Université Paris Nanterre

200 av. de la République
92001 Nanterre Cedex
www.parisnanterre.fr

Membre de l'université Paris Lumières

Thibault Mirabel

Performance and Rarity of Worker-Owned Firms: Empirical Evidence from France

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sous la direction de Mme Nadine Levratto (Université Paris Nanterre)
et de M. Fabrice Tricou (Université Paris Nanterre)

Jury :

Rapporteur :	M. Fathi Fakhfakh	Maître de conférence, HDR, Université Paris Panthéon Assas, France
Rapporteur :	M. Douglas Kruse	Professeur, Université de Rutgers, États-Unis
Membre du jury :	Mme. Carmen Marcuello	Professeure, Université de Saragosse, Espagne
Membre du jury :	M. Antoine Rebérioux	Professeur, Université de Paris, LADYSS, France

THÈSE

pour obtenir le grade de

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Thibault MIRABEL

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Composition du jury :

Rapporteurs

Fathi FAKHFAKH   Maître de conférence, HDR, Université Paris Panthéon Assas, France

Douglas KRUSE   Professeur, Université de Rutgers, États-Unis

Examinateurs

Carmen MARCUELLO   Professeure, Université de Saragosse, Espagne

Antoine REBÉRIOUX   Professeur, Université de Paris, LADYSS, France

Directeurs

Nadine LEVRATTO   Directrice de rercherche, CNRS, Université Paris Nanterre, France

Fabrice TRICOU   Maître de conférence HDR, Université de Paris Nanterre, France

General outline / Plan d'ensemble

Acknowledgments / Remerciements

Reading Guide / Guide de lecture

English follows.

Cette thèse est structurée en trois articles empiriques, chacun d'eux explorant des questions de recherche spécifiques. Chaque chapitre peut être lu de manière indépendante. En outre, chaque chapitre est accompagné d'un résumé, de mots-clefs, de sa classification JEL et d'annexes propres. Aussi, certaines explications portant sur la stratégie d'identification, les aspects institutionnels du contexte français, ou certains faits stylisés se retrouvent dans plusieurs chapitres.

L'Introduction générale vise à fournir une vue d'ensemble des questions auxquelles cette thèse entend apporter des éléments de réponse. Elle présente également le contexte général dans lequel s'insère cette recherche et sa pertinence au regard de la littérature économique empirique et théorique. Cette introduction permet de mettre en évidence l'articulation entre les chapitres.

La thèse se clôt par une Conclusion générale qui résume ses contributions, expose ses principales limites et esquisse des pistes pour de futures recherches.

L'ensemble des références bibliographiques sont rassemblées dans une Bibliographie générale insérée à la fin de la thèse. À chaque fois qu'une référence est citée dans le texte, les noms des auteurs ainsi que l'année de publication sont mentionnés. Lorsque les auteurs sont plus de deux, seul le premier est cité, suivi de la mention « et al. » dès le premier appel de référence. Si plusieurs références des mêmes auteurs ont été publiées la même année, les lettres a, b, c etc. sont ajoutées après l'année de publication. Lorsqu'un même premier auteur a écrit plusieurs articles avec des ensembles de co-auteurs différents la même année, l'ensemble des auteurs est cité dans le texte.

Des figures et des tableaux sont proposées en fin d'ouvrage. La numérotation des figures et des tableaux se fait chapitre par chapitre. Ainsi, la figure 3.2 renvoie à la figure 2 du chapitre 3 ; le tableau 2.C.4 renvoie au tableau 4 de l'annexe C du chapitre 2. Les figures et tableaux numérotés par un simple chiffre renvoient à l'Introduction générale.

L'essentiel de cette thèse est rédigé en anglais, afin de faciliter la dissémination et la discussion de ces travaux dans les milieux universitaires et les institutions non-francophones. Un résumé long de la thèse en français est également fourni. L'Introduction générale, qui est rédigée en anglais, fournit une présentation plus complète de la thèse que le résumé long en Français.

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This thesis is based on three empirical papers, each of which investigates specific research questions. Each chapter was written so that it can be read as a standalone essay. It comes with a summary, keywords, JEL classification, and detailed appendices. As a consequence, some explanations about the identification strategy, the French institutional context, and some stylized facts are repeated in several chapters.

The General Introduction aims at providing a comprehensive overview of the research questions I tackle in this thesis, as well as of the broad context of my research and its relevance with respect to both the empirical and theoretical economic literature.

The thesis ends with a General Conclusion that reviews the contributions, discusses the main limitations, and sketches directions for future research.

All bibliographic references are gathered in a general Bibliography at the end of the thesis. For each citation, the authors' names and the year of publication are mentioned. When there are more than two authors, only the first is cited and I add the mention "et al." to indicate that there are more. If several references from the exact same authors were published in the same year, the letters a, b, c etc. are added after the year of publication. When a first author has co-authored several papers with different sets of co-authors the same year, all authors are cited in the text.

A list of figures and a a list of tables are included at the end of the thesis. The numbering of figures and tables is done chapter by chapter. For instance, Figure 3.2 refers to the second figure in Chapter 3 and Table 2.C.4 refers to the fourth table of Appendix C of Chapter 2. The figures and tables in the General Introduction are numbered by a simple numeral. For instance, Table 2 refers to the second table of the General Introduction.

Résumé long en français

PERFORMANCE ET RARETÉ DES COOPÉRATIVES DE TRAVAILLEURS :
CONTRIBUTIONS EMPIRIQUES À PARTIR DU CAS FRANÇAIS (SCOPS)

Dans un jugement du 20 décembre 2019, le tribunal de grande instance de Paris déclare la société France Télécom, grande entreprise des télécommunications, ainsi que ses principaux ex-dirigeants, coupables de harcèlement moral institutionnel envers la collectivité du personnel sur la période de 2007-2008. C'est la première fois en France qu'est reconnu le caractère institutionnel du harcèlement moral, c'est-à-dire au niveau de l'organisation et de la stratégie de l'entreprise. En 2006, la direction lance les plans de restructuration NExT et ACT qui visent à faire partir 22 000 salariés sur 3 ans sur les plus de 108 000 que compte France Télécom. Est mise en cause lors du procès, non pas les objectifs mais la mise en œuvre de ces plans. France Télécom étant une ancienne entreprise publique, la majorité des salariés ont le statut de fonctionnaires et, en tant que tels, ne peuvent pas être licenciés pour motif économique. Il s'agit donc pour la direction de faire partir volontairement les 22 000 salariés. Devant plus de 200 managers réunis à Paris, l'ex-PDG de France Télécom résume la stratégie de l'entreprise ainsi : « Les 22 000 départs, je les ferai d'une manière ou d'une autre, par la porte ou par la fenêtre! » Est donc systématiquement mis en place par les 4 000 managers de l'entreprise un management par la terreur et une dégradation des conditions de travail visant à pousser à bout les salariés. La stratégie est efficace : la direction compte 22 750 départs en mars 2009, l'Observatoire du stress et des mobilités forcées compte plus de 60 suicides et près de 40 tentatives entre 2008 et 2011.

Dans un autre registre, les 22 et 23 février 2022, la commission des affaires sociales de l'Assemblée Nationale auditionne les dirigeants et les syndicats du groupe privé Orpea sur la situation dans certains de ses établissements. Ces auditions font suite à une enquête journalistique (Castanet, 2022) ayant révélé de nombreux dysfonctionnements sanitaires et financiers au sein des Ehpad [1] de l'entreprise tels que le rationnement de nourriture et de fournitures médicales, la maltraitance chronique des résidents et la dégradation des conditions de travail. D'après son rapport RSE (Orpea groupe, 2021, slide 43), Orpea respecte de nombreux critères environnementaux, sociaux et de gouvernance (ESG). En effet, le groupe Orpea est noté comme « moyennement risquée » (5ème sur 113 sociétés) au sein de son secteur avec une nette progression de 14 places en un an selon Sustainalytics. Orpea entre également en 2021 dans le Top 10% des entreprises (sur 103 sociétés) les plus performantes en matière d'ESG selon l'agence de notation ISS ESG, ce que confirme la forte progression de

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[1] Établissement d'hébergement pour personnes âgées dépendantes.

14ème (sur 46 sociétés) en 2019 à 4ème (sur 47 sociétés) en 2021 selon l'agence Vigeo Eiris. Le groupe Orpea se trouve également dans de nombreux fonds d'investissement labellisés ISR (investissement socialement responsable). Mais les bonnes notes ESG du groupe Orpea ne reflètent ni la maltraitance des résidents ni la souffrance des salariés, et s'apparentent ainsi à du socialwashing, c'est-à-dire à une communication promouvant l'impact social et humain de l'entreprise à l'antipode de certaines de ses pratiques.

Ces deux exemples n'ont pour but que d'illustrer les déficiences, pour ne pas dire les apories, de la moralisation des pratiques managériales et organisationnelles au sein des entreprises conventionnelles. France-Télécom et Orpéa sont deux grandes sociétés anonymes qui représentent le harcèlement moral institutionnel, ou harcèlement managérial, pour l'une et le socialwashing pour l'autre. Si ces entreprises avaient été des coopératives de travailleurs, les faits décrits ci-dessus n'auraient sans doute jamais eu lieu. En attribuant le pouvoir de contrôle de l'entreprise aux salariés, les coopératives de travailleurs portent la démocratie, l'exigence de bien-être au travail, l'investissement socialement responsable, et les pratiques de RSE dans leur A.D.N.

Entendons-nous bien, je ne voudrais pas laisser penser par ces exemples introductifs que je tiens les coopératives de travailleurs pour une panacée. Je ne crois pas en une quelconque vertu ni des travailleurs, ni des actionnaires, ni des dirigeants. Ce qui est en jeu, selon moi, dans l'étude et la promotion des coopératives de travailleurs c'est que le compromis des intérêts contradictoires entre les parties prenantes de l'entreprise (principalement salariés et investisseurs) n'y est pas un vœu pieux, mais y est une contrainte inscrite dans la structure des droits de propriété elle-même, les salariés étant aussi investisseurs et dirigeants. Il ne s'agit pas de demander aux membres de l'entreprise d'être socialement responsables, mais d'organiser la responsabilité sociale dans la norme de l'entreprise. Il ne s'agit pas d'exhorter et de faire confiance aux individus pour dépasser l'horizon de leurs intérêts mais d'instituer les rampes de sécurité qui évitent le carambolage des membres de l'entreprise, et en particulier des salariés, tout en leur laissant la liberté de conduire leur entreprise comme ils l'entendent. C'est parce qu'elles instituent le dialogue d'intérêts divergents voire antagonistes au sein de chaque individu-membre que les coopératives de travailleurs ont été envisagées, de Walras à Marx, comme un possible dépassement du conflit capital-travail limité à l'entreprise.

C'est également en ce sens que depuis une dizaine d'années, les coopératives de travailleurs font l'objet d'une attention accrue de la part des pouvoirs publics et des organisations intergouvernementales internationales. Au niveau international, l'attention porte sur le manque de visibilité et d'informations sur les coopératives de travailleurs. L'Organisation des Nations Unies a proclamé l'année 2012 comme « Année internationale des coopératives ». À cette occasion, un observatoire mondial des coopératives fut créé afin d'élaborer une

base de données multidimensionnelle sur la valeur socio-économique et l'influence des coopératives dans le monde (Gotz, 2017). Dans sa communication du 13 avril 2011 relative à l'Acte pour le marché unique, la Commission Européenne définit l'entrepreneuriat social comme l'un des douze leviers de croissance en Europe. L'objectif est de favoriser le développement des entreprises ayant fait le choix, au-delà de la recherche légitime d'un profit financier, de poursuivre également des objectifs d'intérêt général, de développement social, éthique ou environnemental (European Commission, 2011). L'Organisation Internationale du Travail a recommandé aux gouvernements d'améliorer les statistiques nationales sur les coopératives en vue de leur utilisation pour l'élaboration et la mise en œuvre de politiques de développement (ILO, 2002). De même, l'Assemblée Générale des Nations Unies considère que la recherche et la collecte de statistiques harmonisées sur les coopératives devraient constituer des priorités (United Nations General Assembly, 2019). Au niveau français, l'attention des pouvoirs publics porte sur l'encadrement législatif. La loi du 31 juillet 2014 portant sur l'Économie Sociale et Solidaire vient ainsi modifier les lois de 1947, 1978 et 1992 régissant les coopératives de travailleurs afin de faciliter leur création et leur financement.

Les coopératives de travailleurs présentent de nombreux intérêts académiques. C'est en effet un sujet qui se situe à la croisée de différents champs d'études en économie et, de manière plus générale, en sciences sociales. L'étude des coopératives de travailleurs intéresse le champ de la démographie des entreprises car elle permet d'apporter des éléments de réponse à la question de savoir pourquoi l'immense majorité des entreprises dans le monde sont gouvernées dans l'intérêt des apporteurs de capital et non de travail. Les coopératives de travailleurs représentent non seulement une troisième voie entre entreprises capitalistes et entreprises publiques, mais sont aussi l'exemple paradigmatique de mesures de participation salariale, d'intéressement, et de partage du profit mis en œuvre au sein des entreprises conventionnelles. Leur étude intéresse donc le champ de l'économie participative et l'analyse comparative des systèmes économiques. Enfin, les coopératives de travailleurs sont au cœur des champs de l'économie sociale et solidaire et de l'économie coopérative en raison de leur situation hybride d'être à la fois des entreprises gérées démocratiquement par leurs travailleurs et d'être en compétition directe avec les entreprises conventionnelles, c'est-à-dire que les coopératives de travailleurs doivent concilier démocratie organisationnelle et performance économique.

Au-delà des intérêts économique, institutionnel ou académique, il est possible de défendre d'un point de vue normatif les coopératives de travailleurs. Qu'il s'agisse de soutenir que les coopératives de travailleurs incarnent, schématiquement, soit l'utopie d'une société capitaliste en transformant le travailleur en capitaliste, soit au contraire, l'utopie d'une société post-capitaliste où le conflit capital-travail est dépassé, les coopératives de travailleurs ont de nombreux défenseurs. Notons, en effet, que la défense morale des coopératives de

travailleurs parcourt non seulement les époques, de la révolution industrielle du début du XIXème siècle à la période contemporaine, mais aussi l'ensemble du spectre des idéologies politiques, du libéralisme conservateur au socialisme révolutionnaire. Parmi les défenseurs les plus connus de la supériorité morale des coopératives de travailleurs [2], nous trouvons pêle-mêle des fondateurs de l'économie néoclassique (Léon Walras, Alfred Marshall), de la critique de l'économie politique (Karl Marx), du libéralisme (Alexis de Tocqueville, John Stuart Mill) ou du socialisme utopique (Philippe Buchez, Charles Fourier, Robert Owen). En étudiant la performance économique des coopératives de travailleurs, cette thèse entend apporter des éléments de compréhension des faits stylisés qui nourrissent ces débats philosophiques ainsi que les défis pratiques que doivent affronter ces entreprises.

Sans évidemment prétendre constituer la seule approche disciplinaire pertinente, la science économique, par ses outils conceptuels et empiriques, peut apporter des éclairages précieux sur la performance et la rareté des coopératives de travailleurs. Elle se révèle particulièrement bien outillée pour aborder la question suivante : en quoi la performance économique des coopératives de travailleurs permet-elle d'expliquer leur rareté relative par rapport aux entreprises conventionnelles dans les économies contemporaines ? C'est à cette interrogation générale que cette thèse entend apporter des éléments de réponse. Pour ce faire, elle s'appuie sur trois analyses empiriques. Les questions de recherche qui les structurent sont les suivantes : Les créations de coopératives de travailleurs sont-elles homogènes à travers les secteurs ? Suivent-elles une distribution similaire au reste des entreprises ? Les coûts irrécupérables ont-ils un impact similaire sur les créations de coopératives de travailleurs et celles des entreprises conventionnelles ? Les coopératives de travailleurs sont-elles au moins autant productives que les entreprises conventionnelles ? Les sources de productivité des coopératives de travailleurs sont-elles similaires à celles des entreprises conventionnelles ? Les coopératives de travailleurs survivent-elles au moins aussi longtemps que le reste des entreprises ? Quels sont les impacts des caractéristiques de l'entrepreneur et de la firme sur leur survie ? Ces impacts diffèrent-ils entre coopératives de travailleurs et entreprises conventionnelles ?

La suite de ce long résumé présente, dans une première partie, le fait stylisé fondamental de cette thèse, à savoir la rareté des coopératives de travailleurs dans le monde, et définit les concepts clés de cette thèse, à savoir deux types d'entreprises (conventionnelles ou coopératives) et trois formes de performance économique (création, productivité et survie). La problématique de la thèse est alors formulée au croisement de ce fait stylisé et de ces concepts :

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[2]Ellerman and Gonza (2021) fournissent une liste de défenseurs moins connus des coopératives de travailleurs de toute obédience disciplinaire et politique tels que Henry Carter Adams, Arthur Cecil Pigou, John Dewey, Jacques Maritain, Robert Dahl, Noam Chomsky. Aujourd'hui, les travaux de David Ellerman s'inscrivent dans une défense libérale des coopératives de travailleurs (Ellerman, 2020) tandis que ceux de Bruno Jossa s'inscrivent dans une défense marxiste (Jossa, 2014).

en quoi la performance économique des coopératives de travailleurs permet-elle d'expliquer leur rareté par rapport aux entreprises conventionnelles dans les économies contemporaines ? Le cadre institutionnel des coopératives de travailleurs – SCOPs – en France est aussi brièvement dépeint. La seconde partie de ce long résumé passe en revue les questions de recherche soulevées dans les différents chapitres de cette thèse, les principaux résultats obtenus et leurs implications théoriques et pratiques. Elle détaille également les méthodes statistiques utilisées ainsi que les sources des données mobilisées.

Objet d'étude et contexte

Définitions d'entreprise conventionnelle (EC) et d'entreprise coopérative de travailleurs (SCOP)

Dans un monde théorique à l'équilibre général des marchés, la production est assurée par des agents individuels organisés uniquement par l'échange. Les entreprises sont alors définies comme « des ensembles organisés d'agents individuels qui participent à un processus de production commun et vendent la production qui en résulte sur un marché. » (Dow, 2018*a*, p. 3). Les entreprises théoriques à l'équilibre général des marchés sont des entreprise-points ou des boîtes noires dans la mesure où seules les relations d'échange équitable prévalent en leur sein. Dit autrement, les entreprises à l'équilibre général des marchés manquent d'un élément clé de ce que l'on appelle habituellement les entreprises : les relations de pouvoir.

Pour que des entreprises avec des relations de pouvoir existent, formalisées par l'existence de droits de contrôle, les marchés doivent souffrir d'imperfections. Les économistes ont coutume de dire qu'il n'existe pas de repas gratuit. Pour Coase (1937), cette maxime s'applique au système de prix du marché lui-même. L'organisation de la production et des échanges par le biais d'un système de prix de marché décentralisé nécessite des activités coûteuses. De même, l'organisation de la production par des entreprises disposant de droits de contrôle nécessite des activités coûteuses. Lorsque les coûts de transaction du marché sont inférieurs aux coûts d'organisation des entreprises, il est plus efficace, du point de vue de l'allocation des ressources, que la production soit organisée par des échanges entre agents individuels (c'est-à-dire la situation incarnée par l'équilibre général des marchés). Au contraire, lorsque les coûts de transaction du marché sont plus élevés que les coûts d'organisation des entreprises, il est alors plus efficace d'organiser la production par le biais d'entreprises liant les agents individuels par des relations de pouvoir. Bien sûr, nos économies contemporaines sont criblées d'imperfections de marché et de coûts transactionnels supérieurs aux coûts organisationnels. D'où l'existence des firmes, de l'autorité et de la

domination en leur sein.

En d'autres termes, dans un monde théorique de marchés parfaits, l'allocation optimale des ressources est indépendante de la distribution des droits de contrôle des entreprises – en fait, les entreprises n'ont pas besoin d'exister. Les droits de contrôle des entreprises émergent alors de l'incomplétude des contrats. Quelqu'un reçoit l'autorité de contrôler la gestion des entreprises lorsqu'il est moins efficace d'externaliser une activité par le biais d'échanges sur le marché. Si le marché d'un facteur de production (travail ou capital par exemple) est parfait, alors il n'y a aucune raison pour que les porteurs de ce facteur de production aient des droits de contrôle. Par conséquent, la répartition des droits de contrôle entre le capital et le travail importe tant que les marchés du capital et du travail sont imparfaits.

En suivant (Dow, 2018*a*, p. 4), je définis une entreprise conventionnelle (EC) comme une entreprise où le contrôle ultime est détenu par les apporteurs de capitaux, ou un sous-ensemble d'entre eux (par exemple, les apporteurs de capitaux propres plutôt que les créanciers). Les décisions stratégiques en matière d'emploi, d'investissement, de développement, etc., sont alors prises par ou au nom des apporteurs de capitaux. Les ECs sont souvent désignées dans la littérature académique comme des entreprises capitalistes. Deux mises en garde s'imposent pour éviter toute confusion avec des croyances communes erronées concernant la propriété des entreprises. Tout d'abord, le fait que la plupart des entreprises soient contrôlées par leurs capitalistes est associé à tort au droit légal des capitalistes de contrôler les entreprises. Cela n'est pas vrai. Il n'existe aucune loi, en France ou à l'étranger, qui dispose que dans les ECs, les capitalistes font *de jure* partie du groupe de contrôle de l'entreprise, c'est-à-dire des actionnaires.[3] Les capitalistes ne sont pas nécessairement des actionnaires. Par exemple, le financement d'une entreprise par la dette n'apporte généralement pas d'actions dans l'entreprise aux créanciers. Les actionnaires ne sont pas non plus nécessairement des capitalistes. Une action peut en effet être acquise pour de nombreuses raisons (par exemple, un héritage, un don), l'apport de capitaux propres n'étant que l'une d'entre elles. Ensuite, sur le plan juridique, les actionnaires ne possèdent ni l'entreprise, ni la société, ni les actifs de l'entreprise. Les actionnaires ne possèdent que des actions émises par des sociétés. L'actif et le passif d'une entreprise ne sont pas l'actif ou le passif personnel des actionnaires. En droit, la société est la personne morale qui possède les capitaux propres. La responsabilité limitée des actionnaires est le droit symétrique de l'individualité morale de la société. Que la firme soit conçue comme un nœud de contrats ou comme une institution, elle n'est pas objet de propriété (Chassagnon and Hollandts, 2014).

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[3]Il existe bien des types d'entreprises dans lesquelles les capitalistes sont membres de droit telles que les sociétés en commandite en France, mais il en existe très peu. Ce type d'entreprise est un héritage du XIXème siècle où les entreprises étaient créées pour gérer des monopoles naturels (par exemple, les chemins de fer), nécessitaient l'accord du roi et engageait la responsabilité illimité des capitalistes.

Je définis une entreprise coopérative comme une firme où le contrôle ultime est détenu par ses membres et où l'adhésion est conditionnée par un statut. Une telle contrainte d'adhésion est également appelée patronage par (Hansmann, 1996). En fonction de la contrainte d'adhésion, différents types d'entreprises coopératives sont distingués. Les membres des coopératives d'usagers (par exemple, la coopérative de consommation) doivent être des usagers (par exemple, des consommateurs). Les coopératives agricoles sont un type de coopératives d'entrepreneurs limitant leurs membres aux agriculteurs. Les coopératives multisociétariales sont des entreprises coopératives dans lesquelles le groupe de contrôle doit être composé de différents types de membres. Par exemple, les actionnaires d'une SCIC (société coopérative d'intérêt collectif) en France doivent être composés de travailleurs, d'usagers et d'entités publiques. La définition juridique des sociétés coopératives est plus large que notre définition économique. En effet, l'Alliance Coopérative Internationale (ICA) définit une coopérative comme « est une association autonome de personnes volontairement réunies pour satisfaire leurs aspirations et besoins économiques, sociaux et culturels au moyen d'une entreprise dont la propriété est collective et où le pouvoir est exercé démocratiquement » (ICA, 2015). Le droit français suit la définition de l'entreprise coopérative de l'ICA en mettant l'accent sur trois principes : 1) l'adhésion doit être ouverte et volontaire mais contrainte à une ou plusieurs parties prenantes de l'entreprise ; 2) 1 membre égale 1 voix, c'est-à-dire que la prise de décision doit être démocratique ; 3) la lucrativité limitée, c'est-à-dire que le but de l'entreprise n'est pas le profit mais la satisfaction des besoins de leurs membres.

Je définis une entreprise coopérative de travailleurs (SCOP) comme une entreprise dont le contrôle ultime est détenu par les travailleurs. Contrairement à (Dow, 2018a), je n'inclus pas les sociétés professionnelles dans ma définition des SCOPs. Premièrement, les sociétés professionnelles ont des contraintes d'adhésion fondées sur des professions spécifiques (par exemple, médecins, avocats, comptables) plutôt que sur la gamme plus large d'activités que les entreprises combinent. Par conséquent, certains travailleurs des sociétés professionnelles (par exemple, les secrétaires d'un cabinet d'avocats) n'ont pas le droit de devenir membres de la société professionnelle où ils travaillent. En tant que tels, les sociétés professionnelles ne sont même pas des entreprises coopératives. Deuxièmement, les membres d'une société professionnelle ne produisent pas nécessairement en commun. Par conséquent, les sociétés professionnelles seraient des coopératives d'entrepreneurs, et se situent donc en dehors du champ empirique de cette thèse. C'est également à cause de l'absence de production conjointe que je ne prends pas non plus en compte les coopératives d'activités et d'emploi (CAE) dans cette thèse, malgré le fait qu'elles soient légalement enregistrées comme des SCOPs en France.

Les SCOPs sont des entreprises coopératives dont les membres sont les travailleurs

de l'entreprise. Les SCOPs diffèrent donc des coopératives agricoles ou des coopératives de consommation. Dans les SCOPs, les travailleurs détiennent la majorité des droits de propriété (prise de décision et participation aux bénéfices). Plus généralement, les SCOPs doivent respecter les sept principes énumérés par l'Alliance coopérative internationale. Toutefois, il convient de noter qu'il existe une différence fondamentale entre les SCOPs et les autres formes de coopératives (usagers, entrepreneurs, multisociétariat) : seules les SCOPs garantissent que les personnes qui gouvernent et celles qui sont gouvernées sont égales en termes de pouvoir (Ellerman, 2020). En termes de coûts d'agence, parmi les entreprises coopératives, seules les SCOPs garantissent qu'il n'y a pas de séparation entre la propriété (fonction de prise de risque) et le contrôle (fonction de décision). En revanche, dans une coopérative de consommateurs, la seule activité exercée par les consommateurs-membres est de faire des achats dans la coopérative alors que la distribution des biens est assurée par les employés de la coopérative de consommateurs. De même, dans une coopérative agricole où les agriculteurs vendent leurs produits bruts par l'intermédiaire de la coopé-rative, non seulement les agriculteurs gèrent leurs entreprise grâce à leurs employés, mais les activités des coopératives sont également réalisées par les employés. Notez que dans certaines SCOPs, la part des travailleurs qui ne sont pas membres de l'entreprise peut être assez importante, mais la législation consacrée met en place des incitations et des limites pour éviter la dégénérescence des SCOPs en ECs (c'est-à-dire quand les travailleurs non membres représentent plus de 50% des travailleurs). Par exemple, en France, il est proposé à tout nouveau travailleur d'une SCOP de devenir membre dans les deux ans suivant son embauche, et tout nouveau travailleur peut demander à devenir membre de l'entreprise un an après son embauche.

Les SCOPs sont souvent étudiées en les comparant à d'autres types d'entreprises, et parmi elles, aux ECs. Dans cette thèse, je compare les SCOPs aux ECs, plutôt qu'aux entreprises coopératives, car je m'intéresse aux liens entre la performance économique des SCOPs et leur rareté par rapport aux ECs. Certaines ECs mettent en place des systèmes d'actionnariat salarié et/ou de participation aux bénéfices. Malgré de nombreuses lois depuis 1959 en faveur de la participation aux bénéfices et à l'actionnariat, ces dispositifs concernent surtout les grandes entreprises cotées en France (contrairement aux ESOPs aux Etats-Unis) et le pourcentage de capital détenu par les salariés dans les entreprises conventionnelles reste limité (pour une revue de l'actionnariat salarié en France, voir (Fakhfakh *et al.*, 2022)). En raison de leur faible prévalence dans les entreprises non cotées et du fait que leur contrôle ultime est toujours entre les mains des capitalistes, je considère ces entreprises « hybrides » comme négligeables dans cette thèse, et je les amalgame avec le reste des ECs.

Rareté des coopératives de travailleurs à travers le monde

Au-delà de leurs caractéristiques organisationnelles, un fait frappant concernant les SCOPs, autrefois considérées comme une population, est leur rareté par rapport aux entreprises conventionnelles à travers le monde. Dans tous les pays pour lesquels des données sont disponibles, les SCOPs représentent une proportion minuscule de l'ensemble des entreprises. Les SCOPs en Espagne, en Italie et en France représentent environ 1 pour 1 000 entreprises, et les SCOPs aux États-Unis, au Royaume-Uni et en Israël représentent environ 1 pour 10 000 entreprises. Les ordres de grandeur sont similaires dans d'autres pays (voir (Mirabel, 2021) pour plus de données sur le nombre de travailleurs dans les SCOPs dans un plus large échantillon de pays). Dans son deuxième rapport mondial et sur la base de données provenant de 156 pays, l'Organisation internationale des coopératives industrielles et de services estime à environ 11 millions le nombre de travailleurs associés dans les coopératives à travers le monde (Hyungsik, 2017).

La plus grande SCOP et l'une des plus étudiées au monde est le groupe Mondragón, créé en 1956, basé au Pays basque espagnol, qui compte aujourd'hui 289 entreprises, regroupant 81 000 travailleurs à travers le monde, avec un chiffre d'affaires de 14,43 milliards de dollars en 2018. Similaire au groupe Mondragón en termes de chiffre d'affaires et de nombre de travailleurs, le John Lewis Partnership au Royaume-Uni est également un géant de l'actionnariat salarié. À l'exception de ces deux entreprises, il n'y a pas de grandes entreprises contrôlées par des travailleurs. Quel que soit le pays, les plus grandes ECs sont beaucoup plus grandes que les plus grandes SCOPs. De nombreuses raisons sont invoquées dans la littérature pour expliquer l'absence de grandes SCOPs, par exemple la tendance des SCOPs à un sous-investissement de long terme, leur "dégénérescence" en ECs, ou le contrôle plus étroit de la gestion par les travailleur-membres qui entraverait la croissance de l'entreprise. Dans l'ensemble, la taille plus petite des plus grandes SCOPs pourrait également être un artefact statistique – étant donné le petit nombre de SCOPs qui existent et la très faible proportion de grandes ECs, la probabilité d'observer une grande SCOPs est extrêmement faible.

Les SCOPs existent dans un large éventail de pays avec des contextes institutionnels différents, notamment le degré d'encadrement des SCOPs par la loi. Généralement, les lois consacrées aux SCOPs apparaissent lorsque les SCOPs se sont déjà développées. Par exemple, le Japon et les Etats-Unis n'ont adopté leurs premières lois dédiées aux SCOPs qu'en 2020, et la Belgique a adopté un code coopératif (Code des sociétés et des associations) en 2019. Il convient également de noter que des efforts sont déployés par des universitaires et des politiciens pour harmoniser les lois sur les coopératives au niveau international. Le 15 décembre 2010, le Conseil des ministres de l'Organisation pour l'harmonisation en Afrique du droit des affaires (OHADA) réunissant 17 pays africains a adopté l'Acte uniforme sur le droit des coopératives à Lomé (Togo), inspiré par l'Alliance coopérative internationale pour promou-

voir et harmoniser les lois coopératives à travers le monde. Dans son règlement du Conseil n°1435/2003, daté du 22 juillet 2003, l'Union européenne a créé le statut de la société coopérative européenne (SCE) qui établit la forme juridique de la SCE, garantissant l'identité juridique des sociétés coopératives et de leurs filiales dans l'Union européenne. En 1988, l'Alliance coopérative internationale a publié la "Loi-cadre pour les coopératives d'Amérique latine" afin de contribuer au développement de lois coopératives, qui a été utilisée comme source d'inspiration juridique dans de nombreux pays d'Amérique latine tels que le Brésil, l'Uruguay ou le Pérou. Dans un contexte différent mais avec une philosophie similaire d'extension des droits des coopératives, la loi sur les coopératives a été un pilier des réformes *perestroïka* et *glasnost* de Gorbatchev en URSS, permettant aux SCOPs de fonctionner, par distinction avec les entreprises publiques.

Au-delà de la diversité de leurs environnements juridiques, les SCOPs présentent des similitudes à travers le monde telles que leur répartition sectorielle, leur croissance, ou leurs vagues de créations en période de récession. La distribution industrielle des SCOPs diffère de celle des ECs à un niveau de désagrégation sectorielle suffisant et cette différence est robuste entre les pays. Les SCOPs ont tendance à se concentrer dans les secteurs à faible intensité capitalistique, à faible échelle d'efficacité minimale ou à faible contrôle (Ben-Ner, 1988*b*). En France, les SCOPs sont concentrées dans la construction et l'industrie manufacturière avec une forte présence dans l'imprimerie et l'édition mais une faible présence dans le textile et la chimie. Une fraction croissante des SCOPs se concentre dans les services (Fakhfakh *et al.*, 2012). En Italie, les SCOPs sont surtout concentrées dans la construction, les transports et les services (Pencavel *et al.*, 2006). Au Royaume-Uni, les SCOPs sont surtout concentrées dans la construction, la distribution, l'hôtellerie et la restauration, les services et les autres industries manufacturières (Podivinsky and Stewart, 2007). En Uruguay, les SCOPs sont plus concentrées dans les services de bus et de taxis, les services sociaux que dans le reste de l'économie (Burdín and Dean, 2009).

Au cours des dernières décennies, le nombre de SCOPs a augmenté dans tous les pays, bien qu'elles ne représentent encore qu'une infime partie des entreprises. Dans une étude comparative sur la France, l'Italie, la Suède et le Royaume-Uni, Ben-Ner (1988*a*, p. 9) conclut que "pendant les années 1970 et le début des années 1980, la croissance des entreprises et de l'emploi dans le secteur SCOPs a dépassé celle du secteur EC." Une conclusion similaire peut être tirée depuis les années 1980. En France, le nombre de SCOPs a augmenté de 229 % sur la période allant de 1980 (soit 698 SCOPs) à 2018 (soit 2294 SCOPs). Aux États-Unis, le nombre de SCOPs a augmenté de 30 % entre 2013 et 2017 pour atteindre environ 400 SCOPs (Palmer, 2019). Au Canada atlantique, le nombre de SCOPs a doublé entre 1975 et 1985 (Staber, 1989). En Uruguay, Burdín and Dean (2009) indiquent l'emploi dans les ECs en 2003 représentait en moyenne 87 % de l'emploi en 1998 tandis que l'emploi dans les SCOPs en 2003 représen-

tait 106 % du niveau de 1998. Pour l'Italie, Vieta (2015) montre que le nombre de reprises en SCOPs augmente fortement dans les années 1980 (soit 12 reprises SCOPs en 1982) pour atteindre un pic en 1996 (soit 133 rachats de travailleurs actifs) avant de redescendre à 82 en 2007 et d'amorcer une tendance haussière pour atteindre 135 reprises en SCOPs en 2014.

En raison d'une plus grande médiatisation, les SCOPs sont souvent associées dans l'imaginaire collectif à des reprises d'ECs en difficulté bien que la majorité des SCOPs soient créées *ex nihilo*. Cependant, l'association des SCOPs avec les reprises d'ECs est également soutenue par des éléments empiriques. Un des faits stylisés de la littérature est que des vagues de reprises en SCOPs se produisent pendant les périodes de récession. Par exemple, le développement majeur des SCOPs a eu lieu en Uruguay dans les années 1950 et 1960, dans les dernières années du XXe siècle et au début du XXIe siècle, en raison de la nécessité de conserver son emploi par le biais de manifestations populaires et d'occupations des usines (Cracogna *et al.*, 2013, p. 780). Pour une raison similaire de nécessité, de nombreuses ECs en difficulté ont été converties en SCOPs en Argentine dans les années 2000 via des protestations populaires et des occupations de lieux de travail (Vieta, 2020). Pendant la crise économique internationale qui a suivi la crise américaine des subprimes de 2008, le nombre de SCOPs est resté stable en Italie (Carini and Carpita, 2014), voire a augmenté en Roumanie (Lambru and Petrescu, 2014), alors que le nombre d'ECs a diminué. Des preuves similaires montrent que la création des SCOPs est plus anticyclique que celle des ECs aux Etats-Unis (Conte and Jones, 2015), en Israël (Russell and Hanneman, 1995), en France (Pérotin, 2006), ou en Espagne (Díaz-Foncea and Marcuello, 2015).

Ces similitudes, réunies avec les arguments théoriques brièvement esquissés plus haut et les études économétriques discutées en détail dans la section 2.2. de l'Introduction Générale, nous amènent à considérer les SCOPs comme un phénomène émergent des économies de marché. Aussi, il doit y avoir des facteurs communs expliquant la rareté des SCOPs, comme par exemple leur performance économique.

