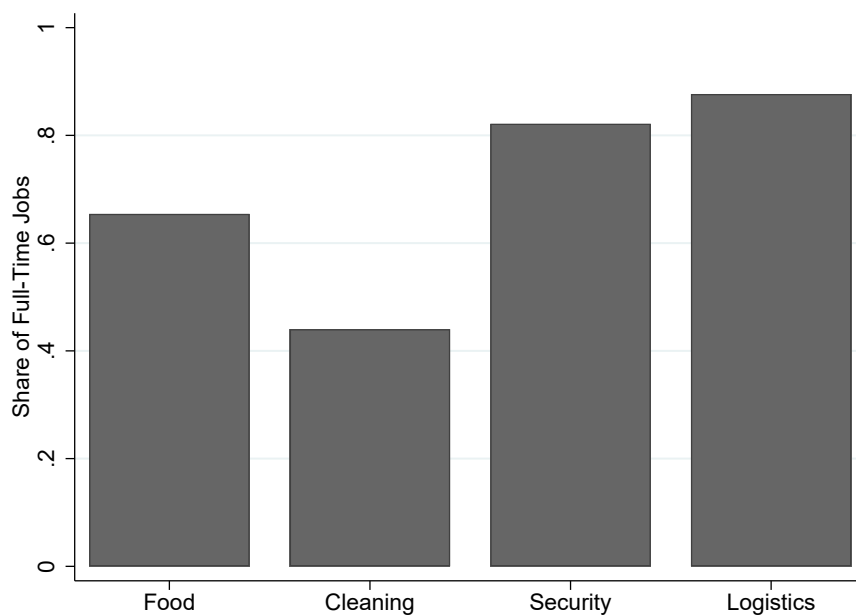
Notes : This Figure plots the share of workers with multiple jobs among FCSL occupations and for the general population. Workers are classified as FCSL workers if they hold at least one job with a FCSL occupation. In 2015, workers with multiple occupations constitute around 6% of the sample. This share was twice larger among workers with at least one FCSL occupation than among workers outside FCSL occupations (resp. 10.7% and 4.8%). Multiple job-holders account for a larger share of the population over time.

FIGURE 3.C.6: OCCUPATION MIX OF FCSL MULTIPLE-JOB HOLDERS



Notes : This Figure reports the occupation mix of FCSL multiple job holders in our sample. It decomposes multiple-job holding into workers with a single FCSL occupation over their different jobs, workers with at least two FCSL occupations, and workers with one FCSL occupation and a non-FCSL occupation. Roughly 40 to 50% of multiple job holders with at least a FCSL occupation hold all jobs with the same FCSL occupation (dark gray). A small fraction hold jobs in two different FCSL occupations (medium gray). Another significant share of multiple job holders with at least a FCDL occupation hold a job with a non-FCSL occupation. This decomposition is highly sensitive to the porosity among occupations.

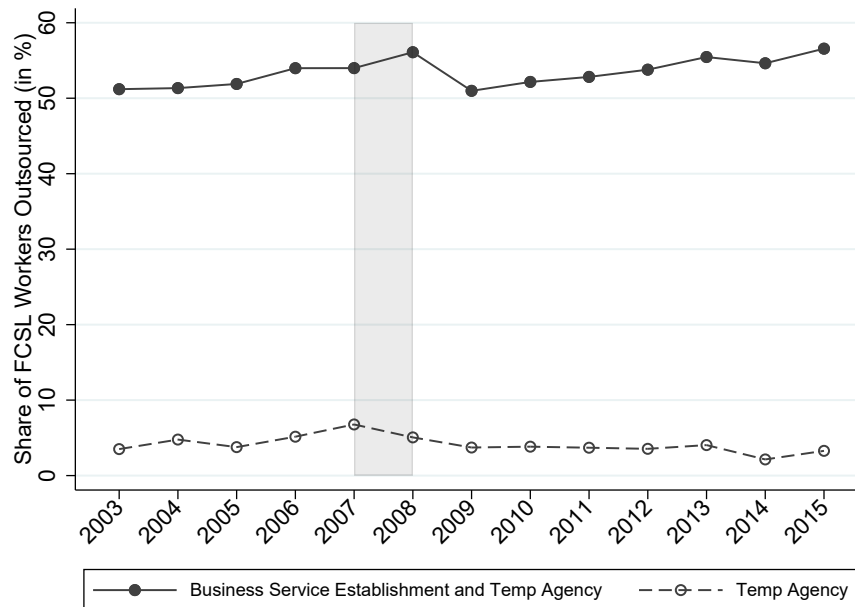
FIGURE 3.C.7: SHARE OF FULL-TIME JOBS AMONG ALL JOBS, BY OCCUPATION



Notes : This Figure reports the average share of jobs that are full-time by FCSL occupation over the period of interest. Full-time jobs correspond to most jobs in logistics (94%) and security (82%) while they only account for 62% of jobs in food and 43% of jobs in cleaning.