Typologie économique de la performance économique

La rareté des SCOPs et la domination des ECs dans les économies contemporaines sont les deux faces d'une même médaille. Expliquer le premier aspect permet de mieux comprendre le second et de savoir quelle est la forme d'entreprise la plus efficace dans un contexte donné. Alors, pourquoi les SCOPs sont-elles rares ? La littérature fournit de nombreuses explications théoriques (pour une revue détaillée, voir Dow (2018*b*)). Les SCOPs, comme tout type d'entreprise ou même d'organisation économique, peuvent être rares pour deux raisons principales : parce que peu d'entre elles sont créées ou parce que beaucoup d'entre elles meurent. Pour explorer ces raisons et comprendre comment expliquer la rareté des SCOPs, j'étudie dans cette thèse deux types de performance économique correspondant

à deux moments de la "vie" de l'entreprise : la naissance (entrée) et la mort (survie).

Premièrement, la création de SCOPs, mesurée par la prévalence des SCOPs, c'est-à-dire le nombre de SCOPs existantes par rapport au nombre d'ECs existantes. Les agents économiques-entrepreneurs sont supposés être des êtres rationnels choisissant un type d'entreprise qui maximisant leur utilité. L'agent-entrepreneur choisit le type d'entreprise le plus efficace, par exemple, une SCOP ou une EC. Ainsi, pour un ensemble donné de conditions, il n'existe qu'un seul type d'entreprise plus efficace que tous les autres. Par conséquent, il est impossible de comparer les différents types d'entreprises ceteris paribus. Les comparaisons de performance entre les SCOPs et les ECs ne peuvent pas être faites au niveau de l'entreprise mais plutôt au niveau de la population d'entreprises. Les prédictions théoriques parlent alors de la prévalence ou de l'incidence des SCOPs dans l'économie, et l'analyse vise à définir les barrières à l'entrée spécifiques aux SCOPs et conduisant l'agent à choisir rationnellement l'EC plutôt que la SCOP, ce qui entraîne un faible nombre d'entrées de ces dernières.

Deuxièmement, la survie mesurée par l'âge de l'entreprise ou le hazard ratio (c'est-à-dire la probabilité de sortir ou de "mourir" une année donnée conditionnellement au fait que l'entreprise ait existé jusqu'à cette année donnée). Un argument largement répandu dans le champ de l'économie coopérative et la théorie des SCOPs pour expliquer la rareté des SCOPs est qu'elles se retirent ou font faillite plus tôt que les ECs en raison d'un sous-investissement à long terme qui grève leur croissance ou d'une dégénérescence accompagnant leur croissance. L'évaluation de l'effet différentiel des ressources à l'entrée entre les ECs et les SCOPs permettra d'apporter de nouveaux éléments au débat sur la survie des SCOPs.

Les coopératives de travailleurs en France (SCOPs)

Cette thèse de doctorat apporte des contributions empiriques à la littérature économique sur les sources de la performance des SCOPs dans le contexte français. La population des SCOPs en France représente une proportion infime (1 pour 10 000) de toutes les entreprises. En 2019, la France compte 2 391 SCOPs regroupant 53 700 travailleurs, dont environ 30 000 travailleurs associés (CGSCOP, 2021).

Les SCOPs sont une population croissante. Les premières SCOPs apparaissent au milieu du XIXe siècle, au moment même où se met en place l'entreprise moderne fondée sur la personnalité morale et la responsabilité limitée. Il est même possible de retracer leur origine dans les associations et corporations ouvrières qui existaient avant la révolution industrielle. Historiquement, les créations des SCOPs semblent s'être produites principalement par vagues. Plusieurs vagues de création ont coïncidé avec des périodes de troubles sociaux, de changements politiques et de récessions économiques, à savoir les révolutions de 1830 et 1848, la Commune de Paris, les grèves de 1893-1894 et 1905-1906, le gouvernement du

Front populaire en 1936 et la fin des années 1960-1970, en plus de la fin de chacune des deux guerres mondiales (Pérotin, 2006). La population des SCOPs a une distribution hétérogène à travers le temps, les secteurs et l'espace. Elles ont un cycle de création spécifique. La vague de créations de SCOPs à la fin des années 1970 correspond également à l'arrivée de la gauche au gouvernement qui a suivi les événements de Mai 68. Les créations de SCOPs sont contra-cycliques par rapport aux créations d'ECs au début des années 1990 et dans les années 2010. Pendant les années qui suivirent la crise de 2008, les créations de SCOPs augmentèrent alors que celles des ECs diminuèrent.

Les créations de SCOPs sont plus susceptibles de se former dans des secteurs où la taille optimale est petite, où le contrôle centralisé est difficile et où l'intensité capitalistique est relativement faible. Les secteurs où les coûts irrécupérables sont très élevés n'ont jamais connu de créations de SCOPs, alors que d'autres secteurs comprennent une proportion significative de SCOPs. Bien entendu, plus la classification sectorielle utilisée est désagrégée, plus la création de SCOPs apparaît hétérogène par rapport à celle des ECs.

La distribution spatiale des SCOPs n'est ni homogène, ni aléatoire, ni représentative de celle des ECs. La France peut être grossièrement divisée en deux parties le long d'une diagonale allant du Nord-Ouest au Sud-Est. Sous cette diagonale, les SCOPs sont sur-représentées tandis qu'au-dessus de cette diagonale, elles sont sous-représentées. Quatre clusters de SCOPs se dégagent : 1) le pôle Ouest (Bretagne), 2) la région Sud-Est (Rhône-Alpes), 3) la région Sud-Ouest (Toulouse et ses environs), 4) le pôle Centre (Nord-Aquitaine, de Nantes à Clermont-Ferrand).

Les entreprises coopératives de travailleurs sont appelées SCOPs en France. SCOP est l'acronyme de Société Coopérative Ouvrière de Production ou Société Coopérative et Participative (art.1 de la loi de 1978). Le fonctionnement des SCOPs est régi par quatre lois datant de 1947, 1978, 1992 et 2014, faisant référence aux sept principes de l'Alliance Coopérative Internationale. La loi de 1947 a créé le statut coopératif défini conformément au Code du commerce. La loi 1978-763 du 19 juillet 1978 a créé le statut de SCOP avec les principales caractéristiques décrites ci-dessous. La loi de 1992 a modernisé le statut coopératif. La loi de 2014 est consacrée à l'Économie Sociale et Solidaire et apporte des aménagements au statut de SCOP afin de faciliter son financement. À noter que le nombre SCOPs a fortement augmenté suite à la loi de 1978.

La SCOP est une entreprise coopérative de droit commercial sous la forme d'une société anonyme, d'une société par actions à responsabilité limitée ou d'une société par action simplifiée, avec un cadre juridique spécifique dans lequel les salariés sont actionnaires majoritaires. Toute entreprise peut être transformée en SCOP, quelle que soit sa forme juridique.

Les travailleurs deviennent membres de l'entreprise parce qu'ils sont travailleurs de l'entreprise, et non parce qu'ils prennent part au capital en tant qu'investisseurs. Il s'agit d'un

statut de membre. C'est pourquoi les SCOPs sont considérées comme un groupe de personnes plutôt que comme un groupe d'associés. Il est proposé à tout nouveau travailleur de devenir membre de la SCOP dans les deux ans qui suivent son arrivée dans l'entreprise. Tout nouveau travailleur peut demander à devenir membre de l'entreprise un an après son embauche. Est membre de la SCOP celui qui possède au moins une part sociale. L'acquisition d'une part sociale est légalement et paradoxalement liée à l'apport de capitaux propres. Ainsi, tout travailleur qui a acheté une part sociale est membre, et un individu qui n'est pas travailleur peut devenir membre s'il a acheté une part sociale (il existe des restrictions sur la part des membre-non-travailleurs au sein des SCOPs détaillées plus bas). Les travailleurs qui n'ont pas apporté de capitaux propres ne peuvent pas être membres de la SCOP.

Les travailleurs des SCOPs doivent détenir au moins 51 % du capital social et représenter au moins 65 % des votes à l'assemblée générale. Les voix à l'assemblée générale ne sont pas proportionnelles au nombre de parts sociales détenues : le premier principe de l'ICA "une personne égale une voix" se substitue au principe conventionnel "une action égale une voix" (art.1 de la loi de 1947). Les SCOPs peuvent créer des parts sociales avec un intérêt privilégié mais sans droit de vote. Par ailleurs, les statuts peuvent prévoir que les membres extérieurs non travailleurs ou certaines catégories d'entre eux disposent d'un nombre de voix proportionnel au capital qu'ils détiennent (Art. 3bis de la loi de 1947). L'assemblée générale se réunit au moins une fois par an pour prendre connaissance du rapport sur l'activité de l'entreprise, approuver les comptes de l'exercice écoulé et décider, le cas échéant, de l'élection des administrateurs ou gérants et des commissaires aux comptes (art. 8 de la loi de 1947). L'assemblée générale des membres des SCOPs est similaire au conseil d'administration des ECs, c'est-à-dire que les administrateurs et les gérants disposent d'une voix chacun pour décider à la majorité absolue des décisions importantes concernant l'entreprise. Ce qui diffère entre une SCOP et une EC au niveau des organes décisionnels, c'est que le conseil d'administration et l'assemblée générale conventionnels sont fondus dans ce qu'on appelle l'assemblée générale des membres. Dans les SCOPs, les membres sont à la fois des entrepreneurs, des directeurs et des créanciers (ils ne sont pas des investisseurs puisqu'ils prêtent leur capital et qu'ils ne peuvent pas faire de plus-value sur leur apport).

Les SCOPs doivent répartir leurs bénéfices en trois parties. 1) la partie "entreprise" : elles sont légalement tenues de réinvestir au moins 16 % de leurs bénéfices en auto-investissement (15 % pour les réserves légales et 1 % pour les réserves statutaires). 2) la partie « travail » est distribuée à tous les travailleurs, qu'ils soient membres ou non de l'entreprise (minimum 25 %), à condition qu'ils aient travaillé pendant trois mois dans l'entreprise ou qu'ils aient été embauchés depuis au moins six mois. Il ne s'agit pas d'un salaire. Il n'est pas nécessaire que la part soit la même pour tous les travailleurs. 3) la partie « capital » : les dividendes dus aux membres, qu'ils soient travailleurs de l'entreprise ou investisseurs

extérieurs (maximum 33 %). En comparaison, la participation aux bénéfices est libre dans les ECs telles que les sociétés anonymes et les sociétés à responsabilité limitée. Dans les SCOPs, la rémunération du dividende est fixée à la rémunération moyenne des obligations (environ 2 %). La valeur du capital de chaque associé est fixée à sa valeur d'acquisition. Aucune plus-value n'est possible lors du rachat des parts en cas de départ de l'actionnaire salarié (art. 26ter de la loi de 1978). De même, en cas de cession, le capital est restitué aux coopérateurs sans plus-value, avec possibilité de réévaluation indexée sur l'inflation. En cas de bénéfices nets de liquidation (excédents du fonds, boni de liquidation), l'article 20 de la loi de 1978 interdit la distribution de ces bénéfices aux membres au-delà de leurs ayants-droit. Il oblige le transfert de cet excédent à des organisations coopératives, suivant le sixième principe de l'Alliance Coopérative Internationale énonçant la coopération entre coopératives.

Le capital est variable, ce qui signifie que tout apporteur de capital, qu'il soit travailleur ou non, peut exiger de récupérer son capital investi dans l'entreprise. En termes économiques, le capital apporté par les capitalistes est loué, c'est pourquoi il n'ouvre pas à un droit de propriété sur les rendements de l'entreprise ou à un droit de décision à l'assemblée générale. Les SCOPs ne peuvent pas utiliser les fonds propres pour augmenter leur capital, seuls l'endettement et la location de capital sont disponibles comme sources de financement. À noter que lors de l'attribution d'un marché public, un droit de préférence est accordé, à prix égal ou à équivalence d'offres, à l'offre présentée par une SCOP. Un réseau d'organismes d'appui centré autour de la Confédération générale des sociétés coopératives et participatives (CGSCOP) soutient le développement des SCOPs françaises en jouant un rôle de négociation collective, en coordonnant la formation des coopérateurs, en assurant la gestion des ressources humaines, en apportant un soutien financier modeste et en faisant pression sur les organisations publiques.

Au niveau national, la CGSCOP fournit une aide et un suivi aux dirigeants d'entreprises de travailleurs et assure la collecte continue de données sur toutes les SCOPs, même si elles ne sont pas membres de la CGSCOP. Elle est principalement financée par les cotisations de ses membres (environ 3 000 entreprises). La CGSCOP assure l'éducation et la formation des travailleurs sur le statut d'entreprise détenue par les travailleurs et la philosophie coopérative. En accord avec le sixième principe de l'Alliance Coopérative Internationale énonçant la coopération entre les coopératives, la CGSCOP fournit quatre outils financiers principaux aux entreprises appartenant aux travailleurs : 1) accorder des prêts participatifs (Socoden), 2) investir en capital, en parts sociales et en obligations convertibles (Scopinvest), 3) garantir les prêts à moyen terme, les financements de fonds de roulement ou les crédits-bails accordés aux Scop par le Crédit Coopératif (Sofiscop), 4) financer et soutenir les entreprises numériques innovantes (CoopVenture). L'attribution des fonds est décidée localement par le

comité d'engagements financiers régionaux. En plus de ces outils, les SCOPs peuvent bénéficier d'un soutien financier spécifique auprès du Crédit Coopératif (banque), d'Esfin-Ides (fonds dédié à l'économie sociale et solidaire), de France Active (fonds dédié à l'entrepreneuriat social) et de la Caisse des Dépôts et des Consignations.

Au niveau régional, il existe 13 Unions Régionales de la CGSCOP, appelées URSCOP, réparties sur l'ensemble du territoire afin d'accompagner les entreprises localement. Elles sont financées principalement par la CGSCOP, qui leur alloue un tiers de ses fonds. Certaines URSCOP ont développé des outils financiers pour aider les entreprises de travailleurs dans leurs régions, comme Pargest en PACA (Côte Sud-Est) et Transmea en Rhône-Alpes (Sud-Est).

Au niveau sectoriel, trois fédérations professionnelles soutiennent le développement des entreprises ouvrières françaises dans des secteurs d'activité spécifiques : la construction (créée en 1946), la communication (créée en 1949) et l'industrie (créée en 1981). La majorité de leurs ressources provient des cotisations de leurs adhérents qui sont uniquement des SCOPs.

Contributions

Contributions générales attendues

Cette thèse porte sur deux grandes questions économiques et politiques : les SCOPs sont-elles un type d'entreprise performant ? Et pourquoi les SCOPs sont-elles rares ? Elle vise à faire la lumière sur les performances d'entrée et de survie des SCOPs et sur la manière dont elles contribuent à expliquer leur rareté. Cette thèse vise ainsi à répondre à la question suivante : comment la performance économique des SCOPs permet-elle d'expliquer leur rareté par rapport aux ECs dans nos économies contemporaines ?

Chapitre 1

Dans le chapitre 1, j'étudie les déterminants de l'entrée des SCOPs. Je cherche à tester la prédiction théorique de Mikami and Tanaka (2010) disposant que la probabilité de créer une SCOP est maximale lorsque les coûts échoués en capital humain sont dominants et les coûts échoués en capital physique sont négligeables. Afin de réaliser cette analyse, j'utilise un panel de secteurs manufacturiers sur la période 2012-2016. J'utilise un modèle logistique et des proxies des coûts échoués en capital humain et capital physique. Ainsi, je peux mesurer l'effet de leur interaction sur la prévalence des SCOPs à travers les secteurs, tout en contrôlant pour d'autres déterminants. Les résultats confirment la prédiction de Mikami and Tanaka (2010). La probabilité qu'une SCOP soit créée augmente avec la différence entre les coûts échoués en capital humain et les coûts échoués en capital physique. L'effet d'interaction

entre les deux types de coûts est plus fort pour les SCOPs nées d'une reprise d'entreprise conventionnelle que pour les SCOPs créées *ex nihilo*. Ces résultats permettent d'expliquer la concentration spécifique des SCOPs dans les industries manufacturières légères et leur croissance dans le secteur des services, qui ont lieu en France, en Uruguay, au Royaume-Uni, en Italie et en Espagne. L'effet négatif bien connu des coûts échoués en capital physique sur la probabilité de création d'une SCOP peut être compris comme une approximation de l'effet d'interaction étudié dans le Chapitre 1. Aussi, le Chapitre 1 affine le rôle de barrières à l'entrée des SCOPs que joue les coûts échoués en capital physique en soulignant son interaction avec les coûts échoués en capital humain. Le Chapitre 1 fournit aussi de nouveaux éléments empiriques soutenant la conclusion de Groot and van der Linde (2017) qu'une politique de soutien aux SCOPs serait plus efficace si elle prenait la forme de subventions à la création plutôt que d'avantages fiscaux permanents.

Chapitre 2

Dans le chapitre 2, je compare les profils de survie des SCOPs et des ECs et je cherche à répondre aux trois questions suivantes. Premièrement, est-ce que les probabilités de survie des SCOPs et des ECs diffèrent sensiblement ? Deuxièmement, comment les probabilités de survie des SCOPs et des ECs évoluent ? Troisièmement, comment les ressources à l'entrée de l'entrepreneur ou de la firme affectent le taux de survie des SCOPs et des ECs ? Afin de réaliser cette analyse, j'utilise un échantillon appareillé de SCOPs et de ECs sur une période d'observation de 72 mois. J'estime un modèle cloglog afin de calculer la différence de probabilité de survie entre les SCOPs et les ECs et de comparer l'impact des ressources de l'entrepreneur et de la firme sur les probabilités de survie des SCOPs et des ECs. Les résultats montrent que les SCOPs survivent plus longtemps que les ECs indépendemment du fait que leurs ressources à l'entrée diffèrent ou non. L'avantage de survie des SCOPs sur les ECs est principalement dû au différentiel des ressources à l'entrée pour les deux premières années, puis est dû au mode de gouvernance des SCOPs pour les années restantes. Ces résultats montrent que les SCOPs ne sont pas rares parce qu'elles feraient faillite plus tôt que les ECs. Au contraitre, les SCOPs présentent un avantage de survie par rapport aux ECs.

Chapitre 3

Dans le Chapitre 3, je compare les profils de survie des SCOPs en distinguant quatre modes d'entrée (SCOPs nouvellement créées, reprises d'entreprises en difficulté, reprises d'entreprises saines et reprises d'organisations à but non-lucratif). Afin de réaliser cette analyse, j'utilise un panel de SCOPs sur la période 1989-2018. J'estime un modèle cloglog afin de calculer les différences de probabilités de survie entre les différents mode d'entrée des

SCOPs. Le hazard ratio est 32% plus faible pour les reprises d'entreprises saines que pour les SCOPs nouvellement créées, 18% pour les reprises d'entreprises en difficulté, et 64% pour les reprises d'organisations à but non-lucratif. Ces résultats montrent que les SCOPs forment une population hétérogène d'entreprises. Selon leur mode d'entrée, les SCOPs présentent différents profils de survie, suggèrant ainsi que chaque mode d'entrée fait face à des barrières à l'entrée spécifiques et bénéficie de ressources à l'entrée spécifiques. De manière générale, les résultats du Chapitre 3 montrent que les SCOPs sont composés de groupes avec différents profils de survie qui sont ignorés lorsque qu'une analyse porte sur la population agrégée des SCOPs. Avec prudence, les institutions soutenant les SCOPs pourraient défendre les reprises en SCOP d'entreprises en difficulté et les reprises en SCOPs d'organisations à but non-lucratif comme étant des formes viables d'entrepreneuriat.

Données de la CGSCOP et de l'INSEE

Les contributions de cette thèse sont essentiellement empiriques, ce qui signifie que les forces et les faiblesses des données utilisées sont essentielles à la portée de mes résultats. L'utilisation de grands panels d'informations au niveau de l'entreprise, incluant des entreprises appartenant à des travailleurs et des entreprises conventionnelles similaires, est rare dans la recherche empirique sur les SCOPs. Trouver les données les plus appropriées compte tenu de mes questions de recherche a été un aspect important de la thèse. Je détaille ici les sources des ensembles de données utilisées dans les trois chapitres de cette thèse.

L'identification des SCOPs dans les Chapitres 1, 2 et 3 se fait par le biais du numéro d'identification de l'entreprise (SIREN) enregistré dans les registres de la CGSCOP. Les données transmises par la CGSCOP contiennent pour chaque entreprise (et non établissement) son numéro d'identification (SIREN), son mode d'entrée, son année d'entrée, son année de sortie et pour chaque année d'existence, lorsque les données sont disponibles, la commune du siège social, le nombre de travailleurs, le chiffre d'affaires total et le nombre de membres. La CGSCOP établit la liste officielle demandée par le gouvernement français et publiée au Journal Officiel. Cette liste ouvre des droits pour les SCOPs. Cela signifie que toutes les entreprises de cette liste sont des SCOPs et que toutes les SCOPs sont sur cette liste.

L'utilisation des enregistrements de la CGSCOP assure une identification rigoureuse des SCOPs, condition *sine qua non* à la construction d'un panel apparié de SCOPs et d'ECs et à la réalisation d'une analyse économétrique de leurs performances. En effet, l'identification des SCOPs est un problème majeur dans la collecte des données. Dans la plupart des pays, il n'existe pas d'agence de soutien aux SCOPs, ou celle-ci n'est pas en mesure de fournir une identification fiable de la population des SCOPs. Par conséquent, les études empiriques précédentes peuvent reposer sur une identification artisanale ou approximative. À cet égard, les Chapitres 1, 2 et 3 de ma thèse, qui s'appuient sur un large panel de SCOPs, présentent

une analyse de la performance sur l'un des plus grands ensembles de données utilisés dans la littérature économique sur les SCOPs.

L'utilisation des fichiers de la CGSCOP permet également d'éviter l'écueil d'une mauvaise identification due aux données administratives. L'identification uniquement par l'Institut national de la statistique et des études économiques (INSEE) serait biaisée. En effet, l'INSEE classe toutes les entreprises par leur catégorie juridique. Les SCOPs ont leurs propres catégories ("5458", "5558", "5658"). Mais de nombreuses SCOPs sont mal classées, tandis que certaines ECs sont définies comme des SCOPs. Cette erreur de catégorisation est probablement due au manque d'informations des Centres de Formalités des Entreprises sur les SCOPs ou à des préjugés négatifs contre les SCOPs, qui ont conduit les entrepreneurs à choisir une forme conventionnelle d'entreprise même lorsqu'ils voulaient créer une SCOPs. Cette erreur d'identification par l'INSEE s'aggrave en cas de transition d'une SCOP à une EC, ou vice-versa. Le biais s'est accru depuis les années 2010 avec l'augmentation de la population des SCICs (sociétés pluriactives, créées par la loi 2001-624 du 17 juillet 2001) et des CAEs (coopératives d'activité et d'emploi, créées par la loi 2014-856 du 31 juillet 2014) qui sont classées comme SCOPs, alors que les premières ne limitent pas leur sociétariat aux travailleurs et que les secondes ne concernent pas l'activité conjointe et s'apparentent plus à des coopératives d'entrepreneurs qu'à des coopératives de travailleurs. Par exemple, en faisant correspondre la liste CGSCOP des SCOPs avec une liste extraite du jeu de données FARE (Fichier approché des résultats d'Esane) sur la période 1997-2016 selon les catégories juridiques des SCOPs, j'ai constaté que seulement 56 % des SCOPs listées par la CGSCOP sont présentes dans la liste FARE, alors que 87 % des SCOPs présentes dans la liste FARE correspondent à celles de la liste CGSCOP.

Le Chapitre 1 utilisé l'ensemble de données FARE pour la période 2012-2016. L'ensemble de données FARE provient des documents fiscaux annuels soumis par les employeurs français et est fourni par l'INSEE. Dans ces documents, les entreprises fournissent leurs bilans et des informations détaillées sur leur secteur d'activité. Comme ces documents constituent la base des obligations fiscales et qu'ils font l'objet d'un audit, cela augmente notre confiance dans leur fiabilité. La base de données FARE ne doit pas être utilisée pour les analyses démographiques des entreprises (les entrées et sorties agrégées ne sont pas fiables) mais peut être utilisée pour obtenir des informations détaillées sur des entreprises spécifiques (comme les SCOPs), pour obtenir des statistiques sectorielles agrégées ou pour construire un échantillon représentatif d'ECs. Pour le Chapitre 1, j'utilise tous ces aspects. L'ensemble de données FARE est disponible pour les chercheurs sur demande et accessible par des systèmes informatiques à distance où toutes les analyses sont effectuées sur des serveurs sécurisés.

Le chapitre 2 nécessitait des informations au niveau de l'entreprise sur la survie et les caractéristiques de l'entrepreneur, tant pour les SCOPs que pour les ECs. Afin d'augmenter la

qualité du panel d'entreprises appariées, le chapitre 3 a exigé de contrôler le mode d'entrée (entreprise ex nihilo ou entreprise convertie) pour les ECs et les SCOPs. À ma connaissance, seule la base de données SINE (Système d'Information sur les Nouvelles Entreprises) répond aux exigences susmentionnées. Créée et est maintenue par l'INSEE, la base SINE est une enquête en trois vagues adressées à l'ensemble de la population des entreprises nouvellement créées et des reprises d'entreprises à trois moments de leur vie (au démarrage, à 3 ans, et à 5 ans). L'INSEE a adressé un questionnaire aux entrepreneurs/propriétaires-dirigeants et a demandé aux répondants des informations sur eux-mêmes et sur leur entreprise. Plus précisément, mon ensemble de données contient des informations au niveau individuel (par exemple, des données démographiques, le capital humain et social de l'entrepreneur, les activités de préparation à la création, la motivation) ainsi que des informations au niveau de l'entreprise (par exemple, les paramètres organisationnels initiaux, les ressources, le financement, les marchés, le développement de l'entreprise) pour l'ensemble des cohortes d'entreprises créées en 1994, 1998, 2002, 2006, 2010 et 2014. Comme l'enquête est obligatoire, le taux de réponse est très élevé (environ 75 %). Afin d'obtenir le maximum d'observations pour les entreprises appartenant à des travailleurs, j'utilise six cohortes (1994, 1998, 2002, 2006, 2010, 2014) de la base de données SINE pour le chapitre 3. Comme la base de données FARE, la base de données SINE est disponible pour les chercheurs sur demande et accessible par des systèmes informatiques à distance où toutes les analyses sont effectuées sur des serveurs sécurisés.

Le chapitre 3 se contente d'utiliser la base de données fournies par la CGSCOP dans le cadre d'une convention collective entre la CGSCOP et le laboratoire EconomiX. Cette base fournit pour chaque SCOP son numéro d'identification, son année d'entrée, son mode d'entrée, son secteur d'exercice ainsi que son année de sortie.

Le reste de cette thèse est rédigé en anglais.

General Introduction

Preamble

In a judgment dated December 20, 2019, the Paris Court of First Instance found France Telecom, a major telecommunications company, and its main former managers, guilty of institutional moral harassment of the staff community over the period 2007-2008.[4] This is the first time in France that institutional moral harassment has been recognized, i.e., moral harassment at the level of a company's organization and strategy. In 2006, the management launched the NExT and ACT restructuring plans, which aimed to make 22,000 of France Telecom's 108,000 employees leave over a period of three years. The trial does not question the objectives but the implementation of these plans. As France Telecom is a former state-owned company, the majority of employees have the status of civil servants and, as such, cannot be dismissed for economic reasons. Thus, the aim of management was to make the 22,000 employees leave voluntarily. In front of more than 200 managers gathered in Paris, the former CEO of France Telecom summarized the company's strategy as follows: "The 22,000, I'll get rid of them one way or another, through the door or through the window!" The company's 4,000 managers were, thereafter, systematically implementing management by terror and a degradation of working conditions aimed at pushing employees away. The strategy was effective: the management counts 22,750 departures in March 2009, and the Observatory of Stress and Forced Mobility counts more than 60 suicides and nearly 40 suicide attempts between 2008 and 2011.

In another case, on February 22-23, 2022, the Social Affairs Committee of the French National Assembly heard from the managers and unions of the listed company[5] Orpea about the situation in some of its establishments. These hearings followed a journalistic investigation (Castanet, 2022) that revealed numerous health and financial dysfunctions within the company's nursing homes, such as the rationing of food and medical supplies, chronic mistreatment of residents and the deterioration of working conditions. According to its Corporative Social Responsibility (CSR) Report (Orpea, 2021), Orpea respects many environmental, social, and governance (ESG) criteria. Indeed, Orpea is rated as "medium risk" (5th out of 113 companies) within its sector, with a clear progression of 14 places in just one year according to Sustainalytics. Orpea also features in the Top 10% of companies (out of 103 companies) in 2021 with the best ESG performance according to the rating agency ISS ESG, which is confirmed by its dramatic progression from 14th (out of 46 companies) in 2019 to

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[4]TGI Paris, 31e ch., 2e sect., 20 déc. 2019, no 0935790257, Association d'aide aux victimes et aux organisations confrontées aux suicides et dépressions professionnels (ASD PRO) et a. c/ Sté Orange SA.

[5]A "listed company" issues shares of its stock for trading on a stock exchange.

4th (out of 47 companies) in 2021, according to the agency Vigeo Eiris. Orpea is also included in many investment funds flagged with the SRI (socially responsible investment) label. The good ESG ratings do not reflect the mistreatment of residents or the suffering of employees, and therefore amounts to socialwashing, i.e., communication promoting the social and human impact of the company contradictory to some of its practices.

These two examples serve to illustrate the deficiencies, if not the aporias, of the moralization of managerial and organizational practices within conventional firms. France Telecom and Orpea are two large listed companies that represent institutional moral harassment and socialwashing. If these firms had been worker-owned firms (WOFs), the facts described above would probably never have taken place. By attributing the power of control of the company to the employees, WOFs embody democracy, concerns of workers' well-being, socially responsible investment, and CSR practices in their DNA.

Let me be clear, I would not like to imply by these introductory examples that I hold WOFs to be a panacea. I do not believe in any kind of virtue, neither of the workers, nor of the shareholders, nor of the managers. What is at stake, in my opinion, in the study and promotion of WOFs is that the compromise of conflicting interests between the stakeholders of the enterprise (mainly employees and investors) is not a pious wish, but a constraint inscribed in the structure of property rights itself, since the employees are also investors and managers. It is not a matter of asking the members of the company to be socially responsible, but of embedding social responsibility into the company norms. It is not a matter of exhorting and trusting individuals to go beyond the horizon of their interests, but of instituting safety rails that avoid the destructive collapse of the company's members, and in particular the employees, while giving them the freedom to run their firm as they wish. Because WOFs institutionalize the dialogue of divergent or even antagonistic interests within each individual member (as both supplier of capital and of labor), they have been supported, from Walras to Marx, as a possible avenue to overcome, in the case of firms, the capital-labor conflict.

During the last decade, WOFs have received increasing attention from international intergovernmental organizations, promoting the information and visibility of WOFs. The United Nations proclaimed 2012 as the "International Year of Cooperatives." On this occasion, a World Cooperative Monitor was created to develop a multidimensional database on the socio-economic value and influence of cooperatives around the world (Gotz, 2017). In its communication of April 13, 2011, on the Single Market Act, the European Commission defined social entrepreneurship as one of the twelve levers for growth in Europe. The goal is to promote the development of firms that have chosen, beyond the legitimate pursuit of financial profit, to also pursue objectives of general interest, social, ethical, or environmental development (Commision, 2011). The International Labor Organization has recommended that governments improve national statistics on cooperatives for use in the formulation and

implementation of development policies (ILO, 2002). Similarly, the United Nations General Assembly considers the research and collection of harmonized statistics on cooperatives to be a priority (Assembly, 2019). At the French level, public authorities focus on the legislative framework. The law of Social and Solidarity Economy, passed on July 31, 2014, thus modifies the laws of 1947, 1978 and 1992 governing WOFs in order to facilitate their creation and financing.

WOFs present many academic interests. It is indeed a subject that lies at the crossroads of different fields of study in economics and, more generally, in social sciences. The study of WOFs is of interest to the field of firm demography because it provides some answers to the question of why the vast majority of firms in the world are governed to serve the interests of the contributors of capital and not of labor. WOFs not only represent a third option between capitalist enterprises and state-owned enterprises but are also the paradigmatic example of employee ownership and profit-sharing schemes for workers implemented within conventional enterprises. Their study is therefore of interest to the field of participatory economics and the comparative analysis of economic systems. Finally, WOFs are at the heart of the fields of social and solidarity economics and cooperative economics because of their hybrid identity of being both democratically worker-managed enterprises and being in direct competition with conventional enterprises, i.e., they must combine organizational democracy and economic performance.

Beyond economic, institutional, or academic interests, it is possible to support WOFs from a normative standpoint. Whether it is to argue that they embody, schematically, either the utopia of a capitalist society by transforming the worker into a capitalist, or, on the contrary, the utopia of a post-capitalist society where the capital-labor conflict is overcome, WOFs have many supporters. Indeed, the moral support spans not only the ages, from the industrial revolution of the early XIXth century to the contemporary period, but also the entire spectrum of political ideologies, from conservative liberalism to revolutionary socialism. Among the best-known supporters of the moral superiority of WOFs,[6] we find the founders of neoclassical economics (Leon Walras, Alfred Marshall), of the critique of political economy (Karl Marx), of liberalism (Alexis de Tocqueville, John Stuart Mill) and of utopian socialism (Philippe Buchez, Charles Fourier, Robert Owen). By studying the economic performance of WOFs, this thesis intends to provide new insights and stylized facts that feed these philosophical debates as well as the practical challenges that these enterprises face.

Without blindly claiming to be the only relevant disciplinary approach, economics, through its conceptual and empirical tools, can provide valuable insights into the perfor-

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[6]Ellerman and Gonza (2021) provide a list of less-known supporters of WOFs of all academic disciplines and political ideologies such as Henry Carter Adams, Arthur Cecil Pigou, John Dewey, Jacques Maritain, Robert Dahl, and Noam Chomsky. Today, David Ellerman's work is part of a liberal defense of WOFs (Ellerman, 2020) while Bruno Jossa's work is part of a Marxist defense (Jossa, 2014).

mance and rarity of WOFs. It is particularly well equipped to address the following question: How does the economic performance of WOFs explain their relative rarity compared to conventional firms (CFs) in contemporary economies? It is to this general question that this thesis intends to provide some answers. To do so, it relies on three empirical analyses. The research questions that structure them are the following: Do sunk costs have the same impact on WOF and CF entries? Do WOFs survive at least as long as CFs? What are the impacts of entrepreneurial characteristics on their survival? Does the survival performance of WOFs differ according to their entry mode, especially between newly created WOFs and worker buyouts?

My thesis begins with a general introduction organized into three parts. The first part presents the basic stylized fact of this thesis, namely the rarity of WOFs across the world, and defines the key concepts of this thesis, namely two types of firms (conventional or worker-owned) and two forms of economic performance (entry or survival). The problematic of the thesis is then formulated at the intersection of this stylized fact and these concepts: How does the economic performance of WOFs help explain their relative rarity compared to CFs in contemporary economies? The second part of my general introduction highlights the problematic of the thesis in the existing economic literature and in the French context. It also examines the empirical and theoretical results concerning the creation, productivity, and survival of WOFs and insists on the institutional specificities of the French case *vis-à-vis* WOFs. The third part reviews the research questions raised in the different chapters of this thesis, the main results obtained, and their theoretical and practical implications, as well as detailing the statistical methods and data sources used.

Contents of the General introduction

1. Object of study and context

1.1. Conventional firms, cooperative firms, and worker-owned firms: Some definitions

In the theoretical world of the general equilibrium of markets, production is ensured by individual agents organized only by exchange. Firms are then defined as "an organized set of individual agents who participate in a common production process and sell the resulting output on a market" (Dow, 2018*a*, p. 3). The theoretical firms at the general equilibrium of markets are dot-firms or black boxes to the extent that only fair exchange relationships prevail within them. Put another way, firms at the general equilibrium of markets lack one key element of what is usually referred to as firms: power relations.

For firms with power relations, formalized through the existence of control rights, to exist, markets must suffer from imperfections. Economists used to say that there is no such thing as free lunch. For Coase (1937), this maxim applies to the market price system itself. Organizing production and exchange through a decentralized market price system requires costly activities. Similarly, organizing production through firms with control rights requires costly activities. When the transactional costs of the market are lower than the organizational costs of the firms, then it is more efficient, with regard to the allocation of resources, that production be organized through exchanges between individual agents (i.e., which is the situation embodied in the general equilibrium of markets). On the contrary, when the transactional costs of the market are higher than the organizational costs of the firms, then it is more efficient to organize production through firms linking individual agents by power relationships. Of course, our contemporary economies are riddled with market imperfections and of transactional costs that are higher than organizational costs. Hence the existence of firms, and authority and subordination within them.

In other words, in the theoretical world of perfect markets, the optimal allocation of resources is independent of the distribution of firms' control rights—in fact, firms need not exist. Firms' control rights therefore emerge from the incompleteness of contracts. Somebody is given the authority to control firms' management whenever it is less efficient to externalize an activity through market exchanges. If the market of an input (labor or capital for instance) is perfect, then there is no reason why the corresponding input suppliers need control rights. Therefore, the distribution of control rights between capital and labor matters as long as the capital and labor markets are imperfect.

Complementary to this theoretical narrative, the evolution of law shows that the legal existence and domination of certain forms of firms depend on national histories and legal details with regard to the creation, the governance, and the fiscality of each type of firm. En-

trepreneurs who want to create a firm make trade-offs between the different legal forms of firms that are available to them. In explaining the international history of limited liability companies, Guinnane *et al.* (2008) show that new juridical forms of firms are created to meet the requirements of entrepreneurs. For instance, the limited liability company is created in France, Germany, the UK, and the USA, as a response to both the drawbacks of partnerships (i.e., the risk of premature dissolution and the unlimited responsibility of founders) and the drawbacks of corporations (i.e., the oppression of minority shareholders). Lamoreaux and Rosenthal (2006) show that in France and the USA, at the end of the XIXth century, partnerships remained popular in many branches of economic activity long after the corporation had become widely available. Although corporations did eliminate the problem of untimely dissolution prevalent in partnerships, they did so at the cost of facilitating significant minority oppression. For large firms seeking to raise capital on the equity markets, the benefits of incorporation greatly outweighed the costs. However, for firms where the number of associates was small and investment capital could be obtained more informally, the advantages were not so clear, and the overwhelming majority chose to bear the costs of partnerships rather than to incorporate. The theoretical model of Lamoreaux and Rosenthal (2006) and the historical evidence show that corporations and partnerships are complements rather than substitutes. Therefore, there is no such a thing as an *optimum optimorum* in juridical form of firms, let alone the Anglo-American model of corporations (public limited companies).[7] Hence, there might be common factors explaining the existence of firms with different distributions of ownership rights, and none of them should be considered *a priori* as doomed.

Following Dow (2018*a*, p. 4) and a theoretical approach rather than an historical one, I define a conventional firm (CF) as a firm where ultimate control is held by capital suppliers, or a subset of them (e.g., equity suppliers rather than debt suppliers). Strategic decisions regarding employment, investment, development, etc. are made by or in the name of capital suppliers. CFs are often referred in the academic literature as capital-managed firms, investor-owned firms, or capitalist firms. Two caveats must be raised to avoid confusion with misled common beliefs regarding the ownership of firms. First, the fact that most firms are controlled by their capital suppliers is often incorrectly confused with the legal right of capital suppliers to control firms. This is not true. There are no laws in France, or elsewhere, stating that in CFs the capital suppliers are *de jure* parts of the firm's control group, i.e., shareholders.[8] Capital suppliers are not necessarily shareholders. For instance, financing a firm

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[7]For a history of the relationship between shareholders and directors in corporations in France and the USA, see (Bruno, 2012).

[8]There are specific types of firms in which capital suppliers are *de jure* shareholders, but very few of them exist (e.g., *société en commandite* in France). This type of firm is an inheritance from the beginning of the XIXth century where firms were created to undertake production in natural monopolies (e.g., train networks, boat construction), needed the authorization of the king, and engaged the full liability of the capital supplier.

through debt usually does not provide any shares in the firm to the creditors. Shareholders are also not necessarily capital suppliers. A share can indeed be acquired for many reasons (e.g., inheritance, gift), supplying equity capital is only one of them. Second, legally speaking, shareholders own neither the firm, nor the corporation, nor the assets of the firm. Shareholders only own shares issued by corporations. The assets and liabilities of a firm are not the personal assets or liabilities of the shareholders. In fact, the corporation is the moral person owning equity capital. The limited liability of shareholders is the symmetrical right to the moral personhood of the corporation. Whether the firm is conceived as a knot of contracts or as an institution, it is not an object that can be owned (Chassagnon and Hollandts, 2014).

I define a cooperative firm[9] as a firm where membership is not free and where ultimate control is held by its members. An unfree membership means that being or becoming a member is conditional on a status. Hansmann (1996) calls such a membership constraint 'patronage'. Different types of cooperative firms are distinguished depending on the membership constraint. Figure 1 sums up the different possible members and the corresponding cooperative firm. The members of user cooperatives (e.g., consumption cooperative) must be users (e.g., consumers). Agricultural cooperatives are one type of entrepreneur cooperative limiting their membership to farmers. Multistakeholder cooperatives are cooperative firms in which the control group must be composed of different types of members. For instance, shareholders of a SCIC (*société coopérative d'intérêt collectif*) in France must be composed of workers, users, and public entities. The legal definition of cooperative firms is larger than our economic definition. Indeed, the International Cooperative Alliance (ICA) defines a cooperative as "an autonomous association of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly-owned and democratically-controlled enterprise" (ICA, 2015, p. 2). French law follows the ICA's[10] definition of cooperative firm by stressing three principles: 1) membership constraint, i.e., the members of the firm must also be stakeholders and the membership must be voluntary and open, also known as the "double quality" of cooperative members in France; 2) 1 member equals 1 vote, i.e., the decision-making process must be democratic; 3) limited for-profit, i.e., the firm's goal is not profit but to satisfy their members' needs.

I define a worker-owned firm as a firm where ultimate control is held by labor suppliers. In the academic literature, the following synonyms are used: employee-owned firms, industrial cooperatives, labor-managed firms, producer cooperatives, production cooperatives, self-managed firms, and worker cooperatives. In this thesis, I conventionally use the term worker-owned firm (WOF). Contrary to Dow (2018*a*), I do not include professional partner-

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[9]In this thesis, cooperative firms should not be confused with "cooperative firms" in game theory.
[10]Article 1 of the law n°47-1775 of September 10, 1947 modified by the law n°2014-856 of July 31, 2014.

ships in my definition of WOFs, for two reasons. First, professional partnerships have membership constraints founded on specific professions (e.g., physicians, law, accounting) rather than on the broader range of activities that firms combine. As a result, some workers in professional partnerships (e.g., secretaries in a law cabinet) do not have the right to become members in professional partnerships. As such, professional partnerships are not even cooperative firms. Second, the members of a professional partnership do not necessarily produce jointly. As a result, professional partnerships would be cooperatives of entrepreneurs, and therefore lie outside of the empirical scope of this thesis. It is for the absence of joint production that I also do not take into account cooperatives of activities and employment (CAE) in this thesis, despite the fact that they are legally registered as WOFs in France. In Sections 2.3. and 3.4.1 of the General Introduction, I detail the definition of WOFs, called SCOPs (*sociétés coopératives et participatives*), under French law and the identification of WOFs studied in this thesis, respectively.

Figure 1: The different types of cooperative firms in France and their different types of members
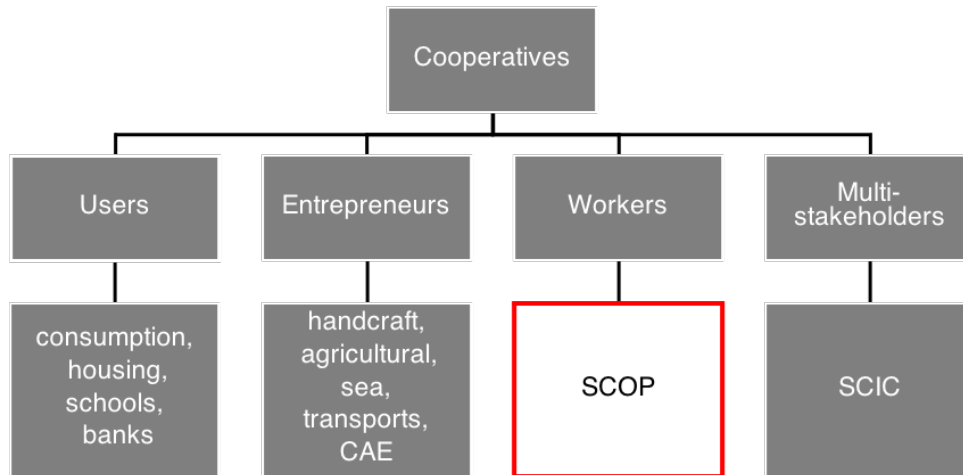
WOFs are cooperative firms where members are the workers of the firm, as shown in Figure 1. WOFs are therefore different from agricultural cooperatives or consumption cooperatives. In WOFs, workers own the majority of ownership rights (decision-making and profit-sharing). More generally, WOFs are encouraged to respect the seven principles listed by the International Cooperative Alliance.[11] However, it is worth noting that there is a fundamental difference between WOFs and other forms of cooperatives (user, entrepreneur,

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[11]The seven principles of the ICA are listed in the *Declaration on the International Cooperative Identity* of 1895, revised in 1995: 1) voluntary and open membership, 2) democratic member control, 3) member economic participation, 4) autonomy and independence, 5) education, training, and information, 6) cooperation among cooperatives, 7) concern for community. In 2016, the ICA's Principles Committee published the Guidance Notes on the Cooperative Principles, a 120-page document giving detailed guidance and advice on the practical application of the Principles to cooperative enterprises.

multi-stakeholder): only WOFs ensure that the people who govern and the people who are governed are equal in membership (Ellerman, 2020). In terms of agency costs, among cooperative firms, only WOFs ensure that there is no separation between ownership (risk bearing function) and control (decision function). By contrast, in a consumer cooperative, the only activity carried out by consumer-members is shopping in the cooperative while the distribution of goods is carried out by the employees. Similarly, in an agricultural cooperative where farmers sell their raw products through the cooperative, the farmers also hire employees. It is important to note that in some WOFs, the share of workers who are not members can be quite large, but devoted legislation has implemented incentives and limits to avoid "degeneration" of WOFs into conventional firms (i.e., nonmember-workers representing more than 50% of workers). For instance, in France, any new worker in a WOF must be proposed to become a member within two years of being hired, and any new worker can ask to become a member after one year.

WOFs are often studied by comparison with other types of firms, and among them, with CFs. In this thesis, I compare WOFs with CFs rather than cooperative firms because I am interested in the links between the economic performance of WOFs and their rarity relative to CFs. Some CFs implement employee share ownership and/or profit-sharing schemes. Despite numerous laws since 1959 in favor of profit- and ownership-sharing, these schemes concern mostly large listed firms in France and the percentage of capital owned by employees in CFs remains limited (for a review of employee ownership in France, see Fakhfakh *et al.* (2022)). Due to their low prevalence in non-listed firms and the fact that their ultimate control is still in the hands of capital suppliers, I consider these "hybrid" firms as negligible in this thesis and consider them to be the same as regular CFs.

There is no consensus among theoreticians to characterize the relation between WOFs and CFs. As far as I am aware, there are three main ways of articulating the relationship.

First, the symmetry framework. This framework is defended by Dow (2018*a*, 2003), Ben-Ner (1988*b*), Mikami (2014). The symmetry framework clearly assumes its neoclassical anchorage. It uses traditional tools of mainstream economics, from the general equilibrium approach to market imperfections. In Dow's formulation, labor-managed firms[12] have the same objective function as capital-managed firms. At the general equilibrium of markets, they are isomorphic. These two types of firms only differ by the factor of production on which their membership is affiliated. Their differences stem from a different allocation of control rights. The only way to explain the observed asymmetries between WOFs and CFs is to assume that they react differently to the same market imperfections. While Mikami or Ben-Ner take for granted that the structure of ownership differs between firms, Dow tries to

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[12]Note that the term "labor-managed firm" (LMF) was historically coined to design the Ward-Vanek-Domar model.

theoretically endogenize the different structures of ownership in the physical fact that labor is inalienable relatively to capital. Labor *per se* cannot be sold, only hours of labor can be sold because labor is always attached to the worker. On the contrary, capital can be totally independent of the individual who owns it and can be sold easily.

Second, the subset framework. The second way of characterizing the relationship between WOFs and CFs is to use the mathematical analogy of limit instead of symmetry. CFs are the limit of the firm under the assumption that the freedom of membership goes to infinity. Free membership means that there is no constraint on who can become a shareholder. WOFs are simply firms in which the freedom of membership is constrained to the workers, what Hansmann (1996) calls patronage. In this view, then, a WOF is a particular type of CF because their membership is not open to anybody but is restricted to the firm's workers. WOFs become a subset of the CF set. Ellerman (2007) argued, in the same fashion as Robé (2011), that, strictly speaking, there is no such thing as firms owned by capital suppliers. This perspective is anchored in law, building upon Hansmann (1996). A firm does not maximize profit, but only maximizes the profit of the group that controls it, and there is nothing in the law that states that capitalists or investors have to control the firm. The growth of the principal-agent literature recognizes that firms are not controlled by capitalists but by their agents. There are plenty of historical examples in which the manager-controller acted against the interests of investors. This has given rise to the development of stock options and other incentive tools for managers to conform to the investors' interests, in the same manner that some laws protect workers against managers' abuse of power. Firms serve the interest of those who control them.

Third, the alterity framework. This third way of characterizing the relationship between WOFs and CFs is to state a radical alterity of WOFs rooted in a different contract than the foundational contract of CFs. CFs are founded on the contract of association between at least two associates that combine some resources in the establishment of an economic activity from which they share the benefits. In his analysis of the cooperative laws on French WOFs, Hiez (2006) argues that members of WOFs have a "double quality," i.e., they are both workers and shareholders, which cannot be reduced to the juxtaposition of an employment contract and a partnership agreement. Rather, members of WOFs are subject to a contract of cooperation that is not made explicit in French law. In other words, WOF members embody a third path that should be legally distinguished from workers and from shareholders. Thus, WOFs are not CFs with a worker-patronage, but a different type of productive organization. The alterity framework is sustained by empirical evidence. For instance, in Portugal, WOFs are ruled by a Cooperation Code while CFs are ruled by the Commercial Code, establishing a clear and radical distinction between the two. However, in France, the first article of the 1947 cooperative law refers directly to the Commercial Code in the definition of WOFs and then is

followed by the rest of the articles which list exceptions to the Commercial Code for WOFs. The alterity framework is also at the core of the Marxist approach, though Marx also stresses the "dual reality" of WOFs.[13] More broadly, the alterity framework defends the democratic rupture that WOFs embody relatively to CFs. The most recent book by Vieta (2020) on worker takeovers of failing CFs (*entrepresas recuperadas de trabajadores*) in Argentina is representative of this approach.

In this thesis, I primarily use the symmetry and the subset frameworks, since only they lead to theoretical predictions concerning the comparative performance of WOFs. However, I do not ignore the alterity framework and use it in my discussion sections to point out limits, to interpret results, or to propound further research agendas. My point is not to choose between these three frameworks. I believe that they should all be used with caution since they all have flaws as well as bringing pertinent insights to understanding the performance and rarity of WOFs. In detailing the three frameworks of articulating WOFs and CFs, my point is to highlight the diversity of economic approaches to WOFs, but also to show that beyond their differences, the question of performance and rarity of WOFs is central to all of them. In this respect, I hope that this thesis will bring valuable insights for supporters of any of these approaches and consolidate a sound basis of stylized facts on which the controversies and fruitful discussions can be founded.

1.2. The rarity of worker-owned firms across the world

Beyond their organizational features, a striking fact about WOFs, once considered as a population, is their rarity relative to CFs across the world. In all countries where data are available, WOFs stand for a tiny proportion of all firms. Table 1 provides a sample of countries with the number of WOFs. WOFs in Spain, Italy, and France represent about 1 in 1,000 firms, and WOFs in the USA, the UK, and Israel represent about 1 in 10,000 firms. Similar orders of magnitude are found in other countries (see (Mirabel, 2021) for more data on the number of workers in WOFs for a larger sample of countries). In its second global report and based on data from 156 countries, the International Organization of Industrial and Service Cooperatives (Hyungsik, 2017) estimates the number of worker-members in cooperatives across the world to be about 11 million.

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[13]The "dual reality" refers to the ambiguous position of WOFs with one foot in the capitalist mode of production and the other foot in the communist mode of production. Marx (1981, p. 571) stresses this duality: "The cooperative factories run by workers themselves are, within the old form, the first examples of the emergence of a new form, even though they naturally reproduce in all cases, in their present organization, all the defects of the existing system, and must reproduce them. But the antithesis between capital and labor is abolished here, even if at first only in the form that the workers in association become their own capitalist, i.e., they use the means of production to valorize their own labor. These factories show how, at a certain stage of development of the material forces of production, and of the social forms of production corresponding to them, a new mode of production develops and is formed naturally out of the old."

Table 1: Number and proportion of worker-owned firms across countries

Country	Year	Number of WOFs	Percentage of WOFs	Sources
Spain*	2012	17,000	0.5	Pérotin (2016)
Italy	2012	25,000	0.6	Pérotin (2016)
France	2018	2,294	0.1	Author's calculations
USA**	2009	223	< 0.01	Olsen (2013)
UK***	2012	500-600	0.02	Pérotin (2016)
Israel	2000	268	0.05	Abramitzky (2008)

NOTES: The percentage of WOFs is calculated among all firms, excluding non-employing firms. *The estimate for Spain includes the *cooperativas de trabajo asociado* (16,664 is given for 2012 by Pérotin (2016) but not *sociedades laborales*, in which employees own at least 51.01% of the capital but voting is proportional to capital. In 2013 there were 11,322 *sociedades laborales* (de Empleo y Seguridad Social, 1990). The figures about the number of WOFs by countries differ across studies, largely because of different definitions. **The USA estimate does not include ESOP firms even if about 2,000 of them are 100% owned by their workers. ***The UK estimate includes firms that identify themselves as workers' co-operatives and other employee-owned firms that meet the definition provided in this paper. The estimate for UK does not take into account the John Lewis Partnership in which the 90,000 workers are owners of the firm.

Table 2 lists the biggest WOFs (measured in turnover and number of workers) for a few countries. The biggest and one of the most studied WOFs in the world is the Mondragón group, created in 1956 and based in Spanish Basque Country, which today counts about 289 firms gathering 81,000 workers, with turnover of $14.43 billion. Similar in the level of turnover and number of workers to the Mondragón group, the John Lewis Partnership in the UK is also a giant of worker ownership. Besides these two firms, there are no other large WOFs. Whatever the country, the largest CFs are much larger than the largest WOFs. Many reasons are invoked in the literature to explain the absence of large WOFs, for instance the tendencies among WOFs to long-term underinvestment, degeneration into CFs when growing, or closer monitoring of management by their worker members hampering the firm's growth. Overall, the comparatively smaller size of the largest WOFs could also be a statistical artefact—given the small number of WOFs in existence and their small proportion of gigantic firms in general, the probability of observing a gigantic WOF is extremely low.

WOFs exist in a wide range of countries with different institutional contexts, especially the degree to which the law frames WOFs, or does not. In most cases, laws devoted to WOFs emerged after WOFs had already started to develop.

Table 3 lists a sample of countries across the world according to three degrees of how the law rules WOFs and cooperative firms. The first quadrant concerns countries where there are no dedicated laws for WOFs and no law codes for cooperatives; that is, where laws covering cooperative firms are included in the Commercial Code that rules CFs. This does not mean that there are no laws devoted to cooperative firms, but that they are not separated from the Commercial Code ruling conventional firms. I include in this quadrant countries

Table 2: Top worker-owned firms by country, 2018

Name	Country	Turnover (billion $)	Turnover/(GDP per capita) ($)	Number of workers	Sector
Central Nacional Unimed	Brazil	0.86	95,859.04	145	Education, health and social work
Group Up	France	0.53	12,730.87	3,593	Other services
Acome	France	0.51	12,250.46	2,000	Industry and utilities
Scopelec	France	0.41	9,848.41	3,400	Industry and utilities
ULCCS	India	0.17	83,454.85	12,000	Industry and utilities
SACMI	Italy	1.70	49,382.06	4,472	Industry and utilities
Manutencoop	Italy	1.13	32,729.13	15,519	Other services
Coopservice	Italy	1.12	32,363.22	22,214	Other services
CNS	Italy	0.90	26,031.55	108	Other services
CIR FOOD S.C.	Italy	0.80	23,292.78	13,095	Other services
FAI SERVICE	Italy	0.69	19,891.99	65	Other services
Spółdzielnia Wydawniczo-Handlowa "Ksiąąka i Wiedza"	Poland	0.45	29,362.45	3,433	Other services
Corporación Mondragón	Spain	14.43	475,726.94	81,837	Industry and utilities
Fundación Espriu	Spain	1.92	63,172.60	6,182	Education, health and social work
John Lewis Partnership	UK	13.79	320,294.01	83,900	Retail trade
Greenwich Leisure Limited	UK	0.40	9,292.98	14,063	Education, health and social work

SOURCES: World Cooperative Monitor (2020) and desk research.

where legislation does not generally set out classifications for cooperatives, and thus does not clearly distinguish WOFs from other cooperative firms, even if there are some cases in which the laws contain special provisions for certain forms of cooperative enterprises. For instance, in Canada the minimum number of members for cooperative firms is set at 5, but WOFs can be created with only 3 worker-members. It is also rare for federal countries to have a federal law code for cooperatives because of the legal relationships between the provincial and federal legislation. That is why some countries with advanced legislations on WOFs or cooperative firms such as Canada, India, or Spain, do not have any legal code for cooperative firms. Most countries across the world might fit in the first quadrant, covering countries with a significant prevalence of WOFs, such as Canada and the UK, and countries where WOFs are very marginal, such as South Africa and Greece.

The second quadrant, at the top-right of Table 3, lists countries where there are no dedicated laws for WOFs, but where there is a legal Code devoted to cooperative firms. This quadrant gathers a great diversity of countries such as Australia, Belgium, or Russia where cooperative firms play a significant role in the national economy, especially agricultural cooperative firms. In these countries, the absence of legislation devoted to WOFs is tied to the weakness of the social and solidarity economic sector.

The third quadrant, at the bottom-left of Table 3, lists countries where there are laws for

WOFs that prevail over the Commercial Code, and as such WOFs are legally defined as CFs with specificities of governance, reserved earnings, etc., but where there is no legal code devoted to cooperative firms. This quadrant includes countries with large population of WOFs, some of which are well-studied (Italy, Spain, France) and some not (India).

The fourth quadrant of Table 3 lists countries where the laws concerning WOFs are gathered in a dedicated legal code which is different from the Commercial Code ruling CFs. This quadrant encompasses mostly Latin American countries where the social economy, embedded in kinship relationships and local communities, plays a major role in the economy (Argentina, Columbia, Peru, Uruguay).

Table 3: Diversity of legal environment of worker-owned firms across the world

Law Code for cooperatives / Devoted laws for WOFs	No	Yes
No	UK, Canada, Egypt, Ethiopa, Finland, Germany, Ghana, Greece, Switzerland, Indonesia, New Zealand, South Africa	Australia, Belgium, Russia
Yes	Brazil, France, Italy, Spain, India, Japan, USA	Argentina, Columbia, Peru, Poland, Portugal, South Korea, Uruguay

SOURCE: Cracogna *et al.* (2013) and https://coops4dev.coop/en NOTE: the list provided in this table is not exhaustive since, for most countries, information is lacking on the existence of WOFs and on laws for WOFs. Annex 3 in Mirabel (2021) provides a longer list of countries with the estimate number of workers in WOFs and the number of academic publications devoted to them.

Table 3 displays a contemporary picture of the latest legal institutions of WOFs across the world. Of course, this picture has changed in the last decades. For instance, Japan and the USA only adopted their first laws dedicated to WOFs in 2020, and Belgium passed a Cooperative Code (Code of Companies and Associations) in 2019. It is also worth noting that there are efforts among scholars and politicians to harmonize cooperative laws at the international level. On December 15, 2010, the Council of Ministers of the Organization for the Harmonization of Business Law in Africa (OHADA), gathering 17 African countries, adopted the Uniform Act on the Law of Cooperatives in Lomé (Togo), inspired by the International Cooperative Alliance to promote and harmonize the cooperative laws across the world. In its Council Regulation n°1435/2003, dated July 22, 2003, the European Union created the Statute for a European Cooperative Society (SCE) which established the SCE legal form, securing the legal identity of cooperative firms and their subsidiaries across the European Union. In 1988, the International Cooperative Alliance published the "Framework Law for the Cooperatives in Latin America" to contribute to the development of cooperative laws, which has been used as a legal inspiration in many Latin American countries such as Brazil, Uruguay, and Peru. In a different context but following a similar philosophy of extension of cooperative rights,

the Law of Cooperative was a pillar of Gorbatchev's perestroika and glasnost reforms of the USSR, allowing for worker-owned firms to operate, alongside state-owned firms.

Beyond the diversity of their legal environments, WOFs present similarities across the world such as industry distribution, growth, and waves of creations during recessionary periods. The industry distribution of WOFs differs from that of CFs at a sufficiently disaggregated sectoral grid and this difference is robust across countries. WOFs tend to concentrate in low capital-intensive, low minimum-efficient scale, or low monitoring sectors (Ben-Ner, 1988*b*). In France, WOFs are concentrated in construction and manufacturing with a strong presence in printing and publishing but a weak presence in textiles and chemicals. A growing fraction of WOFs is concentrated in services (Fakhfakh *et al.*, 2012). In Italy, WOFs are mostly concentrated in construction, transport, and service industries (Pencavel *et al.*, 2006). In the UK, WOFs are mostly concentrated in construction, distributions, hotels and catering, services, and other manufacturing (Podivinsky and Stewart, 2007). In Uruguay, WOFs are more concentrated in bus and taxi services, social services, and manufacturing than in the rest of the economy (Burdín and Dean, 2009).

Over the last decades, the number of WOFs has grown across countries, though they still represent a minute proportion of firms. In a comparative study on France, Italy, Sweden and the UK, (Ben-Ner, 1988*a*, p. 9) concludes that "during the 1970s and early 1980s firm and employment growth in the WOF sector has exceeded that of the CF sector." A similar conclusion can be drawn since the 1980s. In France, the number of WOFs has increased by 229% over the period of 1980 (i.e., 698 WOFs) to 2018 (i.e., 2294 WOFs). In the USA, the number of WOFs has increased by 30% from 2013 to 2017, reaching about 400 WOFs (Palmer, 2019). In Atlantic Canada, the number of WOFs doubled between 1975 and 1985 (Staber, 1989). For Uruguay, Burdín and Dean (2009) indicate that while employment in CFs in 2003 averaged 87% of employment in 1998, employment in WOFs in 2003 was 106% of the 1998 level. For Italy, Vieta (2015) shows that the number of active worker buyouts sharply increases in the 1980s (i.e., 12 active worker buyouts in 1982) to reach a peak in 1996 (i.e., 133 active worker buyouts) before decreasing to 82 in 2007 and starting an upward trend since, to reach 135 active worker buyouts in 2014.

Even if most of WOFs are created from scratch, they are often associated with worker buyouts because strikes, worker protests, or worker takeovers might temporarily occupy the news and political scene. However, the association of WOFs with worker buyouts is also supported by widespread evidence of workers taking over their firm when it is facing difficulties. Thus, it is quite empirically established that waves of WOF entries occur during recessionary periods. For instance, the major development of WOFs took place in Uruguay during the 1950s and 1960s, in the last years of the XXth century and the beginning of the XXIth century because of motivation of necessity, to keep their jobs through popular protests and

occupation of workplaces (Cracogna *et al.*, 2013, p. 780). Due to this motivation of necessity, many CFs in difficulty were converted into WOFs in Argentina in the 2000s, also through popular protests and occupation of workplaces (Vieta, 2020). During the international economic crisis following the American subprime crisis of 2008, the number of WOFs remained stable in Italy (Carini and Carpita, 2014) and even increased in Romania (Lambru and Petrescu, 2014), while the number of CFs decreased. Similar evidence shows that WOF entries are more counter-cyclical than CF entries in the USA (Conte and Jones, 2015), Israel (Abramitzky, 2008; Russell and Hanneman, 1995), France (Pérotin, 2006), and Spain (Díaz-Foncea and Marcuello, 2015).

These similarities, together with the theoretical arguments briefly sketched in Section 1. and the econometric studies discussed in detail in Section 2.2., lead us to consider WOFs as an emergent phenomenon of market economies. As such, there must be common factors explaining the rarity of WOFs, such as their economic performance.[14]

1.3. Typology of economic performance

Performance is a multidimensional concept that can refer to many different activities. In economics, firm performance is usually defined through objective input-output comparison and formalized as a ratio of outputs over inputs. Return on assets or return on equity are two examples of such performance ratios. This way of defining firm performance raises at least two issues that require us to be cautious in any interpretation of results and accumulation of evidence across studies on firm performance. First, there is no consensus on what criteria should be considered as firm performance and there is no conceptualization or theoretical embedding in empirical studies of the firm performance used. Profitability, employment, sales, growth, and social impact are measures that can all be characterized as firm performance indicators, though these characterizations are rarely discussed. The choice of performance criteria is often due to data availability. Both these problems of the heterogeneity of definitions and the lack of theorization weaken the accumulation of knowledge of the determinants and the effects of firm performance (Murphy *et al.*, 1996). The second issue raised by the broad definition of firm performance as a ratio of outputs over inputs is that there is no consistency in empirical results across measurements (Achtenhagen *et al.*, 2010). A factor that might increase profitability might also decrease employment. Since firm performance is often formalized through a ratio, it is also almost impossible to infer any cause to firm performance increase[15] (i.e., an independent variable X positively impacting the de-

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[14]In addition to their rarity across the world, it is worth noting that WOFs exist in a wide range of epochs, even when CFs were not authorized. For instance, there were WOFs in France before the laws of 1854 and 1857 that founded the limited and moral liability of modern firms.

[15]This is one of the main reasons why Dow (2018*b*) advocates for giving up the Ward-Vanek-Domar model which assumes that WOFs maximize a ratio of income per worker-member.

nominator or negatively impacting the numerator would "cause" a similar increase in the dependent ratio variable of firm performance).

In this thesis, I try to tackle these two issues by: 1) investigating two dimensions of firm performance and carrying out robustness checks to ensure the consistency of results across different measurements of the dimension studied; 2) justifying each dimension of firm performance studied and the main measurement chosen through the previous empirical and theoretical literature on WOFs and CFs; 3) systematically discussing the results of each chapter with the previous literature and providing the maximum amount of detail on the data sources and treatments.

Figure 2 shows how the two types of performance (i.e., entry and survival) studied in this thesis are measured as ratios and explains how they are linked to the fundamental question of the rarity of WOFs.

The rarity of WOFs and the domination of CFs in contemporary economies are two sides of the same coin. Explaining the former gives us insights into understanding the latter and what the most efficient form of firm is in a given context. So, why are WOFs rare? Many theoretical explanations have been provided in the literature (for a detailed review, see Dow (2018*b*)). WOFs, as any type of firm or economic organization, can be rare for two main reasons: because few are created and because a lot of them exit. To explore theses reasons and get insights into explaining the rarity of WOFs, I studied two types of economic performance, illustrated in Figure 2, that match two moments in the "life"[16] of the firm: birth (entry) and death (survival).

First, the creation of WOFs is measured by their prevalence, i.e., the number of existing WOFs over the number of existing CFs. The number of WOF entries is taken as a proxy of performance in the theory of WOFs. In the microeconomic strand, or the symmetric framework as defined in Section 1., entrepreneurs are assumed to be rational agents who choose a type of firm that is expected to maximize their utilities. The agent-entrepreneur chooses the most efficient type of firm, e.g., WOF or CF. Thus, for a given set of conditions, there is only one type of firm more efficient than any other. Therefore, it is impossible to compare the different types of firms *ceteris paribus*. The comparisons of performance between WOFs and CFs cannot be made at the firm level but rather at the population level of firms. The theoretical predictions therefore talk about the prevalence or the incidence of WOFs in an economy, and the analysis aims at defining the barriers to entry specific to WOFs and leading the agent to rationally choose the conventional type of firm rather than the worker-owned one, resulting in a low number of entries.

Second, survival is measured by the firm's age or hazard ratio, i.e., the probability of exit-

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[16]This is only an exemplary analogy. For criticisms of the use of biological analogies in economics, see Penrose (1952) and Ayres (2004).

ing or "dying" at a given year, conditional on the fact that the firm exists until this given year. A widespread argument in cooperative economics and labor-managed firm theory to explain the rarity of WOFs is that they exit earlier than CFs because of long-term underinvestment and degeneration. The assessment of the effect of differential resources and differential behaviors between CFs and WOFs provides insights into the survival debate of WOFs.

Figure 2: Mind map of the study of the economic performance of worker-owned firms in this thesis
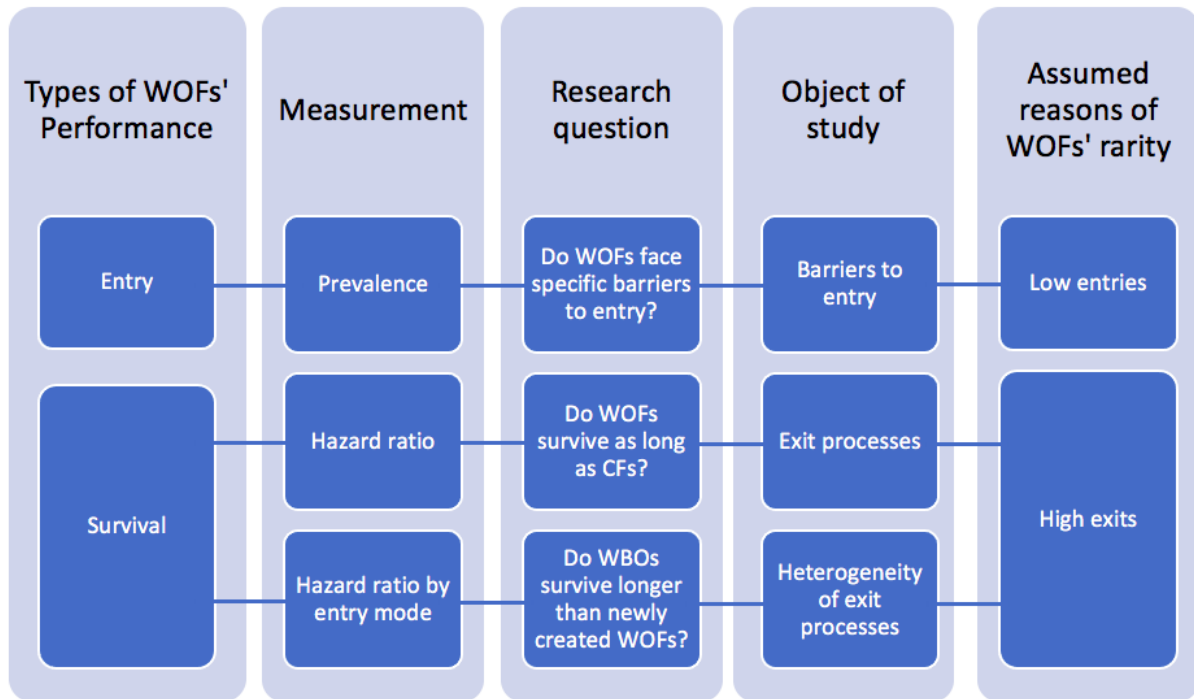
In this section, I have stressed two issues regarding the definition of firm performance as an objective input-output comparison. A third issue is the contradiction between the measures used by researchers (to study firm performance) and by practitioners. For instance, the growth of employment is rarely used an index of performance by entrepreneurs and managers while it is often seen as important for economists and policymakers (Achtenhagen *et al.*, 2010). Through interviews of entrepreneurs, Angel *et al.* (2018) show that entrepreneurs not only vary in the importance they place on different success criteria but that they also vary in how they understand these different success criteria. The discrepancy between the definition of firm performance used by researchers and that of entrepreneurs indicates that there are two different definitions of firm performance.

Therefore, complementary to the input-output ratio definition of firm performance used by researchers, there is another conception of performance as a subjective process used mainly by entrepreneurs and managers. Where the input-output ratio measures the differ-

ences before and after the performance has occurred, the subjective conception of performance emphasizes the process of transformation itself that leads to the input-output ratio. Formally, firm performance as a process is treated as an independent variable rather than a dependent variable and is used as primary data instead of secondary data. Of course, the subjective performance as a process is also at stake in each of the types of firm performance studied, but this thesis focuses on the input-output definition of firm performance.

2. What this thesis is about

2.1. The general issues under investigation

This thesis tackles two broad economic and policy questions: How do WOFs perform compared to CFs? And why are WOFs rare? It intends to shed light on the entry and survival of WOFs and how they help explain their rarity. Chapters 1 and 2 present comparative analyses of performance between WOFs and CFs. Chapter 3 deepens the analysis of survival performance by comparing different types of WOFs. My research addresses empirical questions, which connect with theoretical issues. It involves positive analysis—describing and understanding the world—but no normative statements—stating how the world should be. The problematic of the thesis is at the intersection of this stylized fact and these concepts: how does the economic performance of WOFs help explain their relative rarity compared to CFs in contemporary economies?

In this section, I review the existing economic literature relating to entry, survival, and different entry modes. I then provide an overview of WOFs in France and justify why this country provides interesting institutional contexts for empirical investigations into the performance and rarity of WOFs.

2.2. The performance of worker-owned firms: what does the economic literature tell us?

Before detailing the economic literature, I would like to stress that, overall, the empirical literature on WOFs is scarce. Mirabel (2021) counts only 63 empirical articles published on WOFs over the period of 1970 to 2019 (of over 280 articles) that compare the performance of WOFs and CFs through econometric tools. Early empirical works date back to the beginning of the 1970s, fostered by the Cold War framework of comparative study of socialist and capitalist systems. When the Cold War ended and access to longitudinal firm-level datasets opened, a new generation of researchers emerged that used econometric tools and inquired into new research questions including social economics, cooperative sectors, and organiza-

tional studies. Today, the applied literature on WOFs is gaining momentum (Mirabel, 2021; Jones, 2018). Many studies shed light on aspects of entry and survival in the comparative literature on WOFs. Yet the empirical literature suffers from several blind spots on these economic performance indicators and a limited number of studies investigate diverse sources of performance. In the following literature review, I draw heavily from Pérotin (2012).