General Outsourcing in Multiple-Jobs Sample

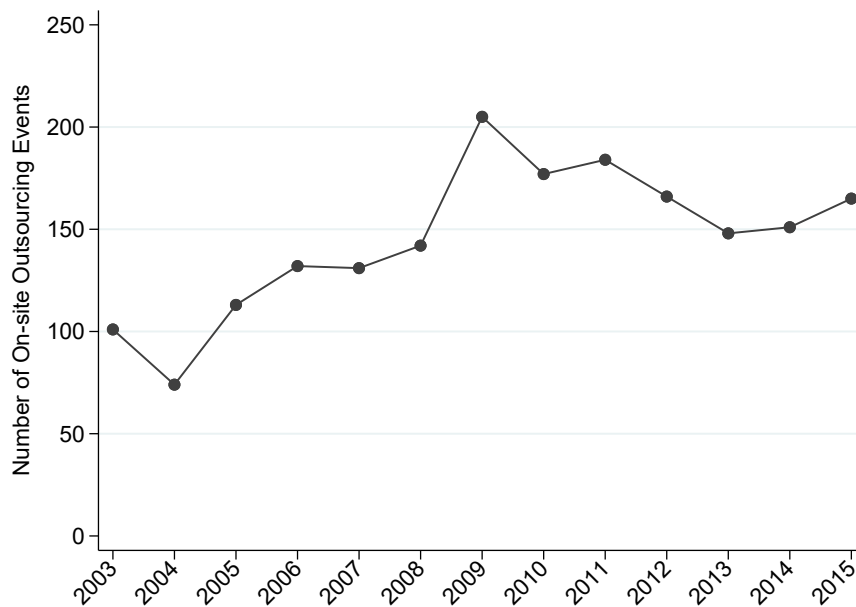
FIGURE 3.C.8: SHARE OF FCSL JOBS IN BUSINESS SERVICE ESTABLISHMENTS OR TEMP AGENCIES IN MULTIPLE JOB SAMPLE



Notes : This Figure reports the average fraction of workers with occupations in the provision of food, cleaning, security and logistics services that are employed in business service establishments or temp agencies over time as a fraction of total employment in these occupations. Workers in food occupations who are employed in restaurants, hotels, and air travel establishments, are not incorporated in the food category. It provides a sense of the general level of outsourcing in these occupations. The level of general outsourcing is slightly higher than in the 'one-job' sample. The shaded area corresponds to a change in the nomenclature of industries, making trends difficult to examine. However, one can look at dynamics piece-wise. The sample is the 'multiple job' sample — and allows for multiple-job holding patterns and for part-time contracts. As a matter of comparison, Figure 3.7.3 performs a similar exercise on the main sample — single full-time job sample. The level of general outsourcing is higher than in the main sample.

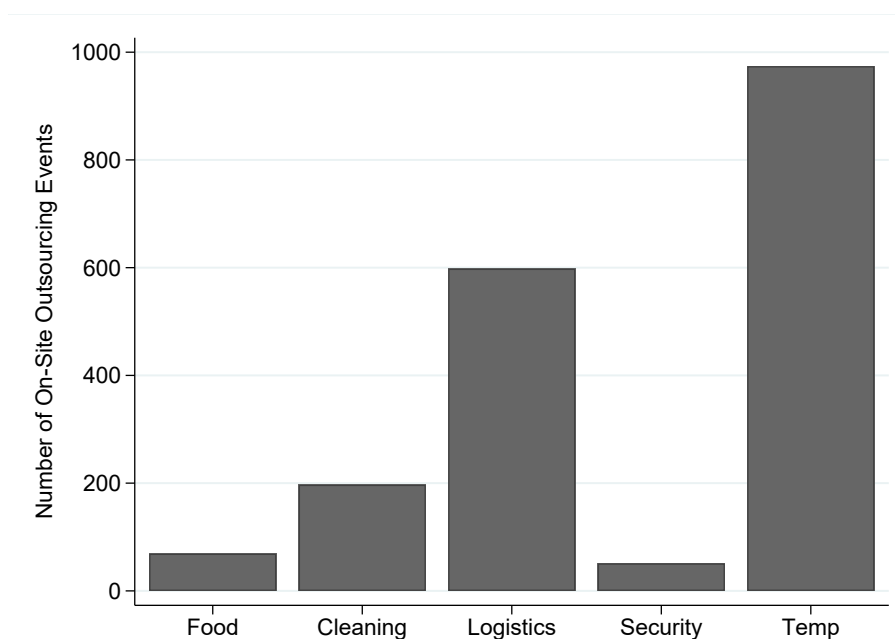
On-Site Outsourcing Events in Multiple-Jobs Sample