2.2.1 Entry

Why are worker-owned firms rare? Because few of them would be created due to barriers to entry. This trend of answers focuses on the role of barriers to entry to explain the rarity of WOFs based on accumulated evidence and theoretical re-founding of labor-managed firms. This approach postulates that WOFs are not intrinsically different from CFs (i.e., they share a standard objective function of profit maximization) but only differ by distributing the firm's ownership rights to the workers rather than to the investors.

The term "barriers to entry" must be precisely defined to avoid equivocation. Building on the seminal works of Bain (1956), Stigler (1968), and Schmalensee (2004). Fee *et al.* (2004) introduce a classification system to clear up the existing confusion of the different definitions of an entry barrier proposed by the economic literature.[17] Unfortunately, the economic literature dealing with WOFs does not use their classification system nor explicitly define entry barriers but instead gives examples.

WOFs face multiple barriers to entry that do not apply similarly to CFs such as "the liability of newness," wealth and credit constraints, entrepreneurial rents, and collective action problems (Olsen, 2013). The effect of the business cycle on exit is the same for WOFs as for CFs, but the effect of the business cycle on entry is not (Pérotin, 2006). The entries of WOFs are more countercyclical, influenced by cooperative density and support agencies (Pérotin, 2006). There is some evidence of positive non-industry-specific externalities among Spanish WOFs (Arando *et al.*, 2012), suggesting that even the scarcity of WOFs plays as a barrier to their entry. This is a usual argument made in the ecological literature stating that the more a type of firm is present, the more legitimate it appears, lowering informational costs and ideological biases.

There is also a growing trend of WOFs in the service sector, where barriers to entry are often low and income possibilities are limited (Staber, 1989). In Uruguay, the formation of WOFs occurred mainly in the service sector between 1997 and 2005, and the historically high

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[17]They operate a double distinction. According to timing, they first distinguish between an economic barrier (i.e., a cost that must be incurred by a new entrant and that incumbents have or do not have to incur) and an antitrust barrier (i.e., a cost that delays entry and thereby reduces social welfare relative to the immediate but equally costly entry). Economic barriers are a subset of antitrust barriers. Second, according to the direction of the effect, they distinguish between a primary barrier (i.e., a cost that constitutes a barrier to entry on its own) and an ancillary barrier (i.e., a cost that does not constitute a barrier to entry by itself but reinforces other barriers to entry if they are present).

concentration in the transport sector declined accordingly (Burdín and Dean, 2009). There is a relatively high concentration of WOFs in the service sector compared to manufacturing, transport, and other sectors (Burdín, 2014). In Portugal, Monteiro and Stewart (2015) remark that WOFs are relatively more frequent in manufacturing and services than in agriculture, mining and quarrying, construction and electricity, gas, and water industries. In the USA, concentration occurs in barrel-making, metal foundries, shingle-making, plywood manufacturing, reforestation activities, and the taxicab industry (Bonin *et al.*, 1993).

At the industry level (Standard and Industrial Classifications), capital intensity and risk have negative effects on the number of WOF entries (Podivinsky and Stewart, 2007). These results suggest that capital starvation is not an exit process, but an entry barrier as much as the limited wealth of workers, which makes them more risk-averse than entrepreneurial-investors. There is some evidence from Italian manufacturing WOFs that human capital specificity and workers' heterogeneity largely explain WOF entry. In contrast, other dimensions, such as limited worker wealth, have a weaker statistical relevance (Belloc, 2017). Conte and Jones (2015) propose an adapted entrepreneurial choice mode and test its main predictions on WOFs in the USA. Their results strongly support their model, confirming a countercyclical pattern, which confirms the positive role of support agencies, but refuting the political motivations and legal institutions as significant factors of WOF entry. The entrepreneurial choice model of Conte and Jones (2015) gathers previously made arguments by Furubotn and Pejovich (1972), Jensen and Meckling (1979), and Ben-Ner (1988*b*). Notably, Conte and Jones (2015) follow the caveat of Bonin *et al.* (1993) that there might be significant interactions between internal[18] and external[19] factors of WOF creations. As Bonin *et al.* (1993, p. 1313) put it: "The birth of a producer cooperative depends on a combination of the internal logic and external influences."

However, the entrepreneurial choice model of Conte and Jones (2015) is not sufficient to explain the distribution of WOF entries and, *a fortiori*, the rarity of the WOF population. Usual barriers to entry for WOFs are stronger for newly created WOFs than for those created through the conversion of an existing firm. However, the overwhelming majority of WOFs are created from scratch. Hence the explanation by barriers to entry remains incomplete (Olsen, 2013). Thus, the entrepreneurial choice model provides only some insights into the understanding of the rarity of WOFs.

The study of WOF entry is a living field where many questions are yet to be answered and more are yet to be raised. Some blind spots need to be studied to advance the inquiry

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[18]For instance: concern over employment, individual preference for democratic decision making in the workplace, lack of entrepreneurial talent, risk-aversion due to specific income variation that cannot be diversified away, higher cost of capital, higher motivation, uninhibited flow of information about preferences, broader scope for workers to choose governance rules and types of contracts.

[19]For instance: economic expansion, unemployment expansion, lack of information, lack of support agencies.

of the determinants and the barriers to WOF entry. For instance, Vanek (1970), Mikami and Tanaka (2010), and Dow (2018*a*) claim that WOFs would self-select sectors with low sunk costs of capital relative to sunk costs of human capital. This prediction is commonly shared by scholars, and the lack of WOFs in the highest capitalistic industries (e.g., aeronautics, extractive industries) is seen as a point sustaining this evidence. But the theoretical prediction has never been tested properly. Rather, studies control for the capital intensity at the sector level (Podivinsky and Stewart, 2007; Belloc, 2017) but do not assess the impact of the sunk costs of human capital and its relationship to the sunk costs of physical capital on WOF entries as suggested by the prediction of Mikami and Tanaka (2010).

2.2.2 Survival

Why are WOFs rare? Because a lot of them would exit. This strand of explanation of the rarity of WOFs is historically tied to the WVD model, first established by Ward (1958) and completed by Vanek (1970) and Domar (1966). This model has served as a workhorse model since the 1960s. The seminal article of Ward (1958) gives the workhorse model of the so-called labor-managed firm. In Ward's formulation, labor-managed firms are distinguished from CFs by their objective function, which does not maximize profit as usual but profit per member-worker. As a ratio, this maximand leads to perverse supply response and degeneration. WOFs could not compete with CFs. Thus, good firms (i.e., conventional firms) should drive out bad firms (i.e., worker cooperatives). Empirical tests of their theoretical predictions started in the 1970s (Mirabel, 2021). The theoretical predictions deduced from the WVD model include that the exit rates of WOFs should be higher than those of CFs, or that WOFs should suffer from capital starvation. However, accumulated evidence invalidates these predictions, leading economists to give up the WVD model.

Empirical evidence from France shows that WOFs have lower exit rates than CFs (Pérotin, 2006; Ben-Ner, 1988*a*), and they do not degenerate into CFs (Batstone, 1983). The transformations of WOFs into CFs represent a small proportion of exits (Pérotin, 1987). WOFs do not suffer from capital starvation (Fakhfakh *et al.*, 2012; Estrin and Jones, 1992). They are as productive as their conventional counterparts (Defourny, 1992; Defourny *et al.*, 1992, 1985). They are more resilient than CFs in times of crisis (Narvaiza *et al.*, 2016). Thousands of theoretical articles were published that complete this model with *ad hoc* hypotheses building a heterogenous theory that finally collapsed. Dow, who started publishing theoretical papers on labor-managed firms in the 1970s, suggests to give up the WVD model (Dow, 2018*b*) for three reasons: 1) the WVD model is theoretically flawed at the disadvantage of WOFs (i.e., if the constraints assumed for the WOF are applied for the CF, then the WOF and CF have isomorphic production functions); 2) the WVD model is not able to explain any stylized facts of current WOFs and is fitted for the Illyrian firm, i.e., the canonical state-owned firm of the

ex-Yugoslavian economy; 3) since the 1980s, econometric studies have largely refuted the risky theoretical predictions of the WVD model concerning the inverse supply curve and the long-term underinvestment problem.

WOFs in the UK, France, and Italy have often exhibited considerable longevity, with a number of firms surviving for more than a century (Jones, 1982; Estrin and Jones, 1992; Pérotin, 2004). However, little comparable evidence exists regarding failure rates, and very few econometric studies have looked at the conditions under which WOFs survive or exit. In France, annual exit rates averaged 10% for WOFs and 11% for CFs in 1979–2002 (Pérotin, 2006) but were 11% for both groups of firms in 1979–1998. Ben-Ner (1988a) shows exit rates of one-third less for WOFs in France (6.9% in 1976–1983) than CFs (10.0% in 1980–1983) and the UK (6.3% WOFs in 1976–1981 vs. 10.5% in 1974–1982). Overall, the patchy evidence reviewed by Dow (2003) suggests that labor-managed firms probably survive better than CFs. The only comparative estimate of a causal hazard function model for WOFs and CFs is Burdín's (2014), which confirms this with a dataset comprising 22,315 firms including 243 WOFs observed from April 1996 to December 2005 in Uruguay. His Cox proportional hazard estimates show the WOFs to have lower hazard rates, all else being equal, than CFs. In addition, he finds the WOFs have lower hazard rates than CFs specifically in industries where rates of worker supervision and of labor turnover are high, suggesting WOFs have a specific advantage in these industries, but relatively higher hazards in industries with higher inequality (which may reflect greater skills heterogeneity). No difference between the hazards of WOFs and CFs is found in industries with high investment rates.

The riskiest years in a WOF's life seem to be the early years, as with CFs. Hazard function estimates for Israel, Atlantic Canada, and France suggest that the riskiest years for WOFs are from years 2 to 5. The discrepancy between a "liability of adolescence" characterizing WOFs and a "liability of newness" of CFs observed by Staber (1993), Russell and Hanneman (1995), and Pérotin (2004) might not hold today. CFs also face a "liability of adolescence" thanks to the subventions to creation implemented in the last decades. The mean survival hazard estimated on the basis of a Cox proportional hazard model was 9.2 years for Israeli cooperatives but 18 for those of Atlantic Canada. Pérotin (2004) constructs nonparametric hazard curves for the 2,740 WOFs created in France in 1977–1993, 1,660 of which closed down during the period, and finds that in the first eight years or so of a firm's life, those created from scratch have the highest hazard rates, followed by worker takeovers of failing firms, followed by those formed by an employee buyout of a sound CF. However, in the few years that follow, the order is reversed, with the highest hazards found among conversions of sound firms, followed by rescues, followed by cooperatives created from scratch. The origin of the firm may therefore affect the timing of the failure risk at least as much as its level.

Following the sociological and economic literatures, Burdín (2014), Staber (1989), and

Russell and Hanneman (1995) all focus on external factors such as the dynamics of organizational demography and the business cycle in explaining hazards, and Pérotin (2006) relies on these factors to explain exit rates. Both Staber (1989) and Pérotin (2006) find that the number of existing WOFs affects their failure risk, though the findings of the two studies are not comparable and suggest effects in opposite directions. Finally, Pérotin (2006) estimates equations explaining the annual number of firms closing down in France for CFs and WOFs in 1981–2002 and finds the two equations are not statistically different. In particular, exits among both types of firms respond in the same way to the business cycle, which suggests that fears that WOFs disappear when market conditions are good are unfounded Ben-Ner (1988*b*). It is unfortunate that there is very little up-to-date research on the relationship between individual cooperatives' characteristics (such as their start-up size, capital intensity, or growth rates) and survival, which might tell us whether, for example, the widespread notion that WOFs' difficulty in accessing external financing is a serious liability, is verified over time.

WOF study cases teach us that the entrepreneur's characteristics and the process of creating the WOF might significantly differ, more than that of CFs. This is a blind spot in the comparative econometric survival literature on WOFs, which focuses on a few variables such as the number of workers and the average wage (Burdín, 2014), making it difficult to assess either the systematic differences in resources at entry and the systematic differences in behavior of the firm along its lifespan according to the distribution of its ownership. To control for the entrepreneur's characteristics and a set of variables at entry and along the firm's lifespan would bring new insights into both the survival advantage and the rarity of WOFs relative to CFs.

2.3. One country under investigation: France

This thesis brings empirical contributions to the economic literature on the sources of the performance of WOFs just reviewed, in France. In what follows, I briefly depict the French population of WOFs, their legal framework, and their network of support agencies.

2.3.1 A small, growing, and heterogeneous population of worker-owned firms

The population of WOFs in France represents a minute proportion (1 in 10,000) of all firms. In 2019, there were 2,391 WOFs comprising 53,700 workers, among which were about 30,000 worker-members (CGSCOP, 2021).

WOFs form a growing population. They appeared in the mid-XIXth century, at the same time the modern firm based on moral personhood and limited responsibility was implemented. One could even trace their origins to the worker associations and corporations that

existed before the Industrial Revolution. Historically, WOF creations seem to have occurred in waves. Several creation waves coincided with periods of social unrest and political change, i.e., the 1830 and 1848 revolutions, the Paris Commune, strikes in 1893–1894 and 1905–1906, the Popular Front government in 1936, and the late 1960s, and the end of each of the two World Wars (Pérotin, 2016).

The population of WOFs has a heterogeneous distribution across time, sectors, and space. The cycle of WOF entries is specific. At first sight, the number of WOF and CF entries seem to evolve differently, even in opposite ways. Figure 3 shows that the number of WOF creations peaks in 1981, corresponding both to the new left-wing government and the implementation of the 1978 law dedicated to the legal statute of WOFs. The wave of WOF creations in the late 1970s also corresponds to the left-wing movement following the events of May 68. The creations of WOFs appear countercyclical to the creations of CFs in the beginning of the 1990s and in the 2010s. During the years following the 2008 crisis, WOF entries have increased while the CF entries have decreased.

Figure 3: Number of entries of WOFs (left-scale) and of conventional firms (right-scale). Sources: CGSCOP, FARE
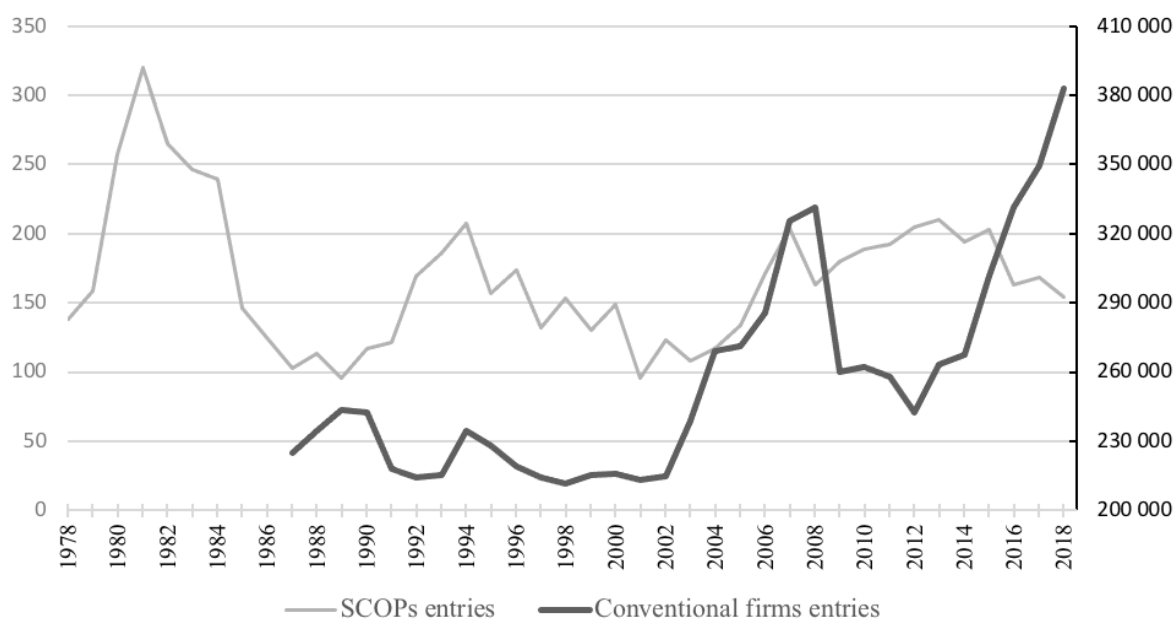
French WOF entries are more likely to be found in industries where the optimal firm size is small, where centralized monitoring is difficult, and where the capital requirements are relatively low. Sectors with very high sunk costs have never experienced WOF entries, while others comprise a significant proportion of WOFs. Of course, the more disaggregated the sector classification used, the more heterogeneous the WOF entries appears compared to

those of CFs. Figures 4 and 5 compare the average entry rate of WOFs with all firms over the period 2009-2016 for a 4-sectors grid and a NACE 1-digit grid, respectively.

Figure 4: Average entry rate (%) of WOFs and all other firms over 2009-2016 (4 sectors)
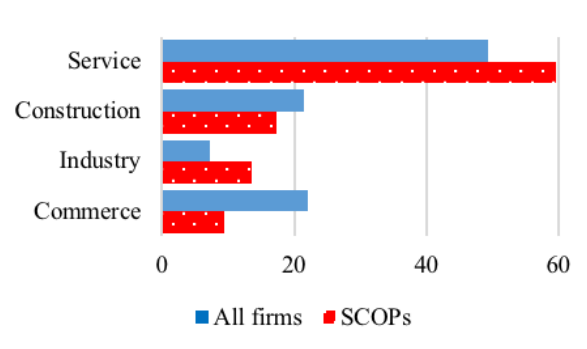
SOURCE: CGSCOP's records, FARE.

Figure 5: Average entry rate (%) of WOFs and all other firms over 2009-2016 (NACE 1 digit)
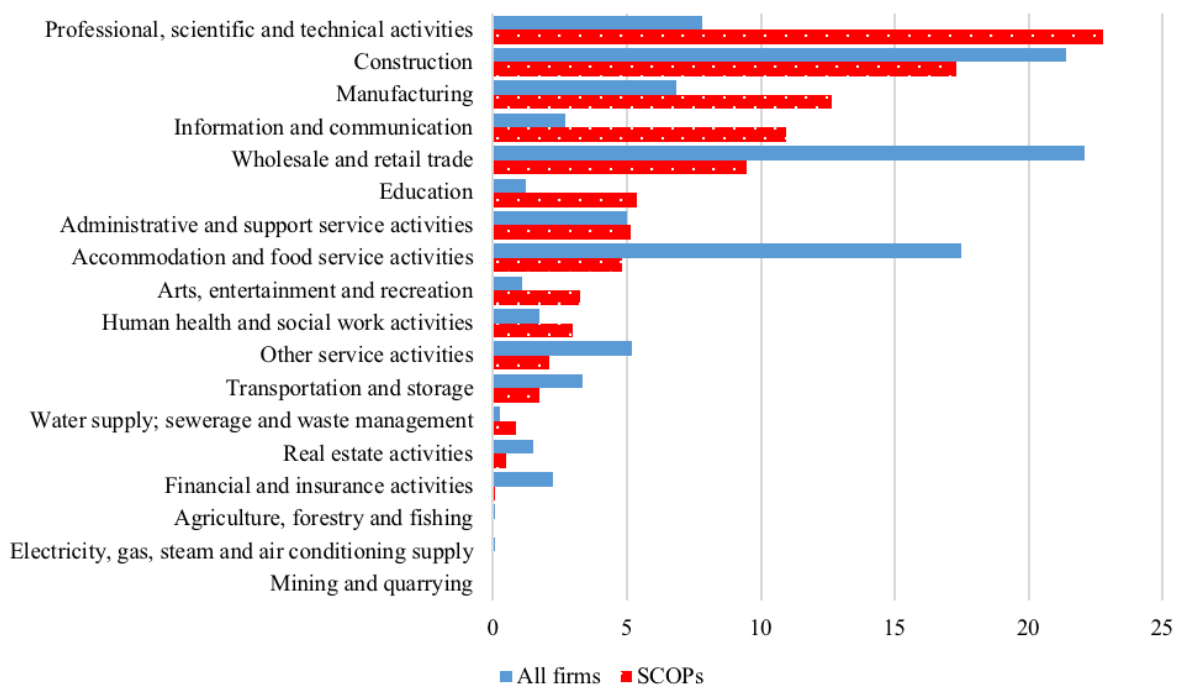
NOTE: The sectors of Public administration and defense, Activities of households as employers, and Extra-territorial activities are excluded. SOURCE: CGSCOP's records, FARE.

WOF rarity is spatially heterogenous, concentrated in regional clusters different from those of all other firms. Spatial distribution of WOFs is neither homogeneous, random, nor comparable to that of conventional firms. Figures 6 and 7 display maps of the raw number of WOFs and their ratio over CFs, respectively. France can be roughly split in two parts diagonally from North-West to South-Est. Under this diagonal line, there are more WOFs than ex-

pected, while above this diagonal line WOFs are underrepresented. Four hot spots of WOFs entries agglomerate a few regions as WOF clusters: 1) West (Brittany), 2) South-East (Rhône-Alpes), 3) South-West (Toulouse and surroundings), 4) Center (North Aquitania, from Nantes to Clermont-Ferrand).

Figure 6: Map of the number of WOFs in metropolitan France in 2013 by labor market areas
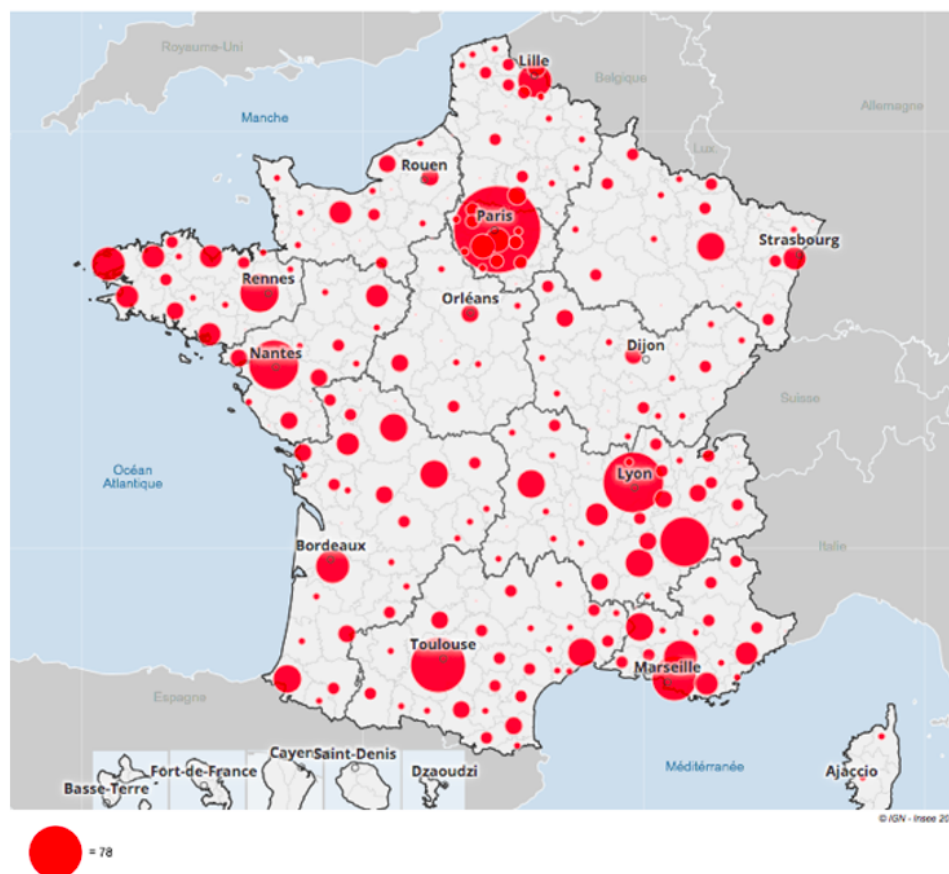
SOURCE: CGSCOP's records.

The weakness of the WOF movement in France as well as its growing trend and its heterogeneity across sectors, time, and space, are also common to the USA, Israel, the UK, Italy, and Spain, as already discussed in Section 1.2..

2.3.2 A devoted legal framework

Laws. WOFs are called SCOPs in France. SCOP is the acronym of *Société Coopérative Ouvrière de Production* or *Société Coopérative et Participative* (Art. 1 of the 1978 law) which literally means Production Worker-owned Firm or Participative Cooperative Firm. The operations of SCOPs are ruled by four laws dated 1947, 1978, 1992, and 2014, referring to the seven principles of the International Cooperative Alliance.[20] The 1947 law created the co-

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[20]See footnote 11.

Figure 7: Quartile map of the number of WOFs for 1000 firms in metropolitan France in 2013 by labor market areas
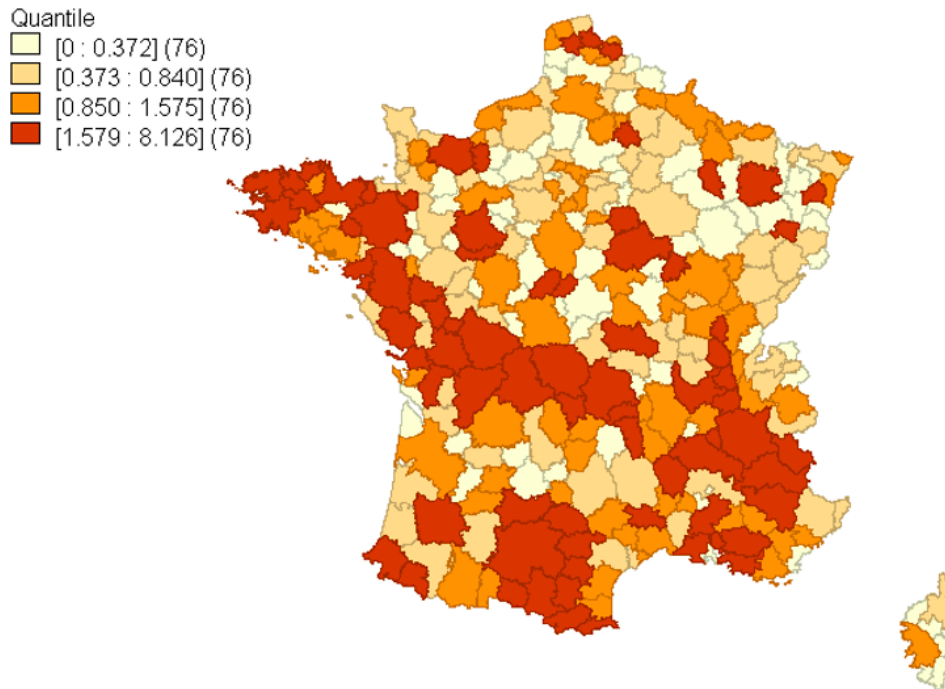
NOTE: A value of the relative risk above (under) 1 means that there are more (less) WOFs entries than expected under a constant risk assumption SOURCE: CGSCOP's records, Insee (2013a).

operative status defined in accordance with the Commerce Code. The 1978-763 law of July 19th, 1978 created the SCOP status with the main characteristics described below. The 1992 law modernized the cooperative status. The 2014 law is devoted to the Social and Solidarity Economy and adjusts the SCOP status in order to facilitate financing. Notably, the number of WOFs skyrocketed with the 1978 law, suggesting that a dedicated legislation supported the growth of the WOF movement.

Legal form. The SCOP is a cooperative firm under commercial law in the form of a public limited firm (société anonyme), limited liability firm (société par actions à responsabilité limitée), or simplified joint stock firm (société par action simplifiée) with a specific legal framework in which employees are majority shareholders. Any firm can be transformed into a SCOP, whatever its legal form.

Membership. Workers become members because they are workers of the firm, not because they supply the equity as investors. This is a membership status. This is why SCOPs are considered as a group of people more than a group of capitalist associates. Any new worker must be proposed to become a member of the SCOP within two years after arriving in the firm, and any new worker can ask to become member of the firm after one year. A member of the WOF is one who owns at least one share. The acquisition of a share is legally and para-

Table 4: Legal differences between conventional and worker-owned firms in France, 2020

	Conventional firms		Worker-owned firms	
Legal form	PLC	LLC/JSC	PLC	LLC/JSC
Creation				
Mininum number of associates	7	2	7 (among workers)	2 (among workers)
Mininum equity	€37,000	Free	€18,500	€30,48 (at least €15,24 by member)
Decision-making				
Organ	General Assembly (GA) and Administration council (AC)		General Assembly	
Rule	GA (1 share = 1 vote), AC (1 member = 1 vote)		1 member = 1 vote	
Profit-sharing				
Distribution	Free distribution between reserves and dividends		Distributed in three parts: labor, capital, and firm	
Shareholder's values	The capital gain is attributed to the shareholders on the sales of shares, liquidation or distribution of reserves		Restitution of invested capital, with the possibility of revaluation indexed on inflation	
Market of shares	Yes		No	
Funding				
Nature of the capital	Fixed	Variable	Variable	
Sources of funding	Equity, debt, reserves		Debt, reserves	
Individual capital	sales of shares between partners or to a third party		refunded in case of departure	
Reserves endowment per year	5% of earnings		legal reserve of 15% of earnings and at least 1% of development fund endowed	
Fiscality				
Business tax	Yes		No	
Corporation tax	Yes, at the common law rate		Yes, at the common law rate; exemption on the share of profits allocated to labor and reserves	
Property tax	Yes		No	
External control				
Statutory auditor	Yes	Only if 2 regulatory thresholds over 3 are reached	Yes	Only if 2 regulatory thresholds over 3 are reached
Cooperative overhaul	No		Yes	

doxically bounded to the suppliers of equity. Any individual who buys a share is a member, whether a worker or not. Workers that have not supplied equity cannot be members of the WOF.

Decision-making. Workers own at least 51% of the social capital and account for at least 65% of votes at the General Assembly. The votes at the General Assembly are not proportional to the number of shares owned: the second principle of the International Cooperative

Alliance (ICA) "one person equals one vote" takes the place of the conventional principle "one action = one vote" (Art. 1 of the 1947 law). SCOPs can create shares with a preferred interest but without any voting rights. In addition, the statutes may provide that the external non-worker members or certain categories of them have a number of votes proportional to the capital they hold (Art. 3bis of the 1947 law). The General Assembly meets at least once per year to take note of the report on the firm's activity, to approve the accounts for the past financial year and to elect directors, managers, and auditors as necessary (Art. 8 of the 1947 law). The General Assembly of members in WOFs is similar to the Administration Council of CFs, i.e., the directors and managers have one vote each to make important decisions concerning the firm at the absolute majority. What differs between a WOF and a CF in the decisional organs is that the conventional Administration Council and the General Assembly are melted into what is called the General Assembly of members. In WOFs, members are entrepreneurs, directors, and capitalists (they are not investors since they loan their capital and they cannot earn money upon their capital supplied).

Profit-sharing. French WOFs must distribute their profits in three parts: (1) The "firm" part: they are legally obliged to return at least 16% of their earnings for auto-investment (15% due to legal reserves and 1% due to statutory reserves). (2) The "labor" part is distributed to all workers, whether they are members or not (minimum 25%) as long as they have worked for three months in the firm or been hired for at least six months. It is not a wage, and does not have to be the same share for all workers. (3) The "capital" part: dividends due to members whether members are workers of the firm or external investors (maximum 33%).

By comparison, profit-sharing is free in CFs such as public limited firms and limited liability firms. In SCOPs, the remuneration of the dividend is fixed to the average remuneration of obligations (about 2%). The value of each shareholder's capital is fixed at its acquisition value. No capital gain is possible when the shares are redeemed in the event of the departure of the employee shareholder (Art. 26ter of the 1978 law). Also, in the event of disposal, the capital is returned to the shareholders without any capital gain, with the possibility of revaluation indexed to inflation. In the event of net profits on liquidation (fund surplus, liquidation bonus), Article 20 of the 1978 law prohibits the distribution of these profits to members beyond their beneficiaries. It obliges the transfer of this surplus to cooperative organizations, following the sixth principle of ICA stating the cooperation between cooperatives.

Funding. The capital is variable, which means that any supplier of capital, whether worker or not, can demand that their capital invested in the firm be returned. In economic terms, the capital brought by capital suppliers is rented, that is why it does not open to a property right on the firm's returns or to a decision right at the General Assembly. French WOFs cannot use equity to increase their capital, only debt and capital renting are available as funding sources. Notably, when a public contract is awarded, a preferential right is given,

at equal prices or equivalence of tenders, to the tender submitted by a SCOP.

Fiscality. SCOPs are exempt from business tax to encourage employee entrepreneurship and benefit from a reduced corporate tax base. SCOPs are subject to corporation tax (*impôt sur les sociétés*) at the standard rate. However, the earnings are exempt from corporation tax if half of it is allocated to employees and half to reserves, following a profit-sharing agreement. SCOPs are also exempt from the local tax (*contribution économique et territoriale*).

Cooperative revision. The revision of cooperative societies and their unions was introduced by the law of July 31, 2014, relating to the social and solidarity economy. It complements the law of September 10, 1947, on the status of cooperation by inserting Article 25-1, which requires that SCOPs submit themselves, every five years when there is a statutory auditor in the firm (every year if not), to an inspection, known as the "cooperative revision," intended to verify the compliance of their organization and operation with the principles and rules of cooperation and the interests of members, as well as with the specific cooperative rules applicable to them and, if necessary, to propose corrective measures.

Groups of SCOPs. Before the 2014 law on Social and Solidarity Economy (Article 29), a SCOP was not entitled to be a majority shareholder of another SCOP for more than ten years, and a fortiori could not form a group with a parent SCOP. Now there must be at least 2 SCOPs, and the members' unanimity is required, for the entry of a new member into the group. So far, only two groups of SCOPs have been created: 1) Calice: the group was composed in May, 2016, of TPC, a cosmetics packaging SCOP near Orléans that employs 80% disabled employees, and Sefard, a conventional metal machining firm in Nogent-le-Rotrou. It is the first SCOP group with SCOPs from different sectors. It was TPC that acquired Sefard, which became a SCOP. 2) Copland: a group composed in May, 2016, of Copland and Copélec, two SCOPs in the sector of power line construction. It is the first SCOP group associating SCOPs from the same sector.

Few countries have devoted laws ruling WOFs, such as in Uruguay (Burdín, 2014), Japan (Mikami and Tanaka, 2010), the UK (Podivinsky and Stewart, 2007), and the USA (Conte and Jones, 2015), but there is no other Cooperative Code such as the one in Portugal.

2.3.3 A developed network of support agencies

A network of support agencies centered around the confederation of WOFs, called CGSCOP (*Confédération générale des sociétés coopératives et participatives*), supports the development of French WOFs by playing the role of collective bargaining, coordinating cooperative formation, providing human resource management, lending modest financial support, and lobbying for WOFs as a professional union.

At the national level, the CGSCOP provides help to WOF managers and ensures the continuous collection of data about all SCOPs even if they are not a member of the CGSCOP. It

is mostly funded by the contributions of its members (about 3,000 firms[21]). The CGSCOP provides education and training to workers on the WOF status and cooperative philosophy. In line with the sixth principle of the ICA which states the cooperation between cooperatives, the CGSCOP provides four main financial tools for WOFs: 1) it grants participatory loans (Socoden), 2) it invests in capital, participatory shares, and convertible bonds (Scopinvest), 3) it guarantees medium-term loans, working capital financing, or lease loans granted to SCOPs by *Crédit Coopératif* (Sofiscop), 4) it finances and supports innovative digital firms (CoopVenture). The allocation of funds is decided locally by the regional committee of financial enhancement (*Comités d'engagements financiers régionaux*). In addition to these tools, WOFs can benefit from devoted support funding with *Crédit Coopératif* (bank), Esfin-Ides (a fund devoted to the Social and Solidarity Economy), France Active (a fund devoted to social entrepreneurship), and a state agency for the development of territories (*Caisse des Dépôts & des Consignations*).

At the regional level, there are 13 regional agencies of the CGSCOP, called URSCOPs, spread all around the country in order to aid firms locally. They are financed mostly by the CGSCOP, which allocates a third of its funds to them. Some URSCOPs have developed financial tools to help WOFs in their regions such as Pargest in PACA (Coastline South-East) and Transmea in Rhône-Alpes (South-East).

At the sectoral level, three job federations support the development of French WOFs in specific branches of activity: construction (created in 1946), communication (created in 1949) and industry (created in 1981). The majority of their resources comes from the contributions of the members which are only WOFs.

At the international level, the CGSCOP is a member of the CICOPA and of the ICA, thus respecting the principles set by these international organizations and collaborating with them to spread information and insights on French WOFs.

The French network of support agencies is similar to that of the Italian cooperative movement (Bonin *et al.*, 1993). The network of French support agencies is less powerful than its Italian counterpart due to a much smaller population of WOFs, since there are ten times more worker-owned firms in Italy than in France. Noteworthy is the fact that few countries have a support agency devoted to WOFs, let alone a network of regional support agencies.

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[21]This number, provided by (CGSCOP, 2021), includes non-WOFs, that is SCICs (multi-stakeholder firms), CAEs (cooperatives of entrepreneurs), and other very rare forms of cooperative firms (Coop'47, SAPO).

3.   Outline and contributions

3.1.   Intended contributions to the literature

As evidenced by the literature review, many fundamental questions regarding performance of WOFs have not yet been tackled by applied economists. I intend to contribute in this field by empirically addressing the following questions in the French institutional context. How do the sunk costs of capital and of labor differently impact WOF entries and CF entries? How is the survival advantage of WOFs over CFs impacted by their resources at entry? How homogeneous is the survival performance of WOFs across their entry mode, especially between newly created WOFs and worker buyouts?

Throughout the thesis, I focus on sources of economic performance that have been neglected in the literature mainly because of the lack of adequate data, but which are significant in order to understand the rarity of WOFs in our contemporary economies.

3.2.   Overview of the Chapters

Chapter 1

I study the determinants of WOF entry. I seek to test the theoretical prediction made by Mikami and Tanaka (2010) that the likelihood of WOF entry is the highest when the sunk costs of human capital are dominant and the sunk costs of physical capital are negligible. To perform this analysis, I use a French panel data set of 4-digit sectors in manufacturing from 2012 to 2016. I use a logit model and proxies of the sunk costs of human capital and physical capital to measure their interaction effect on the prevalence of WOFs across sectors, while controlling for other determinants of WOF prevalence. The results confirm the prediction made by Mikami and Tanaka (2010). The likelihood of WOF entry increases with the difference between sunk costs of human capital and physical capital. The interaction effect between the types of sunk costs is also stronger for worker buyouts than for newly created WOFs. These results help explain the specific sectoral distribution of WOFs concentrating in light manufacturing and increasingly in services rather than in highly capitalistic industries, which is common to France, Uruguay, the UK, Italy, and Spain. The negative effect of capital intensity or sunk cost of physical capital at the sectoral level on the creation of WOFs can be understood as a first approximation of the interaction effect studied in Chapter 1. Thus, Chapter 1 refines the role of the sunk cost of physical capital as a barrier to WOF entry by highlighting its interaction with sunk cost of human capital. Chapter 1 also provides new evidence to support the conclusion of Groot and van der Linde (2017) that public policy to promote WOFs should primarily operate in the form of start-up subsidies rather than

providing permanent tax subsidies.

Chapter 2

I compare the survival patterns of WOFs and CFs and seek to answer the following three research questions. First, do survival probabilities differ between WOFs and CFs? Second, how do survival probabilities of WOFs and CFs evolve? Third, how do entrepreneur-level and firm-level resources at entry impact the survival rates of WOFs and CFs? To perform this analysis, I use a matched sample of WOFs and CFs over an observational period of 72 months. I run a cloglog model to assess the difference between WOF and CF survival probabilities and compare the impact of the entrepreneur and firm resources at entry on WOF and CF survival probabilities. The results show that WOFs survive longer than CFs whether they have different or similar entry resources. The survival advantage of WOFs over CFs is driven by systematic differences in resources at entry in the first 2 years, and then is driven by the specific governance mode of WOFs. These results show that WOFs are not rare due to the fact that they exit earlier than CFs. In fact, WOFs present a survival advantage over both unmatched and matched CFs. These results also lower the endogeneity bias at stake in the comparative analyses of WOF and CF performance. Because WOFs face specific entry barriers, as shown for instance in Chapter 1, WOFs and CFs benefit from different resources at entry. These differences cannot fully explain the survival advantage of WOFs over CFs, suggesting that the governance mode of WOFs, characterised by democratic decision-making, play a non-negligible role in their survival performance.

Chapter 3

I compare the survival patterns of WOFs distinguished by their entry mode (i.e., newly created, worker buyouts of sound conventional firms, worker buyouts of conventional firms in difficulty, or worker buyouts of nonprofit organizations). To perform this analysis, I use a panel data set of WOFs from 1989 to 2018 and run a cloglog model to assess the differences in survival probabilities between worker buyouts and newly created WOFs. The hazard of exit is 32% lower for worker buyouts of sound conventional firms than newly created WOFs, 18% lower for worker buyouts of conventional firms in difficulty, and 64% lower for worker buyouts of nonprofit organizations. The results also show that the survival advantage of worker buyouts over newly created WOFs is similar across sectors with different knowledge intensities but is lower in high capital-intensive sectors than in low capital-intensive ones. These results show that WOFs form a heterogeneous population. According to their entry mode, WOFs present different survival patterns, suggesting that each entry mode faces specific entry barriers and benefits from specific entry resources. Overall, these findings show that WOFs are composed of groups with different survival likelihoods that are obscured if one

only looks at the aggregate population. With caution, support agencies could foster worker buyouts of firms in difficulty and of nonprofit organizations as viable forms of entrepreneurship.

3.3. Analytical tools and methods from economics

This thesis draws on various analytical tools and empirical methods from economics. The general approach is micro: it focuses on individual behaviors and the allocation of scarce resources. The analysis draws on neoclassical micro-economic theory, in particular on the labor-managed firm theory (Vanek, 1970; Dow, 2018*a*).

The findings of this thesis are derived from observational data. Empirical analysis makes use of several econometric methods. The analyses in this thesis use nonlinear models to account for the prevalence of firm entries in Chapter 1, and firm survival in Chapters 2 and 3. When adequate, I systematically perform regressions with different specifications, estimations, or matching procedures to strengthen the robustness of my findings.

As a matter of internal validity, this study relies on observational data which may cast doubts on the results. Many unobserved confounding factors both at the firm- and worker-level are difficult to control for using real-world data. For instance, workers self-select into organizational forms according to their preferences and unobservable traits that might also affect firm-level outcomes. By providing controlled exogenous variation in the assignment of control rights, alternative experimental methods may allow me to make stronger causal claims but with substantial costs to external validity. Numerous robustness checks have been carried out in all three chapters.

As a matter of external validity, the approach of applied economics and the use of econometrics enables me to generalize, with caution, my findings beyond the French case. The French legal framework of WOFs shares important characteristics with other devoted legislations across the world (e.g., Spain, Italy) and the population of WOFs is significant (though minute compared to the overall population of French firms). In addition to these institutional characteristics, the quality of data on French WOFs is very good compared to other countries thanks to the close monitoring of the CGSCOP.

3.4. Data sources

The contributions of this thesis are essentially empirical, meaning that the strengths and weaknesses of the data that were used are critical to the scope of my results. The use of large panels of firm-level information including WOFs and similar CFs is rare in the empirical research on WOFs. Finding the data that were the most appropriate given my research questions has been an important aspect of the thesis. In what follows, I detail the sources of

the datasets used in the three chapters of this thesis.

3.4.1 Support agency data

The identification of WOFs in Chapters 1, 2, and 3 is made through the firm's identification number (*SIREN*) registered in the CGSCOP's records. The dataset transmitted by the CGSCOP contains, for each firm (not establishment), its identification number (*SIREN*), mode of entry, year of entry, year of exit, and for each year of existence (when data are available) the municipality where the registered office is, the number of workers, the total sales, and the number of members. The CGSCOP establishes the official list demanded by the French government and publicized in the Official Journal. This list opens rights for the firms which are granted the status of SCOPs (WOFs). This means that all firms on this list are WOFs and that all WOFs are on this list.

The use of the CGSCOP's records ensures a rigorous identification of WOFs, *sine qua non*, conditional on the construction of a matched panel of WOFs and CFs and on the conduct of an econometric analysis of their performances. Indeed, the identification of WOFs is a big issue in data collection. In most countries, a support agency of WOFs does not exist or is not able to provide reliable identification of the population of WOFs. Hence, previous empirical studies rely on hand-made or rough identification. In this respect, Chapters 1, 2, and 3 of this thesis, relying on a large panel of WOFs, display analyses of performance using one of the biggest datasets used in the economic literature on WOFs.

The use of CGSCOP's records also avoids a pitfall of misidentification due to administrative data. Identification solely by the French National Institute for Statistics (INSEE) would be biased. Indeed, the INSEE classifies all firms by their legal categories. WOFs have their own categories (i.e., "5458," "5558," "5658") but many WOFs are miscategorized, while some CFs are defined as WOFs. Such miscategorization is likely due to the lack of information on WOFs at the Business Formalities Centers (*Centres de Formalités des Entreprises*) or to negative biases against WOFs leading entrepreneurs to choose a CF even when they wanted to create a WOF. This misidentification by the INSEE is more dramatic in cases of transitions from WOFs to CFs or vice-versa. The bias has increased since the 2010s with the growing population of SCICs (multi-stakeholder firms, created by the 2001-624 law of July 17th, 2001) and of CAEs (employment and activity cooperatives, created by the 2014-856 law of July 31st, 2014) that are classified as WOFs, whereas the former does not limit its membership to workers and the latter does not concern joint activity and amounts more to cooperatives of entrepreneurs than cooperatives of workers. For instance, matching the CGSCOP list of WOFs with a list extracted from the FARE (*Fichier approché des résultats d'Esane*) dataset over the period 1997-2016 according to the legal categories of WOFs, I found that only 56% of the WOFs listed by the CGSCOP are present on the FARE list, while 87% of WOFs on the FARE list

match the CGSCOP list.

3.4.2 Administrative data

Chapters 1 require firm-level information on the entru of both WOFs and CFs. Therefore, I use the FARE (*Fichier approché des résultats d'Esane*) dataset for the period 2012-2016.[22] The FARE dataset is drawn from the annual tax documents submitted by French employers and is provided by the INSEE. In these documents, firms provide their balance sheets and detailed industry information. Because these documents are the basis for tax obligations and subject to audit, this increases our confidence in their reliability. The FARE dataset should not be used for firm demographics (the aggregate entries and exits are not reliable) but can be used to obtain detailed information on specific firms (such as WOFs), to get aggregate sectoral statistics, or to construct a representative sample of CFs. The FARE dataset is available to researchers upon application and accessed through remote computing systems where all analysis is conducted on secure servers.

In order to calculate the sunk costs of human capital in Chapter 1, I use Costinot *et al.*'s (2011) index of routineness of sectors, originally calculated from the 2007 version of the USA Occupational Information Network database, covering more than 200 occupational characteristics in about 800 tasks, which measures the importance of the worker ability of "making decisions and solving problems" at an industry-level, re-classified in order to match FARE data and the European Classification of Activities (higher values indicate higher routineness and lower sunk costs in human capital).

Chapter 2 requires firm-level information on the survival and the entrepreneur's characteristics of both WOFs and CFs. In order to increase the quality of the matched panel of firms, Chapter 2 requires me to control for the mode of entry (newly created or firm takeovers) for both WOFs and CFs. To the best of my knowledge, only the SINE (*Système d'Information sur les Nouvelles Entreprises*) database matches the requirements aforementioned. The SINE was created and is maintained by the INSEE and represents a three-wave survey addressed to the entire population of newly founded firms and firm takeovers at three points in their lifespan (at start-up and 3 and 5 years thereafter). The INSEE addresses a questionnaire to entrepreneurs/owner-managers and asks respondents to report on themselves and on their firms. More specifically, my dataset contains individual-level (e.g., demographics, the human and social capital of the entrepreneur, start-up preparation activities, motivation) as well as firm-level information (e.g., initial organizational settings, resources, financing, markets, firm development) for the entire cohorts of firms founded in 1994, 1998, 2002, 2006, 2010, and 2014. As the survey is mandatory, the response rate is very high (about 75%). In order to get the maximum of observations for WOFs, I use six cohorts (1994, 1998, 2002, 2006,

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[22](Insee, 2012, 2013*b*, 2014*b*, 2015, 2016)

2010, 2014) of the SINE database for Chapter 2.[23] Like the FARE dataset, the SINE database is available to researchers upon application and accessed through remote computing systems where all analysis is conducted on secure servers.

Chapter 3 uses only the CGSCOP's records. Therefore, the entry date, mode of entry, and exit date of each worker-owned firm is monitored by the CGSCOP. Exit comprises failure, degeneration, and closure of sound worker-owned firms, but information on the reason for exit is not available. To the best of my knowledge, only the CGSCOP's records distinguish between four entry modes of WOFs, which enables me to compare their survival performance.

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[23](Insee, 1994, 1998, 2002, 2006, 2010, 2014a)

Chapter 1

Do Sunk Costs Nip Worker-Owned Firms in the Bud?

Summary of the chapter

I analyze the interaction effect of the sunk cost of physical capital and of human capital on the entry of worker-owned firms (WOFs) and conventional firms (CFs). I estimate a logit model and use a comprehensive dataset of new French firms in manufacturing sectors with proxies of sunk costs defined at the sector level. The results show that the likelihood of WOF entry is the highest when the sunk cost of human capital is dominant while the sunk cost of physical capital is negligible, as predicted by Mikami and Tanaka (2010). The interaction effect between the types of sunk costs is stronger for worker buyouts than for newly created WOFs. These results are robust to different estimation methods and to endogeneity concerns. These results contribute to the general understanding of the rarity of WOFs in manufacturing sectors and are relevant to policy initiatives supporting cooperative modes of firm organization.

Classification

JEL Classification: J54, P12.

Keywords: sunk costs, human capital, worker-owned firms, routine, PEO.

Contents of the Chapter

1. Introduction

This article examines the conditions under which firms with different distributions of ownership rights can emerge across sectors. Our contemporary economies are dominated by conventional firms (CFs), which are controlled by their capital suppliers, while worker-owned firms (WOFs) represent a minute proportion of all firms. In WOFs, workers have the ultimate control over economic decisions (Dow, 2003) and equal influence on those decisions regardless of their individual capital contributions (one person equals one vote). This type of firm has attracted the attention of renowned economists from Karl Marx to Leon Walras and Alfred Marshall; and in the second half of the twentieth century, a vast body of literature has attempted to explain its behavior and its relative rarity among firms.

Since the seminal article of Ward (1958), WOFs' exit processes of degeneration and long-term underinvestment have been proposed as explanations for their low incidence. However, the empirical literature has provided strong evidence that exit rates of WOFs are equivalent to those of CFs (Burdín, 2014; Olsen, 2013; Pérotin, 2006), that WOFs are as productive as CFs (Fakhfakh *et al.*, 2012), and that they hardly exhibit degeneration or underinvestment processes (Dean, 2019). Another strand in the theoretical literature has also emphasized the importance of barriers to entry in explaining the observed low entry rates of WOFs. This emphasis considers how projects of creating a WOF get aborted as a result of the barriers and difficulties they face (Dow, 2018a). Mikami and Tanaka (2010) provide a theoretical model explaining the prevalence of WOFs by the relative weights of the sunk costs of human capital and of physical capital.

WOF entry refers to both newly created WOFs and to worker buyouts (i.e., WOFs converted from existing CFs, whether in difficulty or not). To analyze the effects of sunk costs on WOF entry, I use a French comprehensive dataset of firm entries in manufacturing sectors over the 5-year period of 2012 to 2016. I couple the firm-level information (i.e., ownership type, year of entry, 4-digit sector of entry) with sectoral variables calculated at the 4-digit level of NACE classification. Using a logit model, I estimate how the probability of WOF entry is impacted by sunk costs in capital and in labor (human capital), controlling for other determinants such as financing sources, size, risk, and market concentration.

The results show that the probability of WOF entry depends on the interaction effect of sunk costs of human capital and physical capital. The likelihood of WOF entry is the highest when the sunk cost of human capital is dominant while the sunk cost of physical capital is negligible, as predicted by Mikami and Tanaka (2010). The interaction effect between the types of sunk costs is also stronger for worker buyouts than for newly created WOFs. These findings contribute to the understanding of the rarity of WOF entries and confirm the theoretical predictions of Mikami and Tanaka (2010) that the likelihood of WOF entry increases

when the sunk cost of human capital increase relatively to the sunk cost of physical capital. These findings are more robust than the empirical assessment, which follows the theoretical model made by Mikami and Tanaka (2010), because of an adequate identification of WOF entries, their entry modes, and the measures of the sunk costs of both physical capital and human capital. These findings also contribute to the empirical debate on the causes that lead WOFs to concentrate in low capital-intensive sectors and provide insights regarding the issues that should be overcome by policy-makers and support agencies to foster the WOF movement.

The remainder of the article is organized as follows. Section 2. presents a review of theoretical and empirical literatures. Section 3. explains the empirical strategy. Section 4. describes the dataset and presents descriptive statistics. In Section 5., the main results are presented with robustness checks. Finally, Section 6. discusses these results and concludes.

2. Sunk costs and prevalence of WOFs: Theoretical framework and previous evidence

2.1. Mikami and Tanaka's (2010) model

Mikami and Tanaka (2010) examine comparative efficiency between CFs [1] and WOFs. To do so, the authors model the entry of a firm, whether CF or WOF, as a Bayesian signaling game between an investor and a worker with incomplete information on the probability of success (either high or low) of the entrepreneurial project. The authors also assume the existence of sunk costs, i.e., part of the resources once invested in physical capital (*m1*) and in human capital (*m2*) that may not be recoverable in the market (Williamson, 1979). A CF or a WOF is considered as efficient if it undertakes the project with high probability of success (t^{H}) and dismisses the project with low probability of success (t^{L}) in equilibrium.

In a CF, the investor is privately informed of the project's probability of success, invests in physical capital (i.e., does not use the rental market), and hires the worker at wage *w*. In a WOF, the worker is privately informed of the project's probability of success, invests in human capital (i.e., does not use the labor market), and rents the physical capital at the rental rate *r*. Thus, WOFs rely exclusively on debt while CFs rely exclusively on equity to finance themselves. The irrelevance proposition of Modigliani and Miller (1958) states that in a perfect market, the capital structure does not affect the value of a firm. Mikami and Tanaka's (2010) model introduces a market failure through asymmetric information of an adverse-selection type. Hence, the comparative efficiency analysis between WOFs and CFs

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[1] Mikami and Tanaka (2010) use the word "investor-owned firm" instead of conventional firm, but the meaning is the same.

also compares the efficiency of debt and equity financing.

In the case of the WOF, the game goes as follows. First, the worker, who is informed of the probability of success of the project, either withdraws the project or offers a rental rate $r \geq 0$ to the uninformed investor, this level of r constituting a signal of project probability of success to the investor. Second, if a rental rate r is offered, the investor either accepts or rejects the entrepreneurial project (i.e., the investor joins the WOF or the WOF is dismissed). Third, if the investor accepts the rental rate and the firm goes into production, the nature determines if the project succeeds or fails. In the case of the CF, the game can be described in a symmetrical manner with the worker accepting wage w to join the CF.[2]

Figure 1.1: Comparison of WOF and CF efficiencies, from (Mikami and Tanaka, 2010, figure 6)
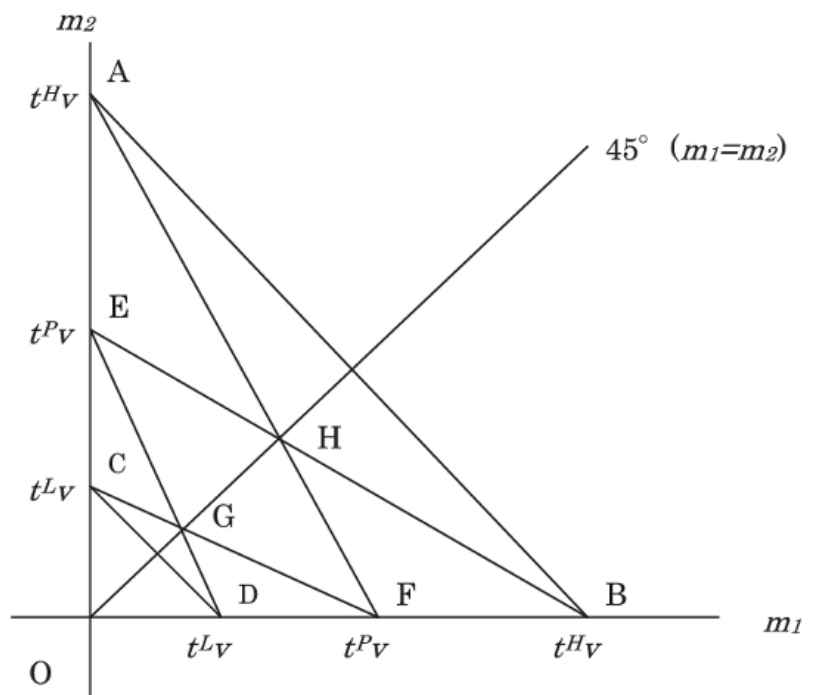
The solutions of the WOF and CF games are pure-strategy perfect Bayesian equilibria and are illustrated in Figure 1.1. The axes represent the degree of sunk costs in physical capital ($m1$) and human capital ($m2$); v is the value of the output produced by the firm for the consumer and, as assumed by the authors, this value equals the price of the output produced by the firm; $t^i v$ ($i = \mathrm{H, L}$) represents the sales of the firm weighted by the probability of success; t^P is the probability by which the uninformed player discounts their sunk cost; $t^\mathrm{P} v$ is therefore the expected income of the uninformed player (i.e., the worker in a CF case, the investor in a WOF case). DC and AB are the production possibility frontiers of the firms:

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[2]For a complete description of this game, see Mikami and Tanaka (2010, pp. 84-89).

the one that is likely to fail and the one that is likely to succeed, respectively. By construction, production occurs only in the quadrilateral ABDC. In diamond EGFH, both the WOF and CF are efficient. In triangles CGD and ABH, both the WOF and CF might be inefficient.[3] The inefficiency stems from the fact that in the triangles CEG and EAH, the WOF is efficient whereas the CF might be inefficient (in CEG, the CF might undertake the project with a low probability of success whereas in EAH, the CF might dismiss the project with a high probability of success). In a symmetrical manner, in triangles DGF and FHB, the CF is efficient and the WOF might be inefficient.

Figure 1.1 shows that if the degrees of sunk costs in physical capital and in human capital are similar ($m1 = m2$), then the WOF and CF are isomorphic in efficiency, either both inefficient or both efficient, and there is no reason for one type of firm to dominate the other. However, if the sunk cost of physical capital are negligible relative to the sunk cost of human capital, for instance if $m1 = 0$ and $m2$ is large, then the mechanism of signaling does not work well in the labor market of human capital. Indeed, a profitable CF cannot reveal its true type to the worker through a high wage since a large $m2$ already entails a large wage, and so the human capital is not provided through the labor market. On the contrary, signaling works effectively in the rental market because a negligible $m1$ enables a profitable WOF to reveal its true type to the investor through a high rental rate.

Mikami and Tanaka (2010, p. 79) summarize their main result as follows: "[It] is efficient that the input suppliers who incur large sunk costs own the firm. That is, investor ownership is efficient when the sunk cost of physical capital is dominant, whereas worker ownership is efficient when the sunk cost of human capital is dominant."

This result has theoretical similarities to Grossman and Hart (1986) and Hart and Moore (1990), who suggest that, in an incomplete contract framework, ownership over physical assets should be assigned to those who are most capable of investing in those assets. Other authors from labor-managed firm theory have proposed similar predictions (Dow, 2018*a*; Conte and Jones, 2015; Ben-Ner, 1988*b*).

2.2. Implications and previous evidence

Mikami and Tanaka's (2010) model predicts that firms tend to become conventional (or investor-owned) when they face large sunk costs of physical capital relative to human capital, and vice-versa, they tend to become worker-owned when they face large sunk costs of human capital relative to physical capital. This theoretical result has multiple implications for the distribution of WOFs in the economy at different levels of analysis (i.e., firm and sec-

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[3]The inefficiencies of WOFs and CFs only appear in the framework of a pooling equilibrium, i.e., an equilibrium where the receiver's belief is not updated after having received the signal. In a separating equilibrium, the WOFs and CFs are always efficient.

tor). I now briefly review these implications through the lens of the empirical literature on WOFs.

At the firm level, WOFs tend to become CFs as their capital requirement expands to facilitate financing.[4] There are many examples and study cases in the literature describing this mechanism, starting with the first emblematic WOF, the Rochdale Pioneers created in 1854 in Great Britain, which inspired the cooperative principles of the International Cooperative Alliance. As the Rochdale Pioneers expanded, it changed into a CF, in which, by 1860, only 200 out of 1,400 shareholders were factory workers.

The interaction effect of types of sunk costs on WOF entry also provides insights into the conversion of CFs into WOFs. Assuming that the assets resulting from the sunk cost of physical capital depreciate slower than those from the sunk cost of human capital, the ratio of sunk costs of human capital over physical capital increases along the firm's lifespan. Therefore, the likelihood that CFs become WOFs increases along their lifespan as long as the sector keeps the same technology. This mechanism might explain why a large share of WOFs in capital-intensive sectors such as manufacturing are worker buyouts rather than newly created WOFs. In France, over the period of 1989 to 2018, the share of WOFs converted from existing firms is higher in high capital-intensive sectors (36%) than in low capital-intensive sectors (26%) (cf. Chapter 3 of this thesis).[5] In the early 1980s, 80% of French WOFs were concentrated in construction and manufacturing and half of all WOFs were worker buyouts (Ben-Ner, 1988*a*). Jones (1984) also observes that throughout the XIXth and XXth centuries more than 50% of WOFs in the manufacturing sector in the USA were worker buyouts.

In addition to the lowering of the sunk cost of physical capital, the conversion of CFs into WOFs can be explained by the increasing sunk cost of human capital, which can happen in an economic crisis. Indeed, due to the increase of unemployment, some resources invested in human capital that were recoverable in the labor market are no longer recoverable. Coupled with the fact that the sunk cost of physical capital has already been paid, CFs facing difficulties are more likely to become WOFs. Ben-Ner (1988*b*) made a complementary argument stating that industrial decline and recessions increase the demand for WOFs and lower their barriers to entry due to the lower cost of purchasing capital. From 1998 to 2002, Argentina faced one of the biggest economic crises of its history with strong deflation, a recession, and an increase in unemployment. Following this crisis, there was a wave of worker buyouts (*empresas recuperadas de trabajadores*) in Argentina. Vieta (2020, pp. 118-119) shows that most of this wave of worker buyouts occurred in manufacturing

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[4]Note that this is a complementary narrative to the usual "degeneration thesis" where WOFs tend to "degenerate" into CFs as they grow because the worker-owners who founded the WOF avoid diluting control and residual rights with new workers by closing membership. The share of workers that are not members increases until worker-members form a minority, thus replicating the hierarchy of a CF.

[5]High capital-intensive sectors include manufacturing, transportation, storage, and information and communication sectors. Low intensive-sectors include construction and distribution.

and industrial sectors.[6] By 2016, manufacturing and industrial worker buyouts represented 75% (274 firms) of all worker buyouts and 74% (11,766 employees) of employment in worker buyouts.

At the sectoral level, it follows from Mikami and Tanaka's (2010) model that WOFs should display a different distribution across sectors than CFs. The absence of WOFs in the highest capitalistic sectors (e.g., aeronautics, extractive industries) can be seen as evidence that CFs are more efficient than WOFs in cases of dominant sunk costs of physical capital, even though highly capitalistic sectors often display natural monopolies hampering any new entry, whether WOF or CF.[7]

The sectoral distribution of WOFs is observed to be neither random nor similar to that of CFs, suggesting that WOFs tend to concentrate in sectors with specific characteristics that provide them with a relative efficiency advantage over CFs. Generally speaking, manufacturing firms use more physical capital than service firms do. Therefore, we could expect WOFs to concentrate in service sectors rather than manufacturing and heavy industries, according to Mikami and Tanaka's (2010) model.[8] Reviewing barriers to WOF entries, Olsen (2013) notes that the wave of WOF entries in the USA in the late 1970s occurred primarily in trading activities and social services rather than in manufacturing or natural resource-based industries, which characterized almost all WOFs in the USA prior to that time. This shift from the traditional manufacturing sectors to the service sectors in WOF entries is also observed in France (Fakhfakh *et al.*, 2022, 2012) and Uruguay (Burdín, 2014). In Italy, Pencavel *et al.* (2006) observe that WOFs are more highly represented in the construction, transport, and services sectors than elsewhere. In Portugal, from 2010 to 2012,Monteiro and Straume (2018) observe that WOFs represent about 15% of firms in manufacturing of food and beverages, as well as in the social work sector. In Spanish Basque Country, from 1995 to 2002, Arando *et al.* (2015) observe that WOF entries are overrepresented compared to CF entries in service sectors (i.e., education; health and social work; household activities; financial intermediation) but underrepresented compared to CF entries in manufacturing and construction sectors. Croce *et al.* (2018) observe that 65% of their sample of Spanish hybrid CFs-WOFs (Sociedad laborales) created before 2003 are concentrated in manufacturing, construction, and distribution.

Both WOFs and CFs can be efficient if the levels of sunk costs of human capital and of physical capital are similar and not too high.[9] In that case, the sector should comprise roughly the same number of WOFs and CFs. This might have been the case of the well-

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[6]Vieta (2020, section 2.2) provides other examples of waves of worker buyouts concentrated in manufacturing and industry around the world (e.g, Brazil, Italy, France, Spain).

[7]This situation matches the triangle FHB in Figure 1.1.

[8]This situation matches the triangle AHE in Figure 1.1.

[9]This situation matches the diamond EFGH in Figure 1.1.

known plywood sector in the Pacific Northwest (Washington state, USA) from the 1940s to the 1990s. Craig and Pencavel (1992) observe that there were 5 WOFs among the 13 firms in 1968 and 8 WOFs among the 18 firms in 1986 in the plywood sector and that the WOFs' share of plywood production was 42% in the late 1960s and almost 50% by 1986. The authors also note that during its flourishing period, the USA plywood sector was not dominated by a few large firms. Gunn (1992) depicts how the equilibrium between WOFs and CFs in the Northwest American plywood sector vanished in the 1990s due to endemic issues and evolutions, such as the progressive shift of the sector to the Southeast,[10] the rising exporting share, and a dramatic decrease of raw materials due to a US district court rule.[11]

Beyond the relative weight of the sunk costs of physical capital and human capital, previous empirical evidence shows that other factors also impact the entry of WOFs. Podivinsky and Stewart (2007) show that capital intensity and risk have negative effects on the number of WOF entries in English manufacturing sectors. On a sample of Spanish firms, Díaz-Foncea and Marcuello (2015) confirm the result of Pérotin (2006): that the degree of unemployment and the density of cooperatives have strong positive effects on WOF entries. Across regions, Díaz-Foncea and Marcuello (2015) also interpret the rise of the share of WOFs in service sectors as a problem of financing the capital requirements. In Italian manufacturing, Belloc (2017) shows that human capital specificity and workers' heterogeneity largely explain WOF entries, while, in contrast, limited worker wealth has a weaker statistical relevance.

3. Empirical strategy

3.1. Tested hypothesis

Based on Mikami and Tanaka's (2010) model, my empirical strategy attempts to test whether, at the sectoral level,[12] the effect of sunk cost of human capital on the likelihood of WOF entry depends on the level of sunk cost of physical capital, and vice-versa. Thus, the

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[10]According to Craig and Pencavel (1992), 99.8% of the USA output of plywood was manufactured in the Pacific Northwest in 1957, but by 1986 this had fallen to 37.7%.

[11]In 1991, a USA district court rule forbade sales of old-growth timber from expected spotted owl habitats in 17 national forests in the Northwest. Old-growth timber was the WOFs' most needed raw material.

[12]Testing for the implications at the firm level requires the identification of firms that have changed ownership type along their lifespan. This is not feasible in the French context and with the data sources available. In the case of CFs converted into WOFs, it is very difficult to follow them before and after their conversion because they might change their identification number. Such a change in identification number is not legally mandatory but is very often used for worker buyouts of failing CFs (see Chapter 3 of this thesis for more details). In the case of a WOF converted into a CF, the firm is likely to change identification number since French law limits the possibilities for the conversions of WOFs into CFs without closing the WOF and opening a new CF. Furthermore, there might not be enough observations to capture the interaction effect of sunk costs since few WOFs degenerate into CFs in France (i.e., 29 from 2009 to 2012 according to Magne (2016, p. 49). Furthermore, testing the effect of sunk costs at the firm level also requires a proxy of the sunk cost of human capital at the firm level which is not available in my data sources.

effect of one type of sunk cost depends on the level of the other type, leading me to assume an interaction effect between the types of sunk costs as follows:

$$P(WOF) = f(SC^L; SC^K) \tag{1.1}$$

$$\frac{\delta^2 f(SC^L; SC^K)}{\delta SC^L \delta SC^K} \neq 0 \tag{1.2}$$

where P(WOF) is the probability of WOF entry, SC^K is the degree of sunk cost of physical capital, SC^L is the degree of sunk cost of human capital, $f(.)$ is a function twice differentiable. Equation 1.2 implies that $f(.)$ displays a product term of SC^L and SC^K, i.e., an interaction effect between the two types of sunk costs. According to Mikami and Tanaka (2010), the signs of the linear terms are expected to be negative for the sunk cost of physical capital and positive for the sunk cost of human capital, meaning that the probability of WOF entry is lowered when the sunk cost of physical capital increases and higher when the sunk cost of human capital increases. The sign of the product term is expected to be negative because the effects of the two types of sunk costs are supposed to be negatively correlated.

3.2. Estimation method

As my dependent variable is a binary variable that equals 1 when the firm is a WOF and 0 if it is a CF, I estimate the following logit model:

$$P(WOF_{ijt} = 1) = f(\beta_0 + \beta_1 SC^L_j + \beta_2 SC^K_{jt} + \beta_3 (SC^L_j \times SC^K_{jt}) + \beta \gamma_{jt} + ALL_{jt}) \tag{1.3}$$

where the subscripts i refer to firms, j to sectors, t to year, WOF_{ijt} is a binary variable that equals 1 if the firm is a WOF and 0 if it is a CF, $f(x) = e^x/((1 + e^x))$ is the cumulative logistic function, β_0 is the model constant, SC^L_j is a proxy of the sunk cost of human capital, SC^K_{jt} is a proxy of the sunk cost of physical capital, β_3 is the coefficient of the interaction term between SC^K_{jt} and SC^L_j,[13] γ_{jt} is a vector of variables controlling for financial sources and other entry factors and β is the corresponding vector of parameters, and ALL_{jt} is an offset variable controlling for the size of the sector counting all existing firms (in log) for which the parameter equals 1. Equation 1.3 is estimated through the maximum likelihood estimator.

In a nonlinear model such as the logit model, the coefficient of the interaction term, the marginal effect of the interaction term, and the interaction effect are different (Ai and

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[13]The interaction term is modelled as a product of the variables.

Norton, 2003):

$$\frac{\delta^2 f(.)}{\delta(\text{SC}_j^{\text{L}}\text{SC}_{jt}^{\text{K}})} = \beta_3 f'(.) \tag{1.4}$$

$$\frac{\delta^2 f(.)}{\delta \text{SC}_j^{\text{L}} \delta \text{SC}_{jt}^{\text{K}}} = \beta_3 f'(.) + (\beta_1 + \beta_3 \text{SC}_{jt}^{\text{K}})(\beta_2 + \beta_3 \text{SC}_j^{\text{L}}) f''(.) \tag{1.5}$$

β_3 is the coefficient of the interaction term in equation 1.3. Equation 1.4 is the marginal effect of the interaction term in equation 1.3 and is defined as the derivative of the product of the interacting variables. Equation 1.5 is the interaction effect of equation 1.3 and is defined as the cross-derivative of the expected value of the dependent variable WOF_{ijt}. Equation 1.5 is clearly different from equation 1.4. This difference has many implications for interpreting the results. First, the interaction effect between the sunk costs of physical capital and of human capital might be significant even if the coefficient of the interaction term β_3 is not statistically significant from 0 at the usual thresholds. Second, the interaction effect is conditional on the independent variables. Third, the interaction effect may have different signs and significance for different values of the covariates. Following Ai and Norton (2003), I present in the result subsections 5.1., 5.2., and 5.3. the coefficient estimates of the interaction term, the marginal effect of the interaction term, and the interaction effect, respectively.

As robustness checks, I estimate 1.3 through logit models with different standard errors. I also provide in the Appendix 1.D all the estimates presented in Section 5. with 1-year lagged covariates to lower endogeneity issues. The main results remain unchanged.

4.   Data and descriptive statistics

4.1.   Data

4.1.1   Identification of firm ownership

The identification of WOFs is based on the monitoring records of the national confederation of WOFs, named CGSCOP (*Confédération Générale des SCOPs*).[14] The CGSCOP is a

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[14]The use of CGSCOP's records also avoids misidentification due to administrative data. Identification solely through the National Institute of Statistics and Economic Studies (INSEE) is biased. Indeed, the INSEE classifies all firms by their legal categories. The WOFs have their own categories (i.e., "5458," "5558," "5658,"). However, many WOFs are miscategorized, while some CFs are defined as WOFs. Such miscategorization is likely to be due to the lack of information on the WOFs at the Business Formalities Centers (*Centres de Formalités des Entreprises*). This misidentification by the INSEE is more dramatic in cases of WOFs converting into CFs, or vice-versa. The bias has increased since the 2010s with the growing population of SCICs (multistakeholder firms) and CAEs (employment and activity cooperatives) that are classified as WOFs. SCICs and CAEs should not be classified as WOFs because the former do not limit their membership to workers and the latter do not concern joint activity and amount to cooperatives of entrepreneurs more than cooperatives of workers.

nonprofit organization mandated by the French Government to provide the official list of existing WOFs every year. Only the firms registered on this list must conform to the obligations listed in special laws for WOFs and can benefit from the fiscal advantages attached to them. The CGSCOP furnishes its aid through 11 regional support agencies and through 3 sectoral agencies (information, manufacturing, and commerce). Newly created WOFs or WOFs converted from existing firms are both considered as WOF entries.

I use the identification numbers of firms (*SIREN*) to identify the WOFs in the FARE (*Fichiers approchés des enquêtes ESANE*) database. The FARE database is an administrative file containing firm-level accounting data of all French firms. Data are collected through annual profit declarations made by the firms to the tax authorities, from annual social data providing information on employees, and from a sample of enterprises surveyed using a specific questionnaire. Newly created CFs are identified on the basis of newly activated identification numbers (*SIREN*). To make sound comparisons with WOFs, which can only take the legal form of limited liability companies (*sociétés à responsabilité limitée*), public limited companies (*sociétés anonymes*), or joint-stock companies (*sociétés par actions simplifiées*), I limit the dataset to those kinds of firms.