FIGURE 3.C.9: NUMBER OF ON-SITE OUTSOURCING EVENTS IN MULTIPLE-JOB SAMPLE



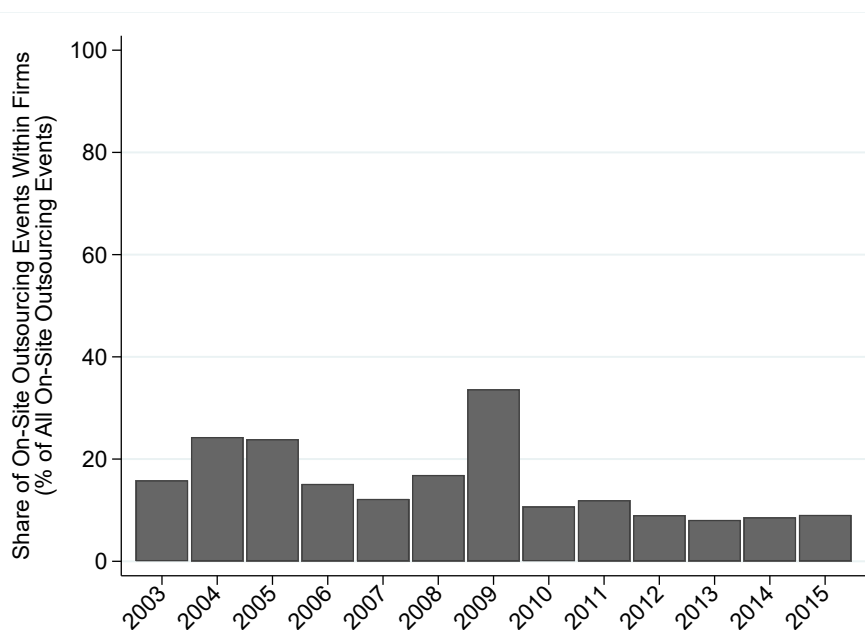
Notes : This Figure reports the yearly number of on-site outsourcing events identified in the 'multiple-job' sample. On-site outsourcing event are defined as per [Goldschmidt and Schmieder \[2017a\]](#). They correspond to a joint flow of at least 10 workers leaving a large establishment (50 employees or more) and moving to a business service firm or temp agency. In this sample, 1,889 on-site outsourcing events are captured. There are large variations in the number of on-site outsourcing events capture each year. On average, 145 events are capture each year with significant variation around the mean.

FIGURE 3.C.10: NUMBER OF ON-SITE OUTSOURCING EVENTS IN MULTIPLE-JOB SAMPLE, BY DESTINATION INDUSTRY



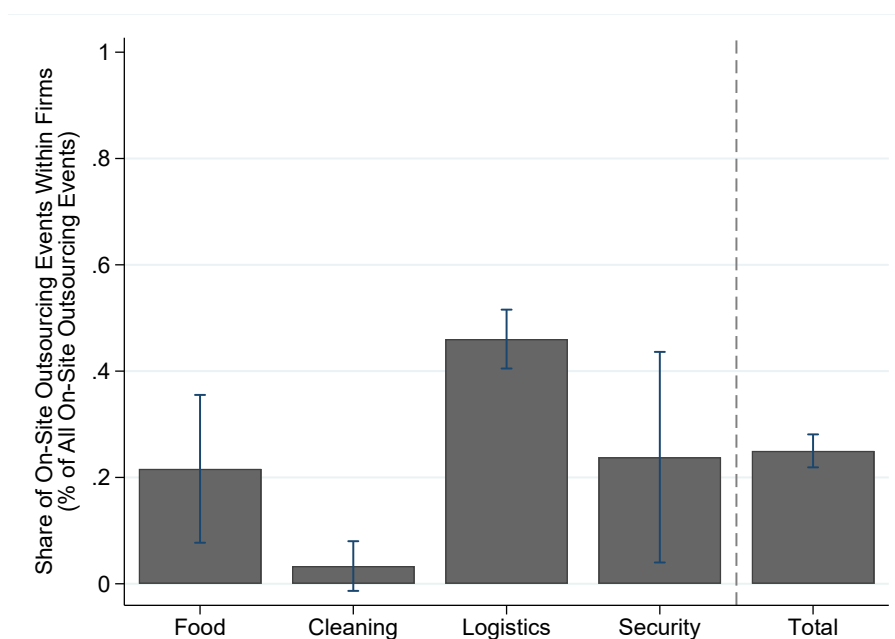
Notes : This Figure plots the yearly number of on-site outsourcing events identified in the 'multiple job' sample — by type of daughter establishment — i.e. destination establishment. On-site outsourcing event are defined as per [Goldschmidt and Schmieder \[2017a\]](#). They correspond to a joint flow of at least 10 workers leaving a large establishment (50 employees or more) and moving to a business service firm or temp agency. On-site outsourcing events are most common towards temp agencies (in light blue) and logistics business services establishments (in orange). This sample allows to capture more events towards cleaning (in blue), food (in maroon), and security (in green) business services establishments.

FIGURE 3.C.11: SHARE OF ON-SITE OUTSOURCING EVENTS WITHIN FIRMS IN MULTIPLE-JOB SAMPLE



Notes : This Figure plots the share of yearly on-site outsourcing events identified in the 'multiple-job' sample that occur within the boundaries of a firm — i.e. the mother and daughter establishment share the same firm identifier — rather than between firms. On-site outsourcing events are defined as per [Goldschmidt and Schmieder \[2017a\]](#). They correspond to a joint flow of at least 10 workers leaving a large establishment (50 employees or more) and moving to a business service firm or temp agency. On average, 15% of 'on-site' outsourcing events occurred within the boundaries of a firm.

FIGURE 3.C.12: SHARE OF ON-SITE OUTSOURCING EVENTS WITHIN FIRM, BY DESTINATION INDUSTRY



Notes : This Figure plots the share of on-site outsourcing events identified in the 'multiple-job' sample that occur within the boundaries of a firm — i.e. the mother and daughter establishment share the same firm identifier — rather than between firms. The diagnosis is decomposed by type of daughter establishment — food, cleaning, security, or logistics business service firm. All years are pooled. On-site outsourcing event are defined as per [Goldschmidt and Schmieder \[2017a\]](#). They correspond to a joint flow of at least 10 workers leaving a large establishment (50 employees or more) and moving to a business services firm or temp agency. On average, one in four (25%) on-site outsourcing event occurred within the boundaries of a firm. There is significant variation in the share of *within-firm* events by type of daughter establishment. This is a more frequent phenomenon in outsourcing events towards logistics and food business service firms (more than 1 in 5). This is not very frequent in events towards cleaning firms, although statistically different from 0.

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Titre : Essais sur l'Activité Partielle et sur la Demande de Travail des Entreprises

Mots clés : Emploi, Activité Partielle, Firmes, Politiques Publiques, Sous-traitance

Résumé : Cette thèse étudie le dispositif d'activité partielle et la demande de travail des entreprises. Les deux premiers chapitres traitent de l'activité partielle, un dispositif qui cherche à limiter les licenciements et préserver les emplois lors de fluctuations économiques en subventionnant les réductions du temps de travail. Le premier chapitre fournit un cadre conceptuel pour déterminer les coûts et bénéfices relatifs de l'assurance chômage, qui assure les individus contre le coût de la perte d'emploi, par rapport à l'activité partielle, qui assure les emplois via la subvention de réductions du temps de travail. Ce cadre conceptuel permet de penser la calibration jointe optimale de ces deux dispositifs. Le papier illustre les différents éléments d'arbitrage par des travaux empiriques, et met en avant le besoin

de travaux supplémentaires sur l'activité partielle. Le deuxième chapitre étudie en détail l'activité partielle. Il mesure les réponses comportementales des entreprises face aux changements d'incitations financières dans le dispositif d'activité partielle en France pendant la pandémie. Il étudie à la fois le comportement de report d'information et le comportement réel (recours au dispositif, ajustement de la demande de travail). Ces distorsions, également appelées aléa moral, pèsent négativement dans la formule de générosité optimale du dispositif. Le troisième chapitre examine la décision des entreprises d'employer en interne ou de sous-traiter les services aux entreprises. Il explore le rôle du partage de la rente entre une entreprise et ses salariés dans ses décisions d'emploi.

Title : Essays on Short-Time Work and on Firm Labor Demand

Keywords : Employment, Short-Time Work, Firms, Public Policy, Outsourcing

Abstract : This thesis studies short-time work programs and firms' labor demand. The first two chapters study short-time work programs, which aim to preserve employment relationships by subsidizing labor hoarding. The first chapter provides a conceptual framework for determining the relative welfare costs and benefits of unemployment insurance, which insures workers against the cost of job loss, and short-time work (STW) programs, which subsidize temporary reductions in hours worked, insuring jobs against temporary shock. This conceptual framework is useful for joint optimal design of the two programs. The paper provides empirical evidence on the elements of

the trade-off, and sheds light on the need for more research on STW programs. The second chapter does exactly this and studies thoroughly STW programs. It quantifies firm reporting and real economic responses to changes in economic incentives from STW in the context of France during the pandemic. These distortions, also known as moral hazard, weigh in the optimal design formula as welfare costs. The third chapter studies the decision of firms to employ in-house or to outsource the provision of services to firms. It explores the role of rent-sharing between the firm and its workers on employment decisions.