The resulting dataset comprises 25,170 observations of new firms in 201 manufacturing sectors (4-digit NACE classification) from 2012 to 2016, among which 82 are WOF entries.

4.1.2 Variables

To estimate equation 1.3 I use the following dependent variable:

WOF_{ijt} : binary variable that equals 1 if the new firm i, in sector j, in year t is a WOF, 0 if it is a CF. The WOF entries comprise newly created WOFs and WOFs converted from existing firms. CF entries only comprise newly created CFs.

The variables measuring sunk costs are calculated at the 4-digit level sector from the FARE firm-level database and are bound to vary between 0 and 1:

$\text{SC}_{jt}^{\text{K}}$ (*Sunk costs of physical capital*): annual proportion of tangible assets devoted to machines and equipment over the total tangible assets. Land is usually considered as the most general asset, machines and equipment the most specific, and buildings somewhere between the two. Therefore, our proxy of sunk cost in physical capital amounts to capital specificity. Mikami and Tanaka (2010) use a similar proxy in their empirical assessment.

SC_{j}^{L} (*Sunk costs of human capital*): I use the index of routineness of Costinot *et al.* (2011), originally calculated from the 2007 version of the USA Occupational Information

Network database – which covers more than 200 occupational characteristics in about 800 tasks – that measures the importance of the worker ability to "make decisions and solve problems" at a sector-level, re-classified in order to match the FARE data and the NACE classification. In sectors where job routineness is higher on average, human capital specificity is lower, as production processes require more standard knowledge. Workers can then more easily switch to alternative jobs within the same sector and tend to develop less firm-specific human capital. I transformed the index of routineness of Costinot *et al.* (2011) so that high values of sunk cost of human capital equals low values of job routineness. This index does not vary over time. A similar index has been used by Belloc (2017) for studying the determinants of WOF creation, and by Oldenski (2009), Blinder (2007), and Kletzer and Jensen (2007) to study the offshorability of service or manufacturing occupations. The fact that this proxy of sunk cost of human capital is based on USA data and is time-invariant limit endogeneity issues.

Many factors other than sunk costs might impact the likelihood of WOF entries which, if not accounted for in the estimation, might bias the result. Therefore, I include year dummies to account for idiosyncratic yearly effects and the following control variables, calculated at the 4-digit level sector for each year from the FARE firm-level database:

Number of workers: natural logarithm of the number of workers at the end of the calendar year.

Capital intensity: total asset stock (in thousands of euros) divided by the number of workers.

Value added per worker: total value added before tax divided by the number of workers.

Risk: standard deviation of earnings before interest, taxes, depreciation, and amortization (EBITDA)

Market concentration: normalized Herfindahl–Hirschman index, calculated as the sum of the squared share of firm sales.

Number of firms: natural logarithm of the total number of existing firms, of which the parameter equals 1. This offset variable corrects for the size of the sectors.

One key assumption of Mikami and Tanaka's (2010) model is that WOFs can only raise external funding through debt and CFs only through equity. While it is true that WOFs only have access to debt, the assumption that CFs only have access to equity financing is hardly verified empirically. For instance, in France, WOFs do indeed only get financed through debt. The capital supplied by the worker-members give right to membership and to a so-called "dividend," which is a misnomer for interest rate on capital supplied. In French WOFs, the capital is variable (and not fixed as in most CFs), which means that any supplier of capital, whether worker or not, can demand to have their invested capital returned at any time. In economic terms, the capital brought by capital suppliers is rented, that is why it does not give access to control rights on the firm's returns or to decision-making rights at the General Assembly. In exchange of capital, the WOF issues shares, which differentiate from stocks because they cannot be sold on a market of shares (due to the absence of a membership market). In French WOFs, the remuneration of the "dividend" is fixed to the average remuneration of bonds (about 2%). The value of each shareholder's capital is fixed at its acquisition value. No capital gain is possible when the shares are redeemed in the event of the employee shareholder's departure. Also, in the event of disposal, the capital is returned to the shareholders without any capital gain, with the possibility of revaluation indexed to inflation. In the event of net profits on liquidation (fund surplus, liquidation bonus), the distribution of these surplus profits to members is prohibited. This obliges the transfer of this surplus to cooperative organizations, following the sixth principle of the International Cooperative Alliance stating the cooperation between cooperatives. Contrary to WOFs, CFs have access to multiple external sources of financing. CFs can issue stocks against equity or contract loans to increase their capital, thus violating Mikami and Tanaka's (2010) assumption of exclusive sources of financing by ownership type of firms. One implication of this violation is that the share of debt in overall financing of CFs should be higher than equity financing when the sunk cost of human capital is dominant and lower when the sunk cost of physical capital is dominant.

To control for the diverse sources of financing among WOFs and CFs, I add the following control variables, calculated at the 4-digit level sector for each year from the FARE firm-level database:

Subsidies over sales: total investment subsidies and operating subsidies divided by sales. According to Chapter 2 of this thesis, there are more WOFs than CFs receiving investment subsidies (15% against 5%) and operating subsidies (80% against 70%).

Debt-to-equity ratio: total debt divided by total equity. WOFs' equity shares amount to debt rather than equity due to the absence of membership markets whereas CFs have access

to both equity and debt as external financing sources.

Cash flow: total cash flows (*capacité d'autofinancement*). WOFs are legally obliged to allocate at least 16% (15% for legal reserves and 1% for statutory reserves) of their annual earnings to a reserve that will constitute the bulk of collectively owned capital. The reserve is used for investment. In contrast, CFs are required to retain 5% of their earnings.

By law, WOFs are exempt from local tax. This exemption lowers the wealth constraint for setting up a WOF compared to a CF. The local tax (*contribution économique et territoriale*) comprises a business tax (*contribution sur la valeur ajoutée des entreprises*) and a property tax (*cotisation foncière des entreprises*). The business tax is the rate of firms' value added paid to the local administration. It is calculated on the firm's sales (and increases with sales), up to a maximum of 0.75% of the firm's value added. Firms with less than €500,000 in annual sales are exempt from this business tax. The property tax is calculated on the firm's sales and the number of square meters used for its plants, shops, offices, etc. and is paid to the local administration. The value of a square meter depends on the local administration and the type of activity (industrial, warehousing, commercial). Due to data availability, I am not able to distinguish the property and the business shares in the local tax. Therefore, to control for the systematic discrepancy arising from the WOFs' exemption of the local tax, I add the following variables, calculated at the 4-digit level sector for each year from the FARE firm-level database:

Local tax over EBITDA: total local tax (*contribution économique et territoriale*) divided by earnings before interest, taxes, depreciation, and amortization (EBITDA).

Local tax over sales: total local tax (*contribution économique et territoriale*) divided by sales.

4.2. Descriptive statistics

WOF entries represent 0.30% of my dataset and are thus absent in most of the sectors. On average, the existing WOFs represent a minute proportion of all firms (1 for 1,000 firms) in manufacturing sectors. Tables 1.1 displays the number of sector-years, the median sunk costs of human capital and physical capital, and their ratio for each count of WOF entries. Table 1.2 displays the same variables for proportions of WOF entries. For instance, in Table 1.1, for 53 sector-years with only 1 WOF entry, the median sunk cost of human capital is 0.53, the median sunk cost of physical capital is 0.61, and their ratio equals 0.893. Table 1.1 shows that the median ratio of sunk costs is higher in sector-years counting at least one WOF

entry than in those where WOF entries are absent. Similarly, Table 1.2 shows that the median ratio of sunk costs increases with the increase of the proportion of WOF entries, except for a very high proportion (between 10% and 100%). As there are a maximum of 3 WOF entries per sector-years, a very high proportion of WOF entry means that there are few firms in the sector-year, suggesting that other factors than sunk costs might be affecting the WOF entries.

Table 1.1: Median sunk costs by number of WOF entries

Number of WOF entries	Number of sector-years	SC_j^L (median)	SC_{jt}^K (median)	SC_j^L/SC_{jt}^K (median)
0	793	0.537	0.629	0.864
1	53	0.530	0.610	0.893
2	10	0.554	0.568	0.980
3	3	0.559	0.697	0.914

Table 1.2: Median sunk costs by proportion of WOF entries

Proportion of WOF entries	Number of sector-years	SC_j^L (median)	SC_{jt}^K (median)	SC_j^L/SC_{jt}^K (median)
0	793	0.537	0.629	0.864
(0-0.01]	12	0.535	0.567	0.912
(0.01-0.1]	34	0.539	0.584	0.916
(0.1-1]	20	0.549	0.652	0.817

5. Results

5.1. Baseline estimates

Table 1.3 presents the coefficient estimates of equation 1.3 for different estimation methods. Column (1) displays the estimate of a baseline maximum-likelihood logit model with non-clustered heteroskedasticity robust standard errors. Column (2) displays the estimates of the clustered version of the Huber-White-sandwich estimator of the variance (Huber, 1967; White, 1980) allowing for within-group correlation of residuals at a 4-digit sectoral level, and thus relaxing the assumption of independence between firm-level observations. Column (3) displays the estimates of a jackknife variance estimation procedure,[15] which enables us to check whether the results are driven by outliers at a 4-digit sector level. Column

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[15]Where the original sample is divided in N sub-samples, each of them excluding the observations of a different 4-digit sector. N is the number of sector-years. The estimation of each model's parameter is computed N times, once for each sub-group, and the final parameter estimates are calculated as the average of the N parameters obtained in each regression round.

(4) displays the estimates of a non-parametric bootstrap estimation with 100 replications,[16] which enables us to check whether the results are driven by outliers at the firm level. Column (5) displays estimates from Winsorized data at the 5% and 95% thresholds minimizing the influence of outliers.

Table 1.3: Coefficient estimates of logit regressions

	(1) (Robust std. errors) Coeff.	(2) (Clustered std. errors) Coeff.	(3) (Jackknife std. errors) Coeff.	(4) (Bootstraped std. errors) Coeff.	(5) (Winsorized std. errors) Coeff.
Sunk costs of human capital (HC)	27.19**	27.19**	27.19**	27.19**	48.85***
	(11.09)	(11.27)	(11.81)	(12.55)	(15.37)
Sunk costs of physical capital (PC)	7.22	7.22	7.22	7.22	34.03**
	(10.33)	(10.03)	(11.01)	(11.26)	(13.89)
Sunk costs of HC x PC	-20.43	-20.43	-20.43	-20.43	-67.96***
	(18.37)	(18.71)	(19.41)	(19.94)	(25.42)
Number of workers (log)	3.01***	3.01***	3.01***	3.01***	2.69***
	(0.28)	(0.44)	(0.3)	(0.32)	(0.51)
Capital intensity	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***
	(0)	(0)	(0)	(0)	(0)
Value added per worker	0.03***	0.03***	0.03***	0.03***	0.02
	(0.1)	(0.1)	(0.1)	(0.1)	(0.02)
Risk	-0.08**	-0.08*	-0.08	-0.08	-0.19*
	(0.04)	(0.05)	(0.05)	(0.05)	(0.11)
Market concentration	6.55***	6.55***	6.55***	6.55***	11.17**
	(1.99)	(2.35)	(2.36)	(2.41)	(4.79)
Local tax over sales	2.36**	2.36*	2.36**	2.36**	-0.86
	(0.93)	(1.36)	(0.97)	(0.92)	(1.90)
Local tax over EBITDA	0	0	0	0	0.09***
	(0)	(0)	(0)	(0)	(0.03)
Subsidies over sales	0.64**	0.64**	0.64**	0.64	0.31
	(0.27)	(0.31)	(0.30)	(0.54)	(0.83)
Debt-to-Equity ratio	-0.34**	-0.34**	-0.34**	-0.34**	-2.07**
	(0.14)	(0.16)	(0.12)	(0.15)	(0.44)
Cash flow	-0.12	-0.12	-0.12	-0.12	0.53
	(0.18)	(0.22)	(0.21)	(0.21)	(1.06)
Number of firms (offset)	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Wald Chi2	1331.22	197.89	63.63	1180.4	1137.82
Prob.> Wald Chi2	0.00	0.00	0.00	0.00	0.00
Observations	25,170	25,170	25,170	25,170	25,170

NOTE: Standard errors in parentheses. Significant at ** 5%, *** 1% confidence levels. Dependent variable is a binary that equals 1 if the firm is a WOF, and 0 if it is a CF. Standard errors in column (2) are clustered at the 4-digit sector level. Standard errors in column (4) are bootstrapped with 100 replications. Column (5) displays estimates of Winsorized variables at the 5% and 95%.

Table 1.3 shows that the coefficient of the interaction term is negative and the coefficient of the linear term of the sunk cost of human capital is positive, as expected. Nevertheless, the

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[16]Where standard errors are produced after a random drawing of n observations from the n-observation dataset and where statistics are obtained by using the resampled dataset in each replication round.

coefficient of the interaction term is not significantly different from 0 at the usual thresholds (and even significantly negative for the Winsorized estimates), which does not entail that there is no interaction effect at play. Table 1.3 also shows that Value added per worker, Local tax over sales, and Cash flow are all associated with a positive and statistically significant parameter, while Capital intensity is associated with a negative and statistically significant parameter, as expected. Number of workers is also associated with a positive and statistically significant parameter, which contradicts Hansmann's (1996) argument that monitoring costs increase with the number of firm members, but this might be due to the large share (64.6%) of worker buyouts among WOF entries. Worker buyouts are on average bigger than newly created WOFs (cf. Chapter 3 of this thesis) and face lower entry barriers (Ben-Ner, 1988*b*).

Differences in standard errors and statistical significance are negligible across specifications, showing that my results are robust to heteroscedasticity, firm-level dependence, and outliers. The Wald Chi2 tests also lead me to reject the null hypothesis of joint non-significance of all the parameters.

5.2. Marginal effects

Table 1.4 presents the average marginal effects for different degrees of sunk costs of human capital and physical capital. Column (1) displays the marginal effects for high sunk cost of physical capital (0.8) and low sunk cost of human capital (0.2). Column (2) displays the marginal effects for average sunk cost of physical capital (0.56) and average sunk cost of human capital (0.52). Column (3) displays the marginal effects for low sunk cost of physical capital (0.2) and high sunk cost of human capital (0.8). Other specifications similar to that of Table 1.3 are provided in Appendix 1.C.

Table 1.4 shows that the interaction term of the sunk cost of physical capital is negative and is significant at the threshold of 10% in the case of low sunk cost of physical capital and high sunk cost of human capital. The marginal effects of both the linear and product terms of the interaction effect of the two types of sunk costs gain in amplitude and statistical significance as the ratio of the sunk cost of human capital over that of physical capital increases.

The marginal effect of the sunk cost of human capital is positive, and significant at the usual thresholds when equal or higher than the sunk cost of physical capital. Once its interaction with the sunk cost of physical capital is accounted for, the marginal effect of the sunk cost of human capital increases, as expected, from 0.00009 in column (1), to 0.05 in column (2), to 3.53 in column (3).[17]

The marginal effect of the sunk cost of physical capital is positive, but not significant at

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[17]Calculated as the marginal effect of the sunk cost of human capital plus the marginal effect of the interaction term weighted by the corresponding degree of the sunk cost of physical capital. For instance, in column (3): $4.159 - 3.125 * 0.2$.

the usual thresholds. Once its interaction with the sunk cost of human capital is accounted for, the marginal effect of the sunk cost of physical capital decreases, as expected, from 0.00002 in column (1), to -0.01 in column (2), to -1.40 in column (3).[18]

Table 1.4: Average marginal effects of logit regressions at the different levels of sunk costs of human and physical capital

	(1)	(2)	(3)
Sunk costs of human capital (HC)	0.000206	0.087635**	4.159024***
	(0.000340)	(0.036982)	(0.866734)
Sunk costs of physical capital (PC)	0.000055	0.023285	1.105062
	(0.000145)	(0.033390)	(1.197805)
Sunk costs of HC x PC	-0.000155	-0.065855	-3.125409*
	(0.000330)	(0.059624)	(1.795365)
Number of workers (log)	0.000023	0.009703***	0.460508***
	(0.000031)	(0.001394)	(0.173861)
Capital intensity	-0.000000	-0.000021***	-0.000999*
	(0)	(0.000008)	(0.000518)
Value added per worker	0.000000	0.000095***	0.004515**
	(0)	(0.000027)	(0.002126)
Risk	-0.000001	-0.000273**	-0.012965
	0.000001	(0.000136)	(0.009454)
Market concentration	0.000050	0.021109***	1.001791**
	(0.000068)	(0.006833)	(0.482292)
Local tax over sales	0.000018	0.007602**	0.360803*
	(0.000026)	(0.003107)	(0.188775)
Local tax over EBITDA	-0.000000	-0.000003	-0.000148
	(0)	(0.000004)	(0.000196)
Subsidies over sales	0.000005	0.002075**	0.098486*
	(0.000007)	(0.000887)	(0.057207)
Debt-to-Equity ratio	-0.000003	-0.001088**	-0.051645*
	(0.000004)	(0.000464)	(0.027554)
Cash flow	-0.000001	-0.000403	-0.019116
	(0.000002)	(0.000580)	(0.025457)
Number of firms (offset)	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Wald Chi2	1331.22	1331.22	1331.22
Prob.> Wald Chi2	0.00	0.00	0.00
Observations	25,170	25,170	25,170

NOTE: Robust standard errors in parentheses. Significant at ** 5%, *** 1% confidence levels. Dependent variable is a binary that equals 1 if the firm is a WOF, and 0 if it is a CF. Column (1) displays the marginal effects for high sunk cost of physical capital (0.8) and low sunk cost of human capital (0.2). Column (2) displays the marginal effects for average sunk cost of physical capital (0.56) and average sunk cost of human capital (0.52). Column (3) displays the marginal effects for low sunk cost of physical capital (0.2) and high sunk cost of human capital (0.8).

The marginal effect of the interaction term is hard to interpret, especially between continuous variables, since it encompasses in one number the change in the marginal effect of

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[18]Calculated as the marginal effect of the sunk cost of physical capital plus the marginal effect of the interaction term weighted by the corresponding degree of the sunk cost of human capital. For instance, in column (3): $1.105 - 3.125 * 0.8$.

one type of sunk cost due to the change in the level of the other type of sunk cost, as shown in equation 3.4. Figure 1.2 maps the marginal effect of the interaction of the sunk costs of physical and of human capital at the means of all other variables (Greene, 2010). Figure 1.2 clearly shows that for a given degree of sunk cost of physical capital, the probability of WOF entry increases with the degree of sunk cost of human capital. This is especially true for high values of sunk cost of human capital and low values of sunk cost of physical capital, as predicted by Mikami and Tanaka's (2010) model. The likelihood of WOF entry is the highest when the sunk cost of human capital is dominant while the sunk cost of physical capital is negligible (i.e., the top left quadrant of Figure 1.2). The lowest likelihood of WOF entry is when the two types of sunk costs are equal (i.e., the bisector of Figure 1.2), or when the sunk cost of physical capital is higher than the sunk cost of human capital (the bottom-right quadrant of Figure 1.2).

Figure 1.2: Choropleth maps of the interaction effect between the sunk costs of physical capital and human capital, at the average of all covariates
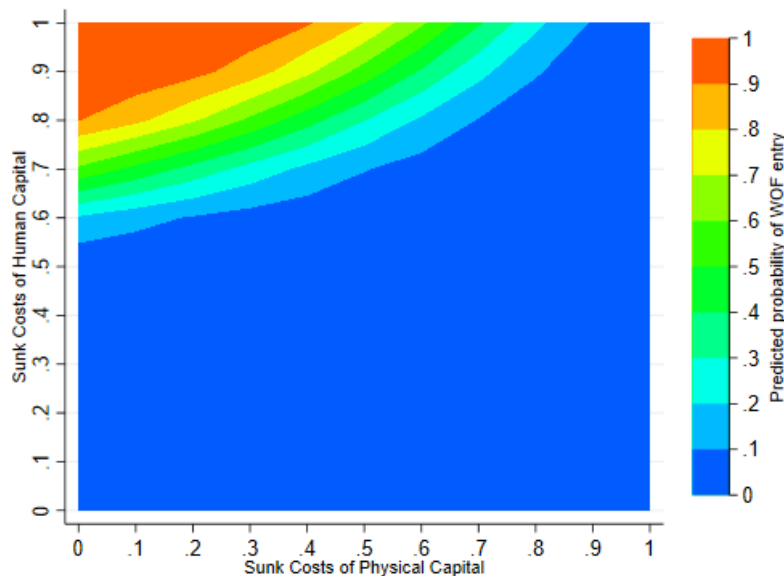
WOFs can enter the market either as newly created firms or as converted firms (i.e., worker buyouts). In my sample, worker buyouts represent 64.6% (i.e., 53 firms) of WOF entries. The effects of sunk costs might be different on the probability of newly created WOFs or on the probability of worker buyouts. Therefore, I run my main model (equation 1.3) on two subsamples. The first one compares newly created WOFs with CF entries, the second one compares worker buyouts with CF entries. Figure 1.3 maps the marginal effect of the interaction of the sunk costs of physical and of human capital at the means of all other variables for the two entry modes of WOFs. Figure 1.3 shows that the marginal effect of the interaction

term is stronger for worker buyouts than for newly created WOFs. Note that the probability of WOF entry is especially high for worker buyouts compared to newly created WOFs when the sunk cost of physical capital is relatively high (around 0.70). This result confirms the implication of Mikami and Tanaka's (2010) model that worker buyouts are more able to overcome sunk cost requirements than newly created WOFs, and as a result should represent a bigger share of WOFs in capital-intensive sectors such as manufacturing.

The difference in magnitude of the marginal interaction effect between newly created WOFs and worker buyouts is even stronger when the conditions assumed by Mikami and Tanaka (2010) are met, such as the absence of tax exemption and subsidies for WOFs, and of debt funding for CFs. Figure 1.B.1 in the Appendix presents choropleth maps of the interaction effect between the sunk costs of human capital and physical capital when these conditions are met.

Figure 1.3: Choropleth maps of the interaction effect between the sunk costs of physical capital and human capital, at the average of all covariates
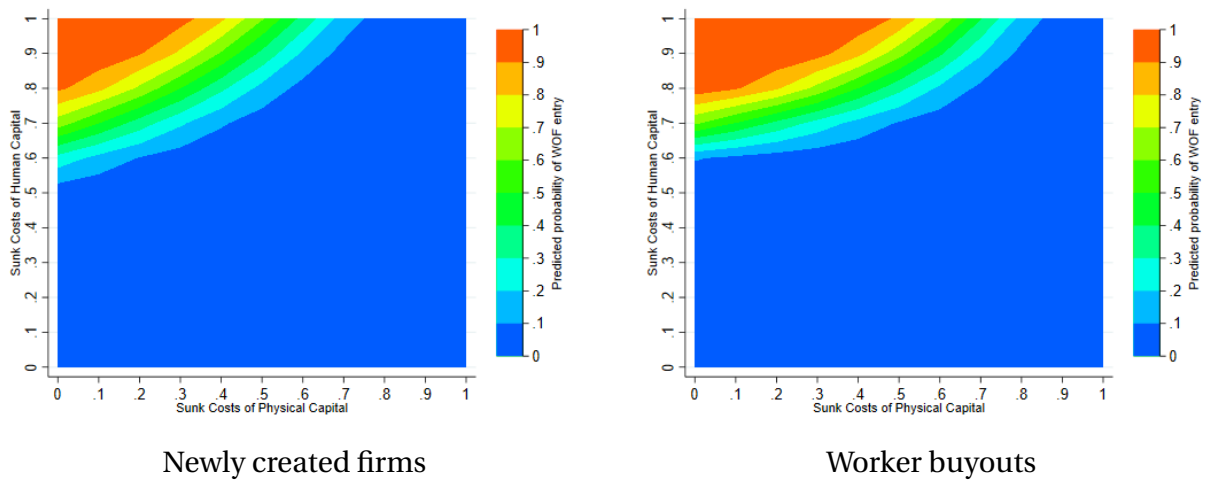

Newly created firms   Worker buyouts

5.3.   Interaction effect

In nonlinear models such as the logit, the interaction effect of two variables is not equal to the marginal effect of the interaction term of these two variables. This discrepancy might bias the results. Testing Mikami and Tanaka's (2010) prediction that the probability of WOF entry is the highest when the sunk cost of human capital is dominant and the sunk cost of physical capital is negligible, as stated in subsection 3.1., requires one to check the consistency between the marginal effect of the interaction term (equation 1.4) and the interaction effect (equation 1.5).

Figure 1.4 plots the coefficient of the interaction effect, as defined in equation 1.5, against the predicted probability of WOF entry. Figure 1.5 plots the z-statistic of the interaction effect of sunk costs against the predicted probability of WOF entry for each observation. The red lines above and below 0 represent the thresholds of 5% risk confidence intervals (+/-1.96). Figures 1.4 and 1.5 confirm that an interaction effect is at play for certain values of the sunk costs of physical and human capital.

Figure 1.4 also shows that the cloud of points is below the red line of the marginal effect of the interaction, suggesting that the marginal effect of the interaction term underestimates the negative magnitude of the interaction effect between the two types of sunk costs. Visually, this underestimation would lead the curves of Figure 1.2 to expand towards the bisector, thus reducing the darkest blue area of very low probability of WOF entry. The average value of the interaction effect is -0.258 (with a standard error of 0.15) which is about 4 times bigger than the average marginal effect of the interaction term provided in Table 1.4 (-0.066 with a standard error of 0.06).

Figure 1.4: Interaction effect between the sunk costs of physical capital and human capital as a function of the predicted probability of WOF entry
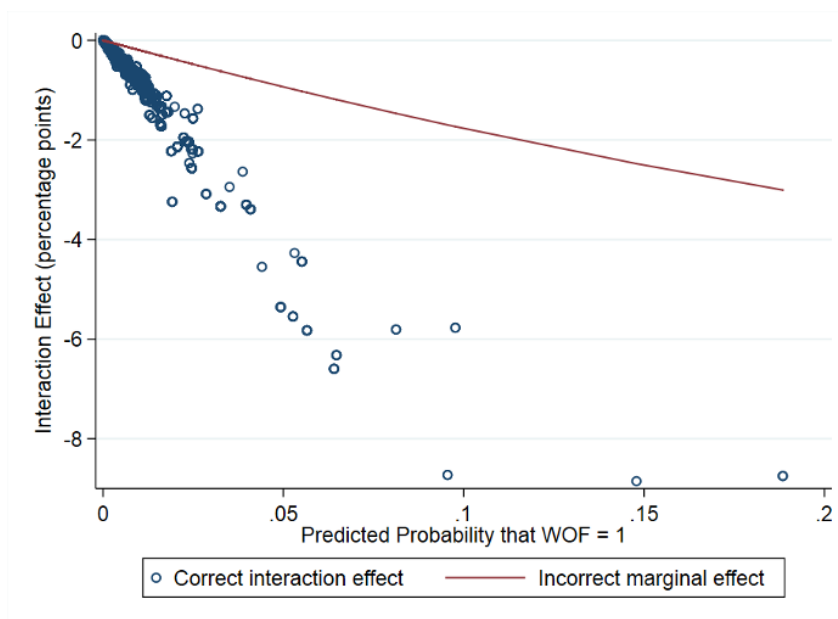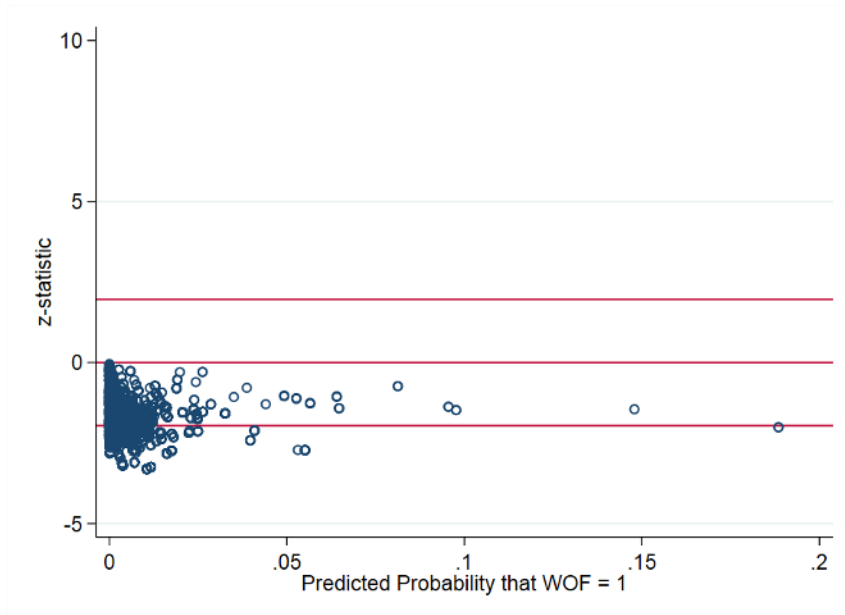
Figure 1.5: Z-statistic of the interaction effect between the sunk costs of physical capital and human capital as a function of the predicted probability of WOF entry

6. Conclusion

In this article, I studied how the sunk costs of physical and human capital impact the likelihood of WOF entry. The estimates were performed on all new firms from 2012 to 2016 in 201 manufacturing 4-digit sectors. The results show that the likelihood of WOF entry is the highest when the sunk cost of human capital is dominant while the sunk cost of physical capital is negligible. The interaction effect between the types of sunk costs is also stronger for worker buyouts than for newly created WOFs. This result confirms the relevance of Mikami and Tanaka's (2010) model comparing CF and WOF efficiencies.

It is worth noting that my results, obtained from French manufacturing firms (2012-2016), are consistent with previous evidence obtained for different years and countries: UK manufacturing firms over the period of 1981-1983 (Podivinsky and Stewart, 2007) and Italian manufacturing firms over the period of 2003-2007 (Belloc, 2017).

The limitations of this analysis force me to view the results with caution. For example, my proxy of the sunk cost of human capital does not vary over time and is calculated using USA employment data dated 2007. In the literature on job routineness, other databases such as the PIAAC or the BERUFENET databases are used to construct an index of job routineness (Mihaylov and Tijdens, 2019; Janser, 2018; Marcolin et al., 2016). These databases would enable me to construct an index of the sunk cost of human capital based on European and more recent data, thus being more likely to assess the technology at stake in France over the period studied. Another proxy besides job routineness could be used to measure the sunk

cost of human capital such as the educational level of workers. The proxy of the sunk cost of human capital used in this study is only available for manufacturing sectors, thus ignoring the development of WOFs in service sectors, which is also implied by Mikami and Tanaka's (2010) model. Future empirical work should overcome these limitations.

Appendix

1.A   Descriptive statistics

Table 1.A.1: Descriptive statistics of variables

	Mean	S.D.	Min	p5	p25	p50	p75	p90	Max	N
Proportion of WOF entries	0	0.02	0	0	0	0	0	0.01	1	25170
Sunk costs of human capital	0.52	0.06	0.33	0.47	0.48	0.49	0.55	0.6	0.69	25170
Sunk costs of physical capital	0.56	0.12	0.06	0.21	0.55	0.57	0.61	0.69	0.88	25170
Number of works (log)	1.84	0.49	0.28	1.18	1.57	1.67	2.07	2.49	6.53	25170
Capital intensity	127.47	120.48	32.27	68.05	72.11	87.88	120.57	244.65	3135.86	25170
Value added per worker	59.13	33.86	-77.18	37.05	38.69	53.11	62.58	79.97	548.99	25170
Risk	2.44	7.59	0.02	0.34	0.52	0.80	1.68	5.70	192.5	25170
Market concentration	0.037	0.074	0.001	0.003	0.006	0.008	0.034	0.084	0.835	25170
Local tax over sales	0.59	0.11	0.07	0.45	0.52	0.54	0.65	0.72	2.29	25170
Local over EBITDA	11.2	129.01	-2894.9	4.87	8.09	9.5	13.26	20.29	3624.29	25170
Subsidies over sales	0.32	0.23	-0.03	0.1	0.21	0.29	0.38	0.5	6.56	25170
Debt-to-Equity ratio	1.74	9.25	-14.18	0.8	1.22	1.64	1.99	2.22	1032.41	25170
Cash flow	246.5	1198.35	-5156.82	7.34	35.05	38.53	167.43	463.38	65341.98	25170
All existing firms	8245	9333	4	164	748	2475	20450	23251	23251	25170

Table 1.A.2: Correlation matrix of variables

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1) Proportion of WOF entries	1.00													
(2) Sunk costs of human capital	0.11*	1.00												
(3) Sunk costs of physical capital	0.06*	0.32*	1.00											
(4) Number of workers (log)	0.11*	0.05*	0.28*	1.00										
(5) Capital intensity	0.00	0.24*	0.17*	0.24*	1.00									
(6) Value added per worker	0.03*	0.26*	0.04*	0.14*	0.81*	1.00								
(7) Risk	0.02*	0.14*	-0.00	0.42*	0.39*	0.41*	1.00							
(8) Market concentration	0.01	0.08*	-0.08*	0.16*	0.53*	0.58*	0.43*	1.00						
(9) Local tax over sales	0.07*	0.41*	0.38*	0.18*	0.10*	0.10*	0.11*	0.13*	1.00					
(10) Local tax over EBITDA	-0.01	-0.01*	-0.02*	0.03*	-0.02*	0.00	-0.01	-0.01	-0.02*	1.00				
(11) Subsidies over sales	0.00	-0.03*	0.21*	0.04*	0.03*	-0.07*	-0.05*	-0.12*	0.13*	0.01	1.00			
(12) Debt-to-Equity ratio	-0.01	-0.02*	0.00	0.02*	0.01	-0.02*	0.03*	0.10*	-0.01*	0.00	-0.01	1.00		
(13) Cash flow	0.02*	0.14*	0.07*	0.40*	0.35*	0.34*	0.85*	0.27*	0.11*	0.00	-0.03*	-0.02*	1.00	
(14) All existing firms	-0.13*	-0.42*	0.08*	-0.35*	-0.32*	-0.39*	-0.20*	-0.34*	-0.36*	-0.02*	-0.02*	0.03*	-0.15*	1.00

1.B Constrained model

Figure 1.B.1: Choropleth maps of the interaction effect between the sunk costs of physical capital and human capital when Local tax over sales, Local tax over EBITDA, Subsidies over sales, Debt-to-Equity ratio are equal to 0, and at the average of all other covariates.

Newly created firms   Worker buyouts
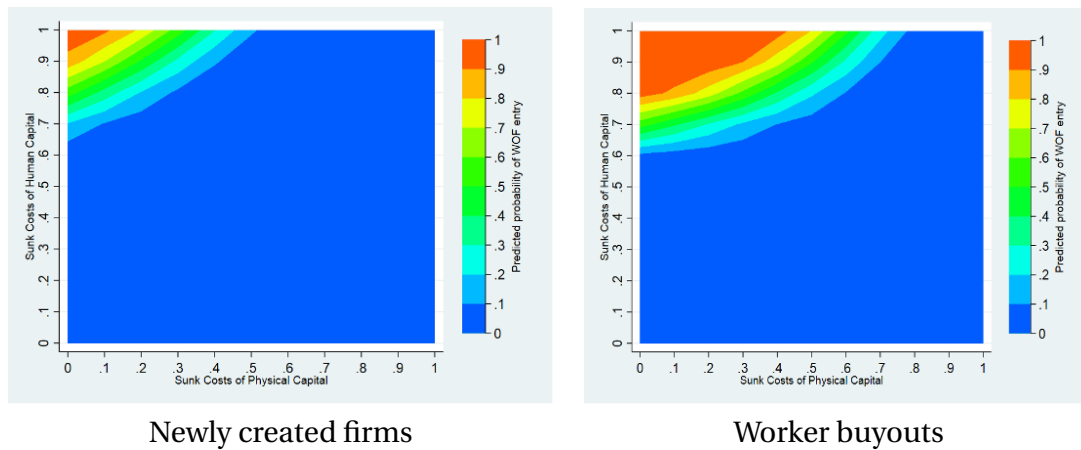
1.C   Robustness checks

Table 1.C.1: Average marginal effects of logit regressions for high sunk costs of physical capital (0.8) and low sunk costs of human capital (0.2)

	(1) (Robust std. errors) Coeff.	(2) (Clustered std. errors) Coeff.	(3) (Bootstraped std. errors) Coeff.	(4) (Winsorized std. errors) Coeff.
Sunk costs of human capital (HC)	0.000206	0.000206	0.000206	0.000339
	(11.09)	(0.000452)	(0.000380)	(0.004553)
Sunk costs of physical capital (PC)	0.000055	0.000055	0.000055	-0.0057389
	(0.000145)	(0.000171)	(0.000162)	(0.0148583)
Sunk costs of HC x PC	-0.000155	-0.000155	-0.000155	0.009157
	(0.000330)	(0.000412)	(0.000369)	(0.02568)
Number of workers (log)	0.000023	0.000023	0.000023	0.001877
	(0.000031)	(0.000045)	(0.000034)	(0.0.003742)
Capital intensity	-0.000000	-0.000000	-0.000000	-0.000003
	(0)	(0)	(0)	(0.000007)
Value added per worker	0	0	0	0.000027
	(0)	(0)	(0.1)	(0.000062)
Risk	-0.000001	-0.000001	-0.000001	-0.000184
	(0.000001)	(0.000001)	(0.000001)	(0.000401)
Market concentration	0.000050	0.000050	0.000050	0.006498
	(0.000068)	(0.000107)	(0.000079)	(0.012369)
Local tax over sales	0.000018	0.000018	0.000018	-0.000643
	(0.000026)	(0.000033)	(0.000028)	(0.00190)
Local tax over EBITDA	-0.000000	-0.000000	-0.000000	0.000006
	(0)	(0)	(0)	(0.000136)
Subsidies over sales	0.000005	0.000005	0.000005	0.000459
	(0.000007)	(0.000010)	(0.000008)	(0.00102)
Debt-to-Equity ratio	-0.000003	-0.000003	-0.000003	-0.00119
	(0.000004)	(0.000005)	(0.000004)	(0.00251)
Cash flow	-0.000001	-0.000001	-0.000001	0.000509
	(0.000002)	(0.000002)	(0.000002)	(0.001549)
Number of firms (offset)	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	25,170	25,170	25,170	25,170

NOTE: Standard errors in parentheses. Significant at ** 5%, *** 1% confidence levels. Dependent variable is a binary that equals 1 if the firm is a WOF, and 0 if it is a CF. Standard errors in column (2) are clustered at the 4-digit sector level. Standard errors in column (3) are bootstrapped with 100 replications. Column (4) displays estimates of Winsorized variables at 5% and 95%.

Table 1.C.2: Average marginal effects of logit regressions for average sunk cost of physical capital (0.56) and average sunk costs of human capital (0.52)

	(1) (Robust std. errors) Coeff.	(2) (Clustered std. errors) Coeff.	(3) (Bootstraped std. errors) Coeff.	(4) (Winsorized std. errors) Coeff.
Sunk costs of human capital (HC)	0.087635**	0.087635*	0.087635*	0.001561
	(0.036982)	(0.045284)	(0.046037)	(0.02395)
Sunk costs of physical capital (PC)	0.023285	0.023285	0.023285	-0.026415
	(0.033390)	(0.034987)	(0.040746)	(0.022862)
Sunk costs of HC x PC	-0.065855	-0.065855	-0.065855	0.042149
	(0.059624)	(0.067887)	(0.072516)	(0.04256)
Number of workers (log)	0.009703***	0.009703***	0.009703***	0.008638***
	(0.001394)	(0.002083)	(0.001627)	(0.002001)
Capital intensity	-0.000021***	-0.000021**	-0.000021**	-0.000015*
	(0.000008)	(0.000009)	(0.000009)	(0.000009)
Value added per worker	0.000095***	0.000095***	0.000095***	0.000124*
	(0.000027)	(0.000029)	(0.000036)	(0.000071)
Risk	-0.000273**	-0.000273*	-0.000273	-0.000846**
	(0.000136)	(0.000159)	(0.000190)	(0.000374)
Market concentration	0.021109***	0.021109**	0.021109**	0.029912
	(0.006833)	(0.010601)	(0.008944)	(0.01898)
Local tax over sales	0.007602**	0.007602**	0.007602*	-0.002961
	(0.003107)	(0.003827)	(0.003914)	(0.005846)
Local tax over EBITDA	-0.000003	-0.000003	-0.000003	0.000277***
	(0.000004)	(0.000002)	(0.000003)	(0.00009)
Subsidies over sales	0.002075**	0.002075*	0.002075	0.000212
	(0.000887)	(0.001069)	(0.001459)	(0.00286)
Debt-to-Equity ratio	-0.001088**	-0.001088**	-0.001088**	-0.005466***
	(0.000464)	(0.000479)	(0.000534)	(0.001415)
Cash flow	-0.000403	-0.000403	-0.000403	0.002343
	(0.000580)	(0.000680)	(0.000893)	(0.003808)
Number of firms (offset)	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	25,170	25,170	25,170	25,170

NOTE: Standard errors in parentheses. Significant at ** 5%, *** 1% confidence levels. Dependent variable is a binary that equals 1 if the firm is a WOF, and 0 if it is a CF. Standard errors in column (2) are clustered at the 4-digit sector level. Standard errors in column (3) are bootstrapped with 100 replications. Column (4) displays estimates of Winsorized variables at 5% and 95%.

Table 1.C.3: Average marginal effects of logit regressions for low sunk costs of physical capital (0.2) and high sunk costs of human capital (0.8)

	(1) (Robust std. errors) Coeff.	(2) (Clustered std. errors) Coeff.	(3) (Bootstraped std. errors) Coeff.	(4) (Winsorized std. errors) Coeff.
Sunk costs of human capital (HC)	4.159024***	4.159024***	4.159024***	0.02990
	(0.866734)	(1.304493)	(0.910123)	(0.458287)
Sunk costs of physical capital (PC)	1.105062	1.105062	1.105062	-0.505822
	(1.197805)	(1.176052)	(1.111318)	(0.865581)
Sunk costs of HC x PC	-3.125409*	-3.125409	-3.125409*	0.807105
	(1.795365)	(1.969350)	(1.682680)	(1.4206)
Number of workers (log)	0.460508***	0.460508**	0.460508***	0.165411
	(0.173861)	(0.202085)	(0.165500)	(0.1857)
Capital intensity	-0.000999*	-0.000999	-0.000999*	-0.000293
	(0.000518)	(0.000721)	(0.000516)	(0.000346)
Value added per worker	0.004515**	0.004515	0.004515**	0.002375
	(0.002126)	(0.003025)	(0.002126)	(0.002503)
Risk	-0.012965	-0.012965	-0.012965	-0.016206
	(0.009454)	(0.009571)	(0.009414)	(0.018867)
Market concentration	1.001791**	1.001791**	1.001791**	0.572792
	(0.482292)	(0.485031)	(0.460300)	(0.650501)
Local tax over sales	0.360803*	0.360803	0.360803*	-0.056610
	(0.188775)	(0.273069)	(0.197739)	(0.12463)
Local tax over EBITDA	-0.000148	-0.000148	-0.000148	0.005312
	(0.000196)	(0.000130)	(0.000154)	(0.004935)
Subsidies over sales	0.098486*	0.098486	0.098486	0.040453
	(0.057207)	(0.063997)	(0.082804)	(0.081211)
Debt-to-Equity ratio	-0.051645*	-0.051645	-0.051645*	-0.104675
	(0.027554)	(0.032776)	(0.027321)	(0.096336)
Cash flow	-0.019116	-0.019116	-0.019116	0.044870
	(0.025457)	(0.033072)	(0.029324)	(0.087971)
Number of firms (offset)	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	25,170	25,170	25,170	25,170

NOTE: Standard errors in parentheses. Significant at ** 5%, *** 1% confidence levels. Dependent variable is a binary that equals 1 if the firm is a WOF, and 0 if it is a CF. Standard errors in column (2) are clustered at the 4-digit sector level. Standard errors in column (3) are bootstrapped with 100 replications. Column (4) displays estimates of Winsorized variables at 5% and 95%.

1.D   1-year lagged estimations

Table 1.D.1: Coefficient estimates of logit regressions with 1-year lagged covariates

	(1) (Robust std. errors) Coeff.	(2) (Clustered std. errors) Coeff.	(3) (Jackknife std. errors) Coeff.	(4) (Bootstraped std. errors) Coeff.	(5) (Winsorized std. errors) Coeff.
Sunk costs of human capital (HC)	31.2***	31.2***	31.2**	31.2**	60.29***
	(11.93)	(12.11)	(12.85)	(13.56)	(14.67)
Sunk costs of physical capital (PC)	12.31	12.31	12.31	12.31	44.20***
	(12.32)	(11.14)	(12.42)	(12.48)	(13.19)
Sunk costs of HC x PC	-29.32	-29.32	-29.32	-29.32	-88.45***
	(19.67)	(20.21)	(21.42)	(22.12)	(24.42)
Number of workers (log)	2.95***	2.95***	2.95***	2.95***	2.87***
	(0.28)	(0.43)	(0.30)	(0.30)	(0.59)
Capital intensity	-0.01**	-0.01*	-0.01**	-0.01**	-0.007**
	(0)	(0)	(0)	(0)	(0.004)
Value added per worker	0.04***	0.04***	0.04***	0.04***	0.01
	(0.1)	(0.2)	(0.1)	(0.1)	(0.02)
Risk	-0.03	-0.03	-0.03	-0.03	-0.10
	(0.03)	(0.03)	(0.06)	(0.06)	(0.11)
Market concentration	2.81	2.81	2.81	2.81	12.22***
	(2.46)	(2.62)	(2.95)	(2.94)	(3.61)
Local tax over sales	3.66***	3.66**	3.66***	3.66***	1.67
	(1.01)	(1.54)	(1.11)	(1.11)	(2.12)
Local tax over EBITDA	0***	0***	0***	0	0.06**
	(0)	(0)	(0)	(0)	(0.03)
Subsidies over sales	0.91**	0.91**	0.91*	0.91	0.31
	(0.38)	(0.42)	(0.51)	(0.74)	(0.95)
Debt-to-Equity ratio	-0.02**	-0.02**	-0.02	-0.02	-1.74***
	(0.01)	(0.01)	(0.26)	(0.23)	(0.48)
Cash flow	-0.43**	-0.43**	-0.43	-0.43	-0.07
	(0.15)	(0.18)	(0.28)	(0.34)	(1.34)
Number of firms (offset)	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	20,169	20,169	20,169	20,169	20,169

NOTE: Standard errors in parentheses. Significant at ** 5%, *** 1% confidence levels. Dependent variable is a binary that equals 1 if the firm is a WOF, and 0 if it is a CF. Standard errors in column (2) are clustered at the 4-digit sector level. Standard errors in column (3) are bootstrapped with 100 replications. Column (4) displays estimates of Winsorized variables at 5% and 95%.

Table 1.D.2: Average marginal effects of logit regressions for high sunk costs of physical capital (0.8) and low sunk costs of human capital (0.2) and with 1-year lagged covariates

	(1) (Robust std. errors) Coeff.	(2) (Clustered std. errors) Coeff.	(3) (Bootstraped std. errors) Coeff.	(4) (Winsorized std. errors) Coeff.
Sunk costs of human capital (HC)	0.000768	0.000768	0.000768	-0.005268
	(0.002041)	(0.002319)	(0.002181)	(0.028665)
Sunk costs of physical capital (PC)	0.000303	0.000303	0.001040	-0.019181
	(0.000973)	(0.001082)	(0.000162)	(0.058689)
Sunk costs of HC x PC	-0.000722	-0.000722	-0.002280	0.031103
	(0.002135)	(0.002419)	(0.000369)	(0.100748)
Number of workers (log)	0.000073	0.000073	0.000073	0.004837
	(0.000169)	(0.000199)	(0.000179)	(0.011994)
Capital intensity	-0.000000	-0.000000	-0.000000	-0.000009
	(0.000001)	(0.000001)	(0.000001)	(0.000025)
Value added per worker	0.000001	0.000001	0.000001	0.000069
	(0.000002)	(0.000003)	(0.000002)	(0.000189)
Risk	-0.000001	-0.000001	-0.000001	-0.000388
	(0.000001)	(0.00000é)	(0.000002)	(0.001084)
Market concentration	0.000069	0.000069	0.000069	0.014714
	(0.000176)	(0.000219)	(0.000194)	(0.035515)
Local tax over sales	0.000069	0.000069	0.000069	0.002115
	(0.000214)	(0.000242)	(0.000229)	(0.006244)
Local tax over EBITDA	-0.000000	-0.000000	-0.000000	0.000120
	(0)	(0)	(0)	(0.000328)
Subsidies over sales	0.000023	0.000023	0.000023	0.000953
	(0.000053)	(0.000061)	(0.000051)	(0.002776)
Debt-to-Equity ratio	-0.000001	-0.000001	-0.000001	-0.002188
	(0.000001)	(0.000001)	(0.000006)	(0.005727)
Cash flow	-0.000010	-0.000010	-0.000010	0.000682
	(0.000026)	(0.000029)	(0.000028)	(0.003518)
Number of firms (offset)	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	25,170	25,170	25,170	25,170

NOTE: Standard errors in parentheses. Significant at ** 5%, *** 1% confidence levels. Dependent variable is a binary that equals 1 if the firm is a WOF, and 0 if it is a CF. Standard errors in column (2) are clustered at the 4-digit sector level. Standard errors in column (3) are bootstrapped with 100 replications. Column (4) displays estimates of Winsorized variables at 5% and 95%.

Table 1.D.3: Average marginal effects of logit regressions for average sunk costs of physical capital (0.56) and average sunk costs of human capital (0.52) and with 1-year lagged covariates

	(1) (Robust std. errors) Coeff.	(2) (Clustered std. errors) Coeff.	(3) (Bootstraped std. errors) Coeff.	(4) (Winsorized std. errors) Coeff.
Sunk costs of human capital (HC)	0.103967**	0.103967**	0.103967**	-0.010213
	(0.041685)	(0.048256)	(0.049162)	(0.030375)
Sunk costs of physical capital (PC)	0.041015	0.041015	0.041015	-0.037184
	(0.038032)	(0.040550)	(0.043552)	(0.02959)
Sunk costs of HC x PC	-0.097704	-0.097704	-0.097704	0.060296
	(0.066549)	(0.076125)	(0.078521)	(0.055715)
Number of workers (log)	0.009838***	0.009838***	0.009838***	0.009377***
	(0.001518)	(0.002215)	(0.001874)	(0.002335)
Capital intensity	-0.000028**	-0.000028**	-0.000028**	-0.000018
	(0.000012)	(0.000013)	(0.000013)	(0.000012)
Value added per worker	0.000134***	0.000134***	0.000134***	0.000134*
	(0.000039)	(0.000042)	(0.000043)	(0.000071)
Risk	-0.000089	-0.000089	-0.000089	-0.000752*
	(0.000102)	(0.000106)	(0.000195)	(0.000454)
Market concentration	0.009358	0.009358	0.009358**	0.028524*
	(0.008273)	(0.009741)	(0.011173)	(0.015111)
Local tax over sales	0.012191***	0.012191**	0.012191***	0.004101
	(0.003667)	(0.004773)	(0.004547)	(0.007043)
Local tax over EBITDA	-0.000006***	-0.000006***	-0.000006	0.000233**
	(0.000002)	(0.000002)	(0.000005)	(0.000101)
Subsidies over sales	0.003040**	0.003040**	0.003040	0.001847
	(0.001317)	(0.001443)	(0.002369)	(0.003641)
Debt-to-Equity ratio	-0.000068**	-0.000068**	-0.000068**	-0.004242***
	(0.000028)	(0.000027)	(0.000642)	(0.001595)
Cash flow	-0.001419***	-0.001419	-0.001419	0.001322
	(0.000530)	(0.000580)	(0.000763)	(0.004903)
Number of firms (offset)	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	20,169	20,169	20,169	20,169

NOTE: Standard errors in parentheses. Significant at ** 5%, *** 1% confidence levels. Dependent variable is a binary that equals 1 if the firm is a WOF, and 0 if it is a CF. Standard errors in column (2) are clustered at the 4-digit sector level. Standard errors in column (3) are bootstrapped with 100 replications. Column (4) displays estimates of Winsorized variables at 5% and 95%.

Table 1.D.4: Average marginal effects of logit regressions for low sunk costs of physical capital (0.2) and high sunk costs of human capital (0.8) and with 1-year lagged covariates

	(1) (Robust std. errors) Coeff.	(2) (Clustered std. errors) Coeff.	(3) (Bootstraped std. errors) Coeff.	(4) (Winsorized std. errors) Coeff.
Sunk costs of human capital (HC)	3.85737***	3.85737**	3.85737***	-0.209544
	(1.297124)	(1.698457)	(1.387729)	(0.655874)
Sunk costs of physical capital (PC)	1.521751*	1.521751	1.521751	-0.762944
	(0.902720)	(0.944476)	(1.005631)	(1.166118)
Sunk costs of HC x PC	-3.625005**	-3.625005**	-3.625005*	1.237143
	(1.524303)	(1.803165)	(1.727715)	(1.951710)
Number of workers (log)	0.36499**	0.36499*	0.36499**	0.192400
	(0.170090)	(0.190229)	(0.182103)	(0.196781)
Capital intensity	-0.001051*	-0.001051	-0.001051	-0.000362
	(0.000616)	(0.000834)	(0.000722)	(0.000430)
Value added per worker	0.004980**	0.004980	0.004980*	0.002740
	(0.002530)	(0.003484)	(0.002857)	(0.002568)
Risk	-0.003314	-0.003314	-0.003314	-0.015418
	(0.004671)	(0.004432)	(0.007004)	(0.018078)
Market concentration	0.347204**	0.347204	0.347204	0.58248
	(0.329788)	(0.323977)	(0.392505)	(0.615727)
Local tax over sales	0.452314**	0.452314	0.452314*	0.084136
	(0.230865)	(0.317242)	(0.244447)	(0.0168361)
Local tax over EBITDA	-0.000216*	-0.000216	-0.000216	0.004787
	(0.000122)	(0.000148)	(0.000170)	(0.003963)
Subsidies over sales	0.112796	0.112796	0.112796	0.037902
	(0.070455)	(0.082187)	(0.131868)	(0.094165)
Debt-to-Equity ratio	-0.002529*	-0.002529	-0.002529	-0.087038
	(0.001480)	(0.001661)	(0.026101)	(0.068928)
Cash flow	-0.052638**	-0.052638	-0.052638	0.027126
	(0.025013)	(0.034878)	(0.032137)	(0.004799)
Number of firms (offset)	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	20,169	20,169	20,169	20,169

NOTE: Standard errors in parentheses. Significant at ** 5%, *** 1% confidence levels. Dependent variable is a binary that equals 1 if the firm is a WOF, and 0 if it is a CF. Standard errors in column (2) are clustered at the 4-digit sector level. Standard errors in column (3) are bootstrapped with 100 replications. Column (4) displays estimates of Winsorized variables at 5% and 95%.

Figure 1.D.1: Choropleth maps of the interaction effect between the sunk costs of physical capital and human capital, at the average of all 1-year lagged covariates
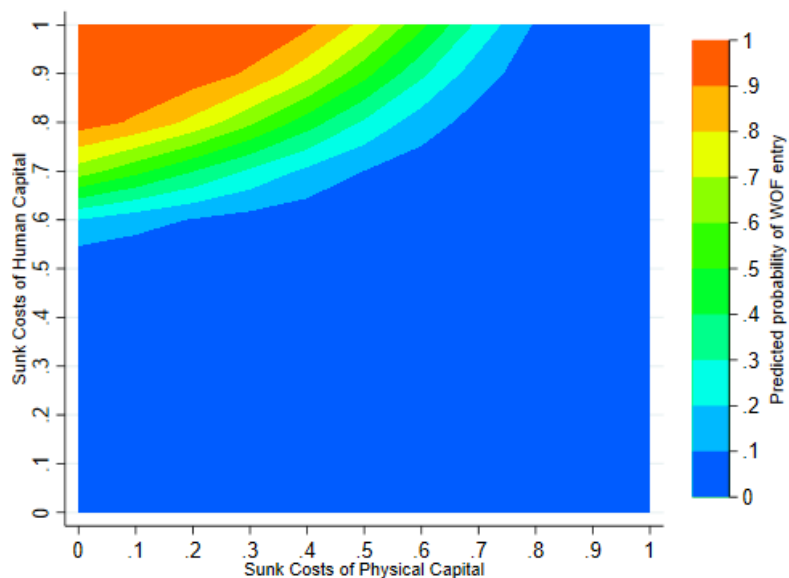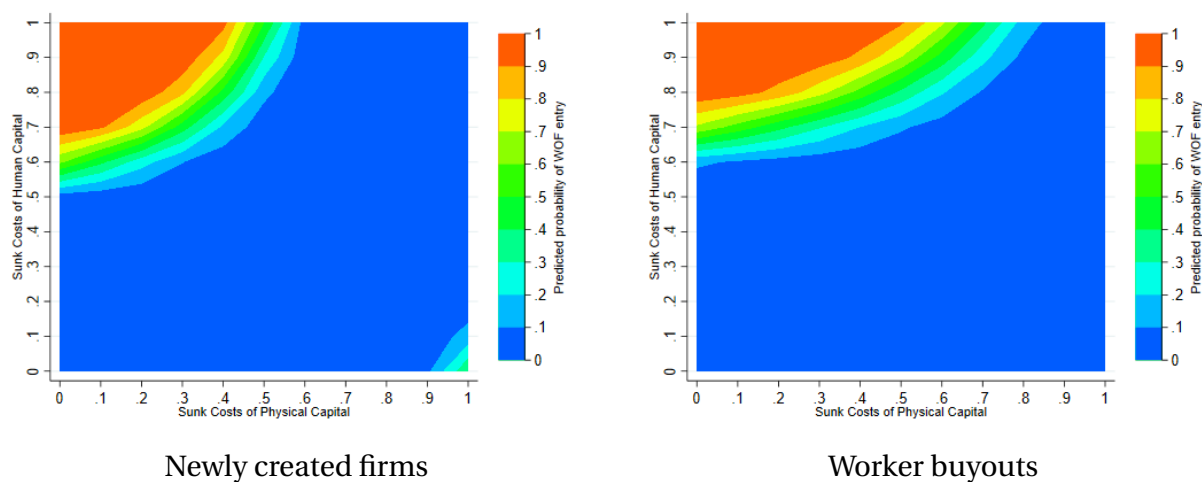

Figure 1.D.2: Choropleth maps of the interaction effect between the sunk costs of physical capital and human capital, at the average of all 1-year lagged covariates

Newly created firms   Worker buyouts

Figure 1.D.3: Choropleth maps of the interaction effect between the sunk costs of physical capital and human capital when Local tax over sales, Local tax over EBITDA, Subsidies over sales, Debt-to-Equity ratio are equal to 0, and at the average of all other covariates. All covariates are 1-year lagged

Newly created firms

Worker buyouts
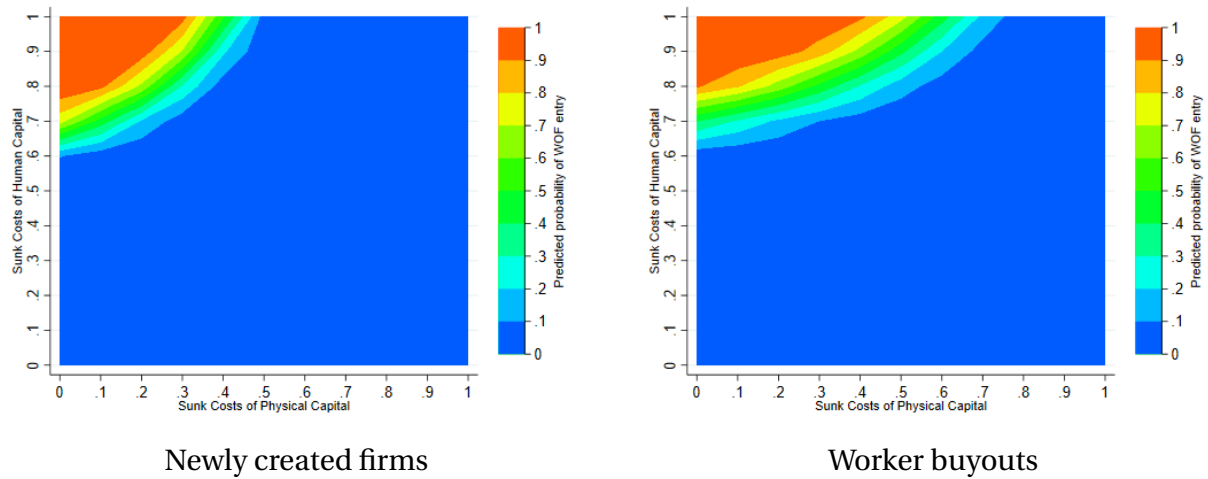
Figure 1.D.4: Interaction effect between the sunk costs of physical capital and human capital as a function of the predicted probability of WOF entry, with all covariates 1-year lagged
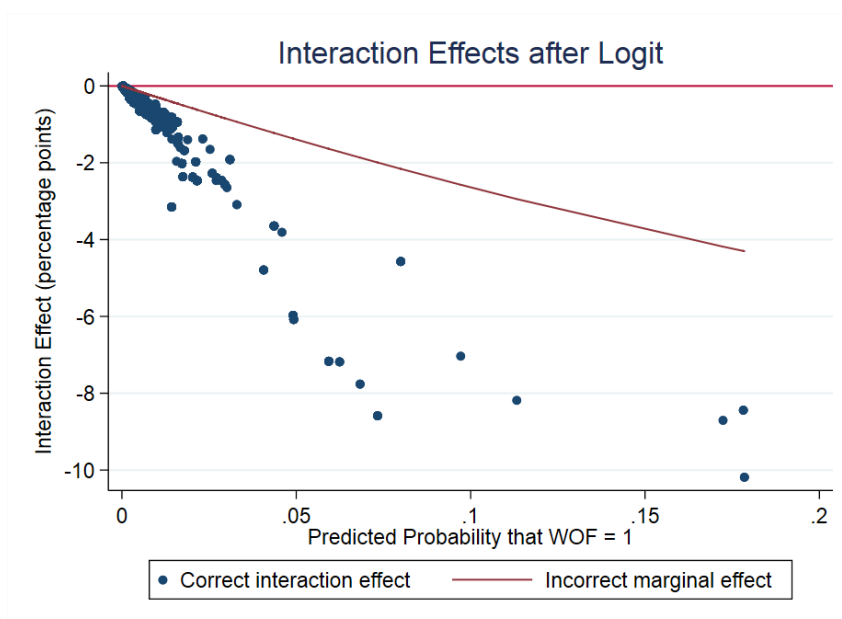
Figure 1.D.5: Z-statistic of the interaction effect between the sunk costs of physical capital and human capital as a function of the predicted probability of WOF entry, with all covariates 1-year lagged
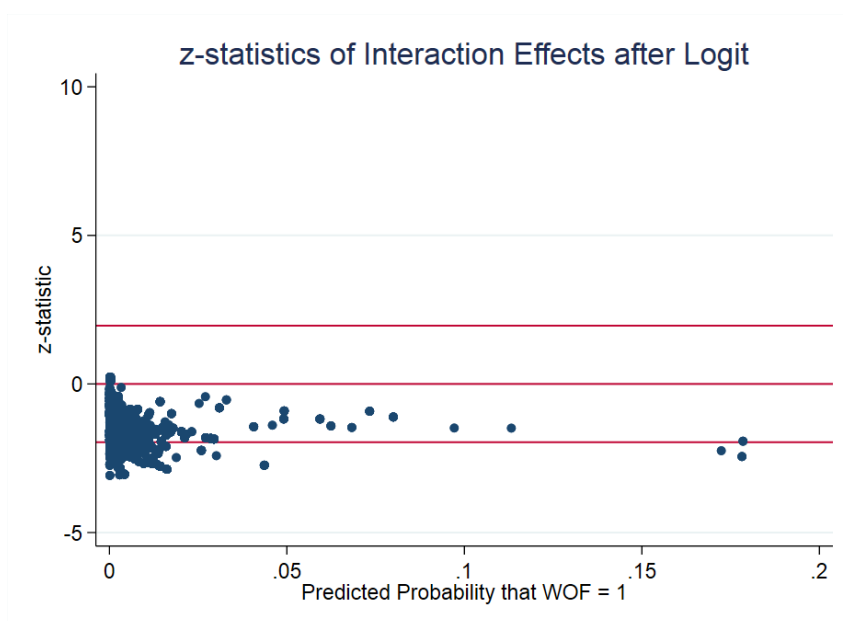
Chapter 2

Entry Resources and the Survival of Conventional and Worker-Owned Firms

Summary of the chapter

Worker-owned firms (WOFs) and conventional firms (CFs) differ by their distribution of ownership rights and their resources at entry. This article compares the survival patterns and determinants associated with WOFs and CFs. I use 6 French cohorts of WOFs and CFs and a discrete-time hazard model to study how the survival performance of WOFs and CFs are impacted by the entrepreneur's and firm's resources at entry. I find that WOFs benefit from a survival advantage over CFs which cannot be explained by systematic differences in their entry resources. I also identify differences in determinants of survival for the two groups of firms. This article contributes to the literature on the rarity of WOFs and to the relationship between entrepreneurship entry and firm survival. This article also provides details on the entrepreneur's characteristics and firm's resources at entry that have never before been studied in quantitative empirical analyses of WOFs.

Classification

JEL Classification: C41; D22; J54; P13.

Keywords: worker-owned firm, survival, resources, PEO.

Contents of the Chapter

1. Introduction

A longstanding argument to explain the rarity of worker-owned firms (WOFs) in our contemporary economies is that WOFs would disappear faster than conventional firms (CFs) due to inherent processes such as underinvestment or "degeneration." However, previous evidence shows that WOFs survive at least as long as CFs (Monteiro and Stewart, 2015; Burdín, 2014; Pérotin, 2006). A more recent explanation of the rarity of WOFs stresses that entry barriers specific to WOFs, rather than exit processes, lower their prevalence. Empirical evidence supports this explanation, showing the negative impact of higher wealth constraints, public good financing, or risk-aversion on the prevalence of WOFs (Belloc, 2017; Conte and Jones, 2015). Empirical and theoretical literatures also suggest that WOFs tend to self-select sectors where they benefit from a competitive advantage over CFs (Dow, 2018a; Podivinsky and Stewart, 2007). Considering that WOFs are subject to higher barriers to entry than CFs, self-selection bias or endogeneity is at stake in the empirical analysis of their economic performance. The endogeneity of WOF prevalence casts doubts on the reason for the absence of survival disadvantage over CFs, whether resulting from higher resources at entry and favorable economic environments or from specific behaviors along their lifespans. The survival performance of WOFs might be similar to that of CFs either because WOFs are systematically different from CFs in terms of resources at entry, or because of their democratic mode of governance in which each member has one vote independently of the capital supplied to the firm.

To clear up this doubt, this article offers a comparison of the survival patterns of WOFs and CFs and seeks to answer the following three research questions. First, do survival probabilities differ between WOFs and CFs? Second, how do survival probabilities of WOFs and CFs evolve? Third, how do entrepreneur-level and firm-level resources at entry impact the survival rates of WOFs and CFs?

To answer these questions, I analyze a sample comprising 6 representative cohorts of WOFs and CFs in France over an observational period of 72 months each. I use a one-to-one propensity score matching to construct the sample. I use a discrete-time hazard model to study how the survival performance of WOFs and CFs are impacted by the entrepreneur's and firm's resources at entry. To the best of my knowledge, this article provides details on the entrepreneur's characteristics at entry that have never before been studied in quantitative empirical analyses of WOFs, thus lowering the omitted variable bias and endogeneity issues. Out of 64 empirical articles studying the survival of WOFs published between 1970 and 2019, only one article (Burdín, 2014) uses a monthly firm-level dataset (Mirabel, 2021).

The French cooperative movement is a particularly well-suited case for studying the survival of WOFs. The movement has had a continuous presence since its inception in the

mid-XIXth century and individual worker cooperatives (*sociétés coopératives de production or SCOPs*) often show remarkable longevity. The oldest WOF in 2018 was founded in 1882; and 13 WOFs created before the first World War were still in operation in 2018. Two of the five largest WOFs still operating in 2018 were created between the two World Wars (Fakhfakh *et al.*, 2022). This record may be due to the fact that WOFs, like Italian and Spanish cooperatives, are immune to the main exit processes identified in the theoretical literature, namely, self-extinction by underinvestment in the long-term and degeneration into CFs.[1] Yet, WOFs represent a minute proportion of all French firms, with 2,294 firms in 2018 employing around 55,000 people out of a total of some 2.5 million firms in France.

The findings of this article provide new stylized facts on WOF survival. First, I find that WOFs have higher survival probabilities than CFs. The risk of exit for WOFs is 34% smaller than that of CFs for the unmatched sample, and 50% less on the matched sample on resources at entry. Thus, WOFs benefit from a survival advantage over CFs which cannot be explained by systematic differences in entry resources. Second, differences in survival probabilities between WOFs and CFs strengthen over time. This result suggests that the survival advantage of WOFs over CFs increases along the firm's lifespan. Third, I find that most resources at entry affect WOFs and CFs survival probabilities similarly. However, some differences exist. While the exit risk of CFs is negatively associated with highly educated, part-time entrepreneurs and firms planning to hire new employees, these characteristics do not significantly impact WOF survival at the usual thresholds. On the contrary, entrepreneurs aged over 50 or that have received entrepreneurial training decrease the risk exit of WOFs, while WOFs with more than 10 employees at entry are associated with a higher exit risk than those with no employees. These characteristics have no significant effect on matched CFs. To check the robustness of these findings, I use alternative matching procedures and alternative estimation methods controlling for the violation of the proportional hazards assumption. The main results remain unchanged.

The remainder of this article is structured as follows. Section 2. discusses how systematic differences in resources at entry between WOFs and CFs might lead to expected differences in their survival patterns. Section 3. introduces my data source, sample, and method. Section 4. details the variables. Section 5. and 6. present my results and robustness checks, respectively. Section 7. draws conclusions.

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[1]French WOFs are immune to the underinvestment issue because at least 16% of a WOFs' annual profit has to be allocated to a reserve that will constitute the bulk of collectively owned capital (Fakhfakh *et al.*, 2022). A negligible fraction of WOF exits can be explained by degeneration or mergers. For instance, Magne (2016, p. 49) counts only 29 French WOFs degenerating into CFs over the period of 2009 to 2012. French law also limits the possibilities for the conversions of WOFs into CFs without closing the WOF and opening a new CF.

2. Ownership, resources at entry, and survival: A brief literature review

In what follows, I briefly discuss how WOFs and CFs differ in ownership rights and in entrepreneur and firm resources at entry, and what these differences imply for their survival. Table 2.1 summarizes my main arguments.

2.1. Firm ownership

A clear distinction can be drawn between WOFs and CFs on their distribution of ownership rights. WOFs are owned mostly by workers (i.e., suppliers of labor) whereas CFs are owned mostly by investors (i.e., suppliers of capital). By ownership rights, I refer to the right to control the firm (decision-making) and the right to receive the firm's residual earnings (profit-sharing). I now detail the French case.

Concerning the right to control the firm, in French WOFs, workers must own at least 51% of the social capital and represent at least 65% of votes at the general assembly. The votes at the general assembly are not proportional to the number of shares owned: the cooperative rule "one person equals one vote" replaces the conventional rule "one action equals one vote." The general assembly meets at least once per year to take note of the report on the firm's activity, to approve the accounts for the past financial year, and to elect directors, managers, and auditors as necessary. In exceptional cases, French WOFs may decide that external non-worker members, or certain categories of them, have a number of votes proportional to the capital they supplied. However, CGSCOP (2021) suggests this is a rare occurence in French WOFs.

Concerning the right to receive the firm's residual earnings, French WOFs must distribute their profits in three parts. First, the "firm part" constitutes collectively owned capital for reinvestment. This must be at least 16% of firm earnings, but in practice this part receives 43% on average (CGSCOP, 2021). Second, the "labor part" is distributed to all workers regardless of whether they are members of the firm or not, as long as they have worked in the firm for three months or have been hired within the previous six months. This must be equal to at least 25% of firm earnings, but in practice this part receives 40% on average (CGSCOP, 2021). It is not a wage, and the share does not have to be the same for all workers. Third, the "capital part" comprises dividends that are due to members, whether these members are workers of the firm or external investors. This can be a maximum of 33% of firm earnings, but in practice this part receives 17% on average (CGSCOP, 2021). The remuneration of the dividend is fixed to the average remuneration of obligations (about 2%). The value of each shareholder's capital is fixed at its acquisition value. No capital gain is possible when the

shares are redeemed in the event of the departure of the employee shareholder. By comparison, in CFs, the profit-sharing is free and the remuneration of the dividend is voted on at the Administration Council.

While WOFs and CFs can be seen as the two opposite ends of a spectrum of employee ownership, there are some hybrid firms, i.e., CFs that have voluntarily implemented a high level of worker participation or profit-sharing schemes. In France, most of these types of hybrid firms are listed firms (Fakhfakh *et al.*, 2022). Indeed, 75% of French listed firms have employee profit-sharing schemes, while only 4% of small and medium-sized firms do (FAS, 2021). Because non-listed firms that have employee profit-sharing schemes represent such a small percentage, they are unlikely to affect the results of my comparative analysis.

2.2. Entrepreneur resources at entry

Due to their different distribution of ownership rights, WOFs and CFs might display systematic differences in entrepreneur resources at entry concerning sociodemographic status, risk aversion, and entrepreneurial skills. The entrepreneur is used here as a proxy of the firm's founders at entry. In CFs, the group of founders is composed mostly of investors. In WOFs, the group of founders is composed mostly of workers. Note that for both WOFs and CFs, the founding group of the firm, when it comprises more than a few individuals, is supported by a leader. This might be counterintuitive for WOFs which are expected to be collective entrepreneurship, but study cases show the importance of one or more leaders, whether WOFs are newly created or worker buyouts (Brown and Quarter, 1994; Barbot-Grizzo *et al.*, 2013).

The founding group of a WOF is likely to be more heterogeneous than that of a CF. While capital suppliers unanimously support the maximization of profit, workers may have widely different attitudes toward effort, investment decisions, wage levels, job security, and workplace amenities. These different attitudes among workers might result from differences in age, experience, skill, and commitment to the firm. Hansmann (1996) pointed out that collective decision-making costs increase with the heterogeneity of the decision-making group. Compared with CFs, WOFs may face higher costs of collective decision making associated with democratic governance. Two ways to lower this organizational cost is to hire workers with similar characteristics or for the founding group to have similar characteristics (Dow, 2018*a*). Notably, investors in CFs may have different time horizons, which may also result in collective decision-making problems regarding investment in capitalist firms (Pencavel, 2013).

The founding group of a WOF is likely to be more risk-averse than that of a CF. Members of WOFs must supply financial resources as well as labor and, hence, invest their savings in an asset of which the returns are highly correlated with the returns on their human capital. However, this would be incompatible with the desire of risk-averse workers to maintain a

diversified financial portfolio (Dow and Putterman, 2000). Members of WOFs could also demand a higher return on earnings as compensation for the lack of portfolio diversification.

The founding group of a WOF is likely to have less entrepreneurial skills than of a CF (Dow, 2018a). A highly skilled entrepreneur has higher incentives to create a CF than a WOF. First, because they can appropriate a bigger share of profit in a CF. Second, because they might be underpaid in a WOF. WOFs present lower wage spread, especially upwards, due to the egalitarian culture (Magne, 2017).

2.3. Firm resources at entry

Due to their different distribution of ownership rights, WOFs and CFs might display systematic differences in firm resources at entry concerning financing, size, and entry mode. At entry, WOFs are more likely to be financed through debt than CFs.[2] The only equity available to WOFs comes from worker-members, who often face wealth constraints (Mikami and Tanaka, 2010). Thus, the personal wealth that could be used as collateral will be more limited in WOFs than in CFs (Conte and Jones, 2015; Bowles and Gintis, 1994). WOFs also suffer from negative bias from bankers that increase the barrier to debt financing (Ben-Ner, 1988b). WOFs might therefore be underfunded during their first years. The concentration of WOFs in low capital-intensive sectors where sunk costs are low is often seen as evidence of these financing difficulties. The subsequent overaccumulation of capital in French WOFs observed by Estrin and Jones (1992) is interpreted as compensatory for the underaccumulation of capital in the first years and as a security net for further investments. WOFs might also receive more aid than CFs due to the role of support agencies (Dickstein, 1988). Support agencies devoted to WOFs can provide financial aid directly through investment funds devoted to cooperatives, which is funded by membership fees and the surplus made when a cooperative is sold. They also play the role of counsel for defining the legal status, and education for initiating the entrepreneurs and all stakeholders into the worker-owned mode of governance. They can also provide aid to WOFs indirectly by fostering more trust from banks and external investors.

Concerning size, measured by the number of workers, WOFs are expected to be bigger than CFs at entry. WOFs are collective entrepreneurial projects that require several workers to gather whereas CFs can be created by one or two associates and progressively expand in size. The more members found the firm, the more the risk is shared. If one assumes

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[2]Strictly speaking, French WOFs can only be financed through debt, not equity. Indeed, in France, the membership right paid by the worker-member (share) is a debt rather than an equity since the sale of this membership right is forbidden, and it is redeemed at its nominal value when the worker leaves the firm (with an interest rate that cannot exceed the average interest rate of French bonds). Thus, when they leave the firm, the worker-members recover their principal plus an interest rate, instead of selling the share at its market value as is the case with equities.

that workers have higher wealth constraints than investors, then, for a given level of capital requirement at entry, WOFs are expected to be founded by more members (workers) than CFs (investors) in order to meet the capital requirement at entry.

The size difference between WOFs and CFs at entry is likely to be reinforced by the expected systematic difference in entry modes between the two. The share of converted firms is expected to be higher among WOFs than CFs. In cases of recessionary periods or industrial decline, as the risk of failure of CFs grows, the likelihood of worker buyouts increases.

2.4. Expected differences in survival

The differences in the characteristics of the founding group at entry should hamper the survival of WOFs compared to that of CFs. The heterogeneity of the founding group increases the cost of decision-making which might lead to suboptimal investment decisions, weakening the firm. Risk-aversion lowers the survival of firms by adverse selection of innovative projects. There is also empirical support for the idea that the presence of skilled labor has a positive and significant effect on firm survival (Geroski *et al.*, 2010; Mata and Portugal, 2002; Gimeno *et al.*, 1997). The inability of WOFs to retain skilled labor may negatively affect their survival chances compared to CFs.

On the contrary, the differences in the firm resources at entry have a positive expected effect on the survival of WOFs compared to CFs. Despite the lack of access to equity that should cause a survival disadvantage for WOFs compared to CFs by limiting available financing sources, the remaining systematic differences in firm resources at entry should increase WOFs survival probabilities. The aid received by devoted support agencies is expected to increase the survival advantage of WOFs over CFs by providing financial and entrepreneurial resources, which could partially counterbalance the negative expected effect of entrepreneur resources at entry. A higher number of workers provides more direct resources which enables the firm to quickly reach increasing returns of scale in the short term. Workers in WOFs are also likely to be motivated differently than those of CFs, for instance, by having a higher psychological commitment to the firm that turns into productivity gains (Pérotin, 2012). Converted firms, whether WOFs (see Chapter 3 of this thesis) or CFs (Xi *et al.*, 2020), survive longer on average than newly created firms. The higher percentage of converted firms among WOFs than among CFs would provide the former with a survival advantage over the latter.

Table 2.1: Differences between WOFs and CFs

Resources at entry	Worker-Owned Firms	Conventional Firms	Expected effect on survival
Entrepreneur	• heterogeneous preferences	• homogeneous preferences	-
	• risk-adverse	• risk-lover	-
	• low entrepreneurial skills	• high entrepreneurial skills	-
Firm	• no access to equity	• access to equity	-
	• devoted support agency	• no devoted support agency	+
	• high number of workers	• low number of workers	+
	• high share of worker buyouts	• low share of worker buyouts	+

NOTE: *Positive (negative) signs in the column of the expected effects on survival means that the corresponding differences in resources are expected to provide a survival advantage (disadvantage) to WOFs over CFs.

3. Data and method

3.1. Data source and sample

To create my sample of WOFs and CFs, I use six cohorts (1994, 1998, 2002, 2006, 2010, 2014) from the French database SINE (*Système d'Information sur les Nouvelles Entreprises*). The SINE database was created and is maintained by the French National Institute of Statistics and Economic Studies (INSEE, *Institut National de la Statistique et des Études Économiques*) and results from a three-wave survey addressed to firms created in the first half of the year (they are surveyed at start-up and again 3 and 5 years thereafter). The INSEE addressed the survey to entrepreneurs/owner-managers and asked respondents to report on themselves and on their firms. More specifically, my dataset contains entrepreneur-level (e.g., demographics, the human and social capital of the entrepreneur, start-up preparation activities, motivation) as well as firm-level information (e.g., initial organizational settings, resources, financing, markets, firm development) for the entire cohorts of firms founded in 1994, 1998, 2002, 2006, 2010, and 2014. As the survey is mandatory, the response rate is very high, about 75% (cf. Table 2.A.1 in the Appendix).

The WOF cohorts sampled comprise about 19% of all WOFs in the same cohorts and their sectoral distribution is representative of all WOFs (cf. Tables 2.A.2 and 2.A.3 in the Appendix). According to their mode of governance, firms' entries display different evolutions (cf. Figure 2.A.1 in the Appendix), of which all cohorts studied (1994, 1998, 2002, 2006, 2010, 2014) are representative.

In the final sample, there are 101,850 CFs and 181 WOFs. As the average number of monthly records per firm is 51.73, the total number of firm-month observations for CFs is 5,594,371 and 10,766 for WOFs.

3.2. Identification

I identify the WOFs thanks to the CGSCOP's records. The CGSCOP is the national support agency of WOFs in France, mandated by the French government to establish the official list of WOFs and to monitor the worker-owned firm movement. Only the firms registered in this list can be considered as WOFs and must respect the laws specific to WOFs. The CGSCOP's records provide the nine-digit registration number, mode of entry, year of entry, and sector of entry (5-digit level) for each WOF. Merging the CGSCOP's records with the SINE databases, I am able to check the consistency of the CGSCOP's records. Appendix 2.C discusses another identification procedure through legal categories of ownership status.

3.3. Matching procedure

Matching is a nonparametric method of preprocessing data to control for some or all of the potentially confounding influence of pretreatment control variables by reducing imbalance between the treated and control groups. The matching procedure consists of estimating the likelihood to receive treatment (here, being a WOF) for both WOFs and CFs in my analysis sample, based on observable resources at entry. The estimated propensity score is used to match a CF group with the same likelihood of being WOF as WOFs. Specifically, I use a one-to-one propensity score matching procedure without replacement conditioned on observable resources at entry. The matching procedure is augmented with a common support restriction to ensure an overlap between the groups.

As a robustness check, I re-estimate the probability of *WOF* with the matched sample to ensure that any observable entry resources do not explain the probability of *WOF*. Table 2.D.1 in the Appendix reports the estimated logit specification before and after matching. Any entry resources are statistically not significant on the matched sample with a Pseudo-R2 drastically reduced from 0.14 to 0.03. Therefore, entry resources are well balanced, and the treatment *WOF* is randomized conditionally to the set of entry resources. For robustness checks, I also use a one-to-three PSM and a Mahalanobis distance matching procedures, the results of which are discussed in Section 6.2..

3.4. Discrete-time hazard model

Firm entry and exit could occur at any time of the year. However, my dataset only includes the month and year of firm entry and exit, not the exact day. As a result, firm survival time is discrete, varying between 1 and 72 months. Hence, I perform a complementary log-log (cloglog) model to compare the survival probabilities and the survival determinants of WOFs and CFs. A binary choice model using a cloglog link function with time-specific in-

tercepts is the exact discrete-time analog of the continuous-time Cox proportional hazards model (Hess and Persson, 2011). Thus, the cloglog model assumes that the impact of a regressor on survival is the same regardless of firm age and proportional shift of the baseline hazard function common to all survival spells. The cloglog models are estimated by maximum likelihood. To perform discrete-time regression, I expand the dataset from firm level to firm-month level. That way, the number of observations over a 6-year lifespan increases from 102,031 to 5,605,137. For robustness checks, I use alternative estimation methods such as a logit and a stratified Cox model, the results of which are described in Section 6.1. and provided in Appendix 2.D.

4. Variables

4.1. Dependent variable

Survival months and response variable: The information used to identify "birth" (creation of a new legal entity or acquisition) and "death" (cessation) stems from two original variables provided by the INSEE: (i) the date of creation/acquisition as a code month_year and (ii) the date of cessation as a code month_year. I define a firm's survival time as the number of months running from its creation or acquisition to its cessation. The data are right-censored, as many firms were still active when the last survey was conducted. Next, to conduct a discrete-time analysis, I code a response variable which equals 0 at month t if the firm is active and 1 if the firm exits at month t. Unfortunately, due to data security concerns, I am unable to determine whether a firm exits for liquidation or individual reasons.

4.2. Entrepreneur-level variables

Both entrepreneur- and firm-level variables are considered in investigating the survival determinants of WOFs and CFs. Information on sectors and firm locations was drawn from the SIRENE firm register (part of the SINE dataset).[3] All other variables are constructed based on self-reported answers collected by the INSEE. Despite the fact that the SINE survey is consistently distributed every four years, all variables and modalities were not available for all cohorts.

Sociodemographic status: I include the entrepreneur's age (*under 35, between 35 and 49, over 50*), gender (1 for *Male* and 0 for *Female*), and nationality (1 for *French* and 0 for *other nationalities*) in the model to analyze an entrepreneur's sociodemographic impact on firm survival. The entrepreneur's educational level is expected to be higher in CFs than in WOFs.

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[3]Administered by INSEE, the SIRENE (*Système informatisé du répertoire national des entreprises et des établissements*) is the official file registering all French firms.

Thus, I include the highest level of diploma achieved preceding entrepreneurship through three dummies (*Lower than A-level diploma, A-level diploma, A-level diploma plus 2 years in higher education,* and *A-level diploma plus more than 2 years in higher education*).

Risk-aversion: Workers are assumed to be more risk-adverse than investors. Thus, entrepreneurs of WOFs are assumed to be more risk-adverse than their conventional counterparts. I use *Opportunity entrepreneurship* to measure the main motivation of entrepreneurship. This dummy is equal to 1 when an individual chose entrepreneurship because they had a new business idea or discovered a business opportunity; *necessity/mixed entrepreneurship* is the benchmark group referring to individuals whose entrepreneurial motivation involved unemployment. I use *Part-time entrepreneurship* to assess an entrepreneur's devotion of time to their firm. This dummy variable is equal to 0 when an entrepreneur claims not to be involved in business activities in addition to their entrepreneurial projects; it is equal to 1 when they are a part-time or hybrid entrepreneur.

Entrepreneurial skills: An entrepreneur's management experience is assumed to influence firm survival (Ganotakis, 2012). I code *Prior management experience* with a value of 1 when an entrepreneur reported being a former CEO or senior manager; otherwise, the dummy variable is equal to 0. Moreover, a *Received entrepreneurial training* dummy variable is used to measure whether an individual received entrepreneurial training before they started their firm. As entrepreneurial knowledge and experience can be transferred within a close relational circle, entrepreneurs with self-employed parents are assumed to be more likely to succeed than those without self-employed parents (de Jong and Marsili, 2015). I capture this form of familial entrepreneurial support by the dummy variable *Entrepreneurs in close relational circle*. Work experience in large versus small firms is assumed to influence firm survival (Sørensen and Phillips, 2011). In my analysis, three categorical variables are coded to measure an entrepreneur's principal work experience acquired by working with firms with less than 49 employees (*small-firm experience*), with 50-249 employees (*medium-firm experience*), and with more than 250 employees (*large-firm experience*) (Klapper and Richmond, 2011).

4.3. Firm-level variables

Financing: I capture differences in firms' financial constraints at entry through the categorical variable *Capital need* (*<16k, 16k-80k, >80k*) measured in euros. The dummy variables *Bank finance* and *Received public aid* are also used to capture the impact of bank and public aid source of financing.

Size: Initial firm size is assumed to be an important determinant on firm growth and survival (Audretsch *et al.*, 1999; Agarwal and Audretsch, 2001). To capture the impact of initial firm size, I use the variable *Number of employees* (*0, [1-5), [5-10), >=10),* and *Plan to hire new*

employees.

Entry mode: Whether a firm is *newly created* or is converted from an existing firm (*firm takeover*) might lead to substantial differences in survival (Xi *et al.*, 2020). Converted firms survive significantly longer than newly created firms whether they are CFs (Xi *et al.*, 2020) or WOFs (Chapter 3 of this thesis). The proportion of newly created and converted firms is different in WOFs (40% with strong variation across cohorts) and CFs (less than 10% with low variation across cohorts). It is thus necessary to control for the mode of entry to avoid a composition effect. Converted firms, whether worker buyouts or not, benefit from more resources (e.g., experience of the workers, track records, specific knowledge of the demand, etc.) than firms created from scratch. Therefore, I control the modes of entries with the dummy variables newly created firm and firm takeovers. All SINE cohorts available (1994, 1998, 2002, 2006, 2010, 2014) distinguish between firm takeovers and family firm takeovers. From the dataset, I select all new firms, but for takeovers, I exclude family takeovers because these are unavailable to nonfamily members and can result from an inheritance or gift. Only since 2002 has the SINE database distinguished between management buyouts and external takeovers. To ensure consistency of the variable *Entry mode* across cohorts, my sample comprises management buyouts as well as external takeovers.[4]

Urban region: I include 1 dummy in the regression to capture differences between urban and non-urban regions (Source: Eurostat).

Industrial factors: I include 5 dummies in the regressions to capture industry differences at the 1-digit NACE level (Manufacturing, Construction, Transport, Services, Other Sectors).

Temporal factors: I include 6 dummies in the regressions to capture cohort differences (1994, 1998, 2002, 2006, 2010, 2014).

5. Results

5.1. Univariate comparison and descriptive statistics

5.1.1 Comparison of survival probabilities (unmatched samples)

Figure 2.1 graphs Kaplan-Meier survival estimates for unmatched samples of WOFs and CFs. The average failure rate is lower for WOFs (31%) than for CFs (45%). A log-rank test

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[4]According to the INSEE, a new firm is a legal entity that has been assigned a new nine-digit registration number, while a business takeover occurs when an entrepreneur takes over a firm (without issuing a new registration number). However, this might not be true for all WOFs created from CFs. The conversion of a CF into a WOF can take the legal procedure of closing the CF and opening a new WOF, resulting in two different registration numbers. This is often the case for WOFs born from rescuing a CF in difficulty. Therefore, I use the mode of entry reported in the CGSCOP's records to identify the WOFs created from CFs even when their registration number has changed.

also suggests that WOFs and CFs have different survival distributions (Chi2= 6.50, P<0.011). To further determine whether my analysis is robust, I conduct a t-test that compares the survival rates of WOFs to those of CFs. Table 2.2 shows that the survival time (in months) of WOFs differ from those of CFs. The mean survival time of WOFs is 4.2 months longer than the mean survival time of CFs (60.81 vs. 56.61 months).

T-test results show significant differences across the two types of firms on several entrepreneur- and firm-level variables. Regarding entrepreneurial attributes, I find that individuals who create WOFs are more likely than CFs to be French (97% vs. 92%), aged under 50 (87% vs. 81%), and more educated (71% vs. 60% with a diploma higher than A-level). Individuals who create WOFs rather than CFs are less likely to be motivated by opportunity entrepreneurship (68% vs. 78%), and to be devoted part-time to entrepreneurship (13% vs. 25%). Individuals who create WOFs rather than CFs also have higher small-firm experience (69% vs. 57%) and lower medium-firm experience (28% vs. 42%) but have less access to an entrepreneurial network among their close friends or family (66% vs. 72%).

Regarding firm characteristics, t-tests of mean equality show significant differences between WOFs and CFs in terms of financing, size, and entry mode. At their entry, WOFs require more capital than CFs (46% of WOFs require between €16k and €80k vs. 30% of CFs). WOFs are more financed through banks than CFs (54% vs. 44%) and are more prone to receiving public aid (75% vs. 37%). Most CFs have, at their entry, either no employees (47%) or between 1 and 5 (46%). WOFs are bigger than CFs at entry with 66% having between 1 and 5 employees and 12% having between 5 and 10 employees.[5] This difference in size between WOFs and CFs might result from both the French entrepreneurial ecosystem dominated by small and very small firms, and the collective characteristic of any cooperative entrepreneurial project which by definition gathers workers. WOFs are also more likely than CFs to hire new employees (49% vs. 34%). WOFs are more often created from existing firms than CFs (28% vs. 13% of firm takeovers), which is due to worker buyouts to save their employment when their firm is failing, or transmission from a conventional entrepreneur to their workers when they are "retiring." WOFs are less likely to be created in urban regions than CFs (32% vs. 39%). WOFs also differ in sectoral concentration since they are overrepresented in "manufacturing" compared to CFs (19% vs. 8%) and "construction" (19% vs. 16%) while they are underrepresented in "services" (58% vs. 65%).

These average differences between the two groups underscore the necessity to create matched samples that limit selection effects in order to disentangle the effects of resources at entry with the effect of cooperative governance over the survival of WOFs.

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[5]Note that it is possible for WOFs to have no employees at their entry. Depending on the regional support agency, WOFs can take a few months or even a year to meet their legal requirements, in exceptional circumstances.

Figure 2.1: Survival functions by mode of governance before matching
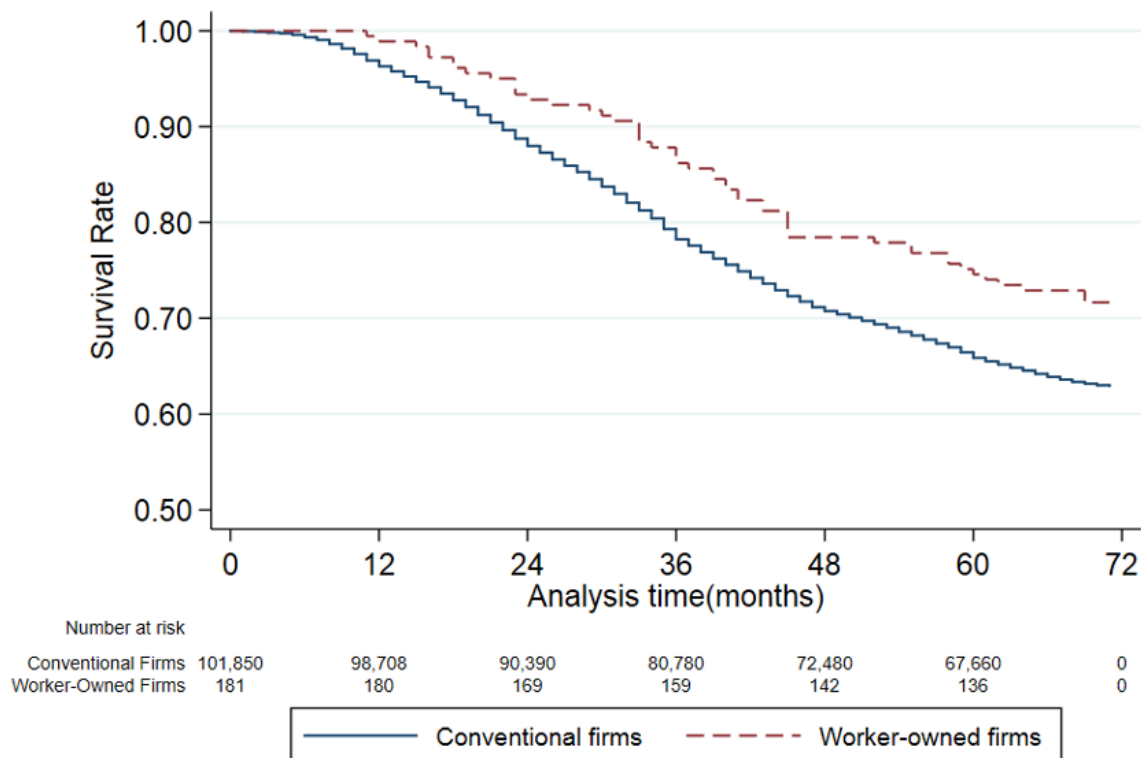
5.1.2   Comparison of survival probabilities (matched samples)

Previous studies have found that an individual's decision to start a WOF or a CF depends on their sociodemographic status, risk-aversion, entrepreneurial skills, and financial capabilities (Conte and Jones, 2015; Podivinsky and Stewart, 2007). To account for these differences and potential selection effects, I apply a propensity score matching 1-to-1 without replacement to construct a sample of 180 CFs similar to the WOFs in terms of firm resources and entrepreneur characteristics.[6]

I graph Kaplan-Meier survival estimates for WOFs and for matched CFs in Figure 2.2. I find that the curve representing the survival function of CFs (plain curve) shifts upwards during the first 3 years, showing that the discrepancy between CFs and WOFs regarding survival rates narrows after the matching is applied. However, the curve representing the survival function of CFs shifts slightly downwards for the last 3 years,[7] suggesting that other factors

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[6]Only one WOF out of 181 has been pruned through the matching procedure.

[7]I observe a similar pattern with the one-to-three propensity score matching and the Mahalanobis distance metric matching procedures. Appendix 2.E shows the survival functions of these two matching procedures.
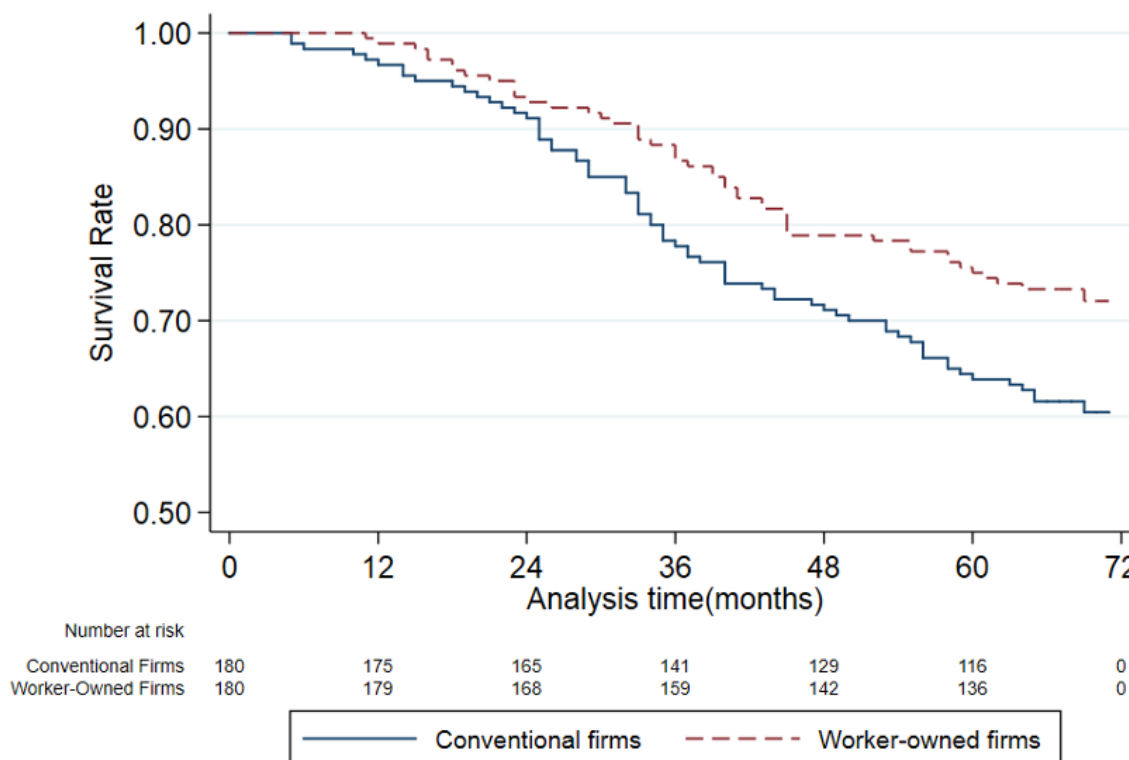
Table 2.2: Characteristics of WOFs and CFs before and after matching

	Before matching			After matching		
	WOFs (mean)	CFs (mean)	*t*-test of mean differences	WOFs (mean)	CFs (mean)	*t*-test of mean differences
Survival months	60.81	56.61	3.39***	60.81	56.83	2.15**
Entrepreneur characteristics						
Sociodemographic Status						
French	0.97	0.92	4.59***	0.97	0.98	-0.34
Male	0.76	0.76	0.01	0.76	0.79	-0.76
Age under 35 (base)	0.34	0.33	0.62	0.34	0.43	-1.63
Age between 35 and 49	0.53	0.48	1.22	0.53	0.46	1.26
Age over 50	0.13	0.19	-2.71***	0.13	0.11	0.49
Lower than A-diploma	0.29	0.40	-3.43***	0.29	0.30	-0.23
A-level diploma	0.17	0.20	-0.85	0.17	0.17	0
A-level diploma plus 2 years of education	0.17	0.14	1.28	0.17	0.17	0.14
A-level diploma over 2 years of education	0.37	0.26	2.88***	0.37	0.36	0.11
Risk-aversion						
Opportunity entrepreneurship	0.68	0.78	-2.71***	0.68	0.73	-0.92
Part-time entrepreneurship	0.13	0.25	-4.46***	0.13	0.16	-0.74
Entrepreneurial Skills						
Prior management experience	0.26	0.29	-0.93	0.26	0.29	-0.70
Received entrepreneurial training	0.35	0.30	1.49	0.35	0.34	0.11
Entrepreneurs in close social network	0.66	0.72	-1.67*	0.66	0.68	-0.45
Small-firm experience	0.69	0.57	3.44***	0.69	0.70	-0.23
Medium-firm experience	0.28	0.42	-4.02***	0.28	0.28	0.12
Large-firm employees	0.03	0.01	1.31	0.03	0.02	0.34
Firm Characteristics						
Financing						
Capital need: <16k	0.37	0.53	-4.48***	0.37	0.33	0.66
Capital need: 16k-80k	0.46	0.30	4.37***	0.46	0.48	-0.42
Capital need: >80k	0.17	0.17	0.04	0.17	0.18	-0.28
Bank finance	0.54	0.44	2.68***	0.54	0.54	-0.11
Received public aid	0.75	0.37	11.70***	0.76	0.75	0.12
Size						
Number of employees: 0	0.14	0.47	-12.26***	0.14	0.17	-0.72
Number of employees: [1-5]	0.66	0.46	5.70***	0.66	0.60	1.20
Number of employees: [5-10]	0.12	0.05	2.94***	0.12	0.12	0
Number of employees: >=10	0.07	0.02	2.51**	0.07	0.11	-1.11
Plan to hire new employees	0.49	0.34	3.96***	0.49	0.49	0
Entry mode						
Firm takeovers	0.28	0.13	4.29***	0.28	0.33	-1.03
Urban region	0.32	0.39	-2.21**	0.32	0.30	0.34
N firms	181	101,850		180	180	

than resources at entry impact the survival of WOFs. Overall, a log-rank test suggests that the matched samples of WOFs and CFs still have different survival distributions (Chi2= 5.71, P<0.017). The last column of Table 2.2 presents t-test results for the matched samples of CFs and WOFs. The difference in the number of survival months observed between WOFs and CFs is roughly similar to the one for the unmatched sample (4.2 months vs. 3.98 months).

As a result of the matching, the two samples were rendered more comparable. For all variables, I no longer observe statistically significant differences. Some variables have a larger average difference (*Male, Age under 35, Capital need > 80*) after than before matching, but these differences are not statistically different from 0 at the usual thresholds, on the unmatched nor the matched samples.

Figure 2.2: Survival functions by mode of governance after matching (PSM 1:1)

Number at risk

Conventional Firms	180	175	165	141	129	116	0
Worker-Owned Firms	180	179	168	159	142	136	0

SOURCE: SINE.

5.2. Multivariate analysis of survival probabilities from discrete-time models

5.2.1 Differences in survival probabilities across WOFs and CFs (first research question)

Table 2.3 displays the cloglog estimates of the unmatched sample and the matched sample over three different time periods: the first 2 years, the first 4 years, and the entire period (6 years). The number of observations increases with the length of the time period. All models include a dummy variable WOF to capture the impact of WOF entrepreneurship on firms' exit risks.

The estimation result given in Table 2.3 shows that over a 6-year lifespan, WOFs are less likely to exit than CFs. The coefficient -0.34 ($p<0.05$) of Model V means that, keeping independent variables of firm resources fixed, the risk of exit for WOFs is 28% smaller than the risk of exit for CFs. This effect still exists when we consider the matched sample and control for the entrepreneur and firm characteristics at entry. The coefficient WOF in Model VI equals -0.50 ($p<0.05$), meaning that the risk of exit for WOFs is 39% smaller than the risk of exit for

CFs. This result suggests that on average WOFs benefit from a survival advantage over CFs in their first 6 years, even when systematic differences in resources at entry are accounted for.

5.2.2 Evolution of the survival probabilities of WOFs and CFs (second research question)

From the coefficient WOF reported in Models I to VI in Table 2.3, I observe that on the un-matched sample the survival advantage of WOFs over CFs tends to decrease over time. The coefficients are -0.48 (p<0.1) for the first 2 years (Model I), -0.35(p<0.05) for the first 4 years (Model III), and -0.34 (p<0.05) for the full period (Model V). However, on the matched sample, the survival advantage of WOFs over CFs tends to increase over time. The coefficients are -0.31 (not significant at the 10% threshold) for the first 2 years (Model II), -0.46 (p<0.05) for the first 4 years (Model IV), and -0.50 (p<0.05) for the full period (Model VI). From these opposite trends of the coefficient WOF for the unmatched and matched samples, I conclude that the survival advantage of WOFs over CFs is driven by systematic differences in resources at entry in the first 2 years after entry, and then is driven by the specific mode of WOF governance.

5.2.3 Impact of the resources at entry on the survival of WOFs and CFs (third research question)

Table 2.4 displays the cloglog estimates for unmatched CFs (Model I), matched CFs (Model II), and WOFs (Model III). Chow tests are performed to test the equality of coefficients between Model I and III, and between Model II and III. Table 4 shows that most resources at entry affect WOF and CF survival probabilities similarly. The main entrepreneur resources at entry that lower the risk of both WOF and CF exit are being *French*, *aged between 35 and 49*, and being a risk-lover (i.e., *opportunity entrepreneurship*). The main firm resources at entry that lower the risk of both WOF and CF exit are *receipt of public aid* and entry into the market through conversion of an existing firm (*firm takeover*).

Some resources at entry impact the survival of WOFs and CFs differently. An educated (*A-level diploma* or *A-level diploma plus more than 2 years of education*), *part-time entrepreneur* or firms *planning to hire new employees* are associated with a decrease in risk of CF exit, while firms *financed through banks* or with an entrepreneur who has *previous firm experience* increase the risk of CF exit. Entrepreneurs of CFs with *experience in medium-size firms* are more likely to fail than those with *experience in small firms*. These characteristics have no significant effect at the usual thresholds for WOFs.

On the contrary, entrepreneurs *aged above 50* that have *received entrepreneurial training* decreases the risk exit of WOFs, while WOFs with *more than 10 employees* at entry are associated with a higher exit risk than those with no employees. These characteristics have no significant effect on matched CFs. This result might be due to the role of support agencies.

Indeed, support agencies train workers to the specificities of cooperative governance and help them to conceive, finance, and implement their entrepreneurial project. This is particularly true in cases of worker buyouts of firms in difficulty where the cooperative project must be set up quickly to avoid workers becoming unemployed or losing the motivation to convert their firm into a WOF.

Table 2.3: Cloglog estimates of firm exits on WOFs and CFs with unmatched and matched samples (PSM 1:1)

	Year 1 – Year 2		Year 1 – Year 4		Year 1 – Year 6	
	Unmatched sample Model I	Matched sample Model II	Unmatched sample Model III	Matched sample Model IV	Unmatched sample Model V	Matched sample Model VI
WOF	-0.48* (0.28)	-0.31 (0.42)	-0.35** (0.16)	-0.46** (0.23)	-0.34** (0.14)	-0.50** (0.20)
Entrepreneur characteristics						
Sociodemographic Status						
French	-0.82*** (0.02)	0.47 (1.13)	-0.75*** (0.01)	-0.32 (0.63)	-0.72*** (0.01)	-0.52 (0.54)
Male	-0.49*** (0.02)	-0.97** (0.49)	-0.41*** (0.01)	0.09 (0.29)	-0.39*** (0.01)	0.10 (0.25)
Age under 35 (default)						
Age between 35 and 49	-0.41*** (0.02)	-0.03 (0.51)	-0.34*** (0.01)	-0.28 (0.25)	-0.33*** (0.01)	-0.24 (0.22)
Age over 50	-0.42*** (0.03)	0.28 (0.71)	-0.34*** (0.02)	-0.11 (0.38)	-0.32*** (0.02)	-0.41 (0.35)
Lower than A-level diploma (default)						
A-level diploma	-0.20*** (0.02)	-0.84 (0.67)	-0.17*** (0.02)	0.10 (0.33)	-0.18*** (0.01)	0 (0.29)
A-level diploma plus 2 years of education	-0.17*** (0.03)	-0.24 (0.63)	-0.18*** (0.02)	-0.08 (0.37)	-0.17*** (0.02)	-0.34 (0.33)
A-level diploma over 2 years of education	-0.24*** (0.03)	-1.61** (0.68)	-0.24*** (0.02)	-0.15 (0.33)	-0.24*** (0.01)	-0.23 (0.28)
Risk-aversion						
Opportunity entrepreneurship	-0.54*** (0.02)	0.46 (0.53)	-0.45*** (0.01)	-0.34 (0.28)	-0.44*** (0.01)	-0.25 (0.24)
Part-time entrepreneurship	-0.04* (0.02)	-1.19 (0.73)	0.01 (0.01)	-0.35 (0.35)	0 (0.01)	-0.14 (0.28)
Entrepreneurial Skills						
Prior management experience	-0.10*** (0.02)	0.86 (0.53)	-0.07*** (0.01)	0.25 (0.29)	-0.06*** (0.01)	0.34 (0.25)
Received entrepreneurial training	-0.19*** (0.02)	-0.67 (0.51)	-0.17*** (0.01)	-0.10 (0.26)	-0.16*** (0.01)	-0.09 (0.23)
Entrepreneurs in close social network	-0.35*** (0.02)	0.66 (0.49)	-0.28*** (0.01)	0.14 (0.24)	-0.25*** (0.01)	0 (0.20)
Small-firm experience (default)						
Medium-firm experience	0.11*** (0.02)	0.64 (0.48)	0.10*** (0.01)	0.59*** (0.24)	0.10*** (0.01)	0.57*** (0.21)
Large-firm experience	-0.33*** (0.07)	-0.35 (1.20)	-0.35*** (0.05)	-0.09 (0.67)	-0.35*** (0.04)	-0.10 (0.65)

(continued)

	Year 1 – Year 2		Year 1- Year 4		Year 1 – Year 6	
	Unmatched sample Model I	Matched sample Model II	Unmatched sample Model III	Matched sample Model IV	Unmatched sample Model V	Matched sample Model VI
Firm Characteristics						
Financing						
Capital need: <16k (default)						
Capital need: 16k-80k	-0.17*** (0.02)	-0.71 (0.49)	-0.12*** (0.01)	0 (0.27)	-0.11*** (0.01)	-0.22 (0.24)
Capital need: >80k	-0.28*** (0.03)	-1.43 (0.93)	-0.23*** (0.02)	0.61 (0.41)	-0.23*** (0.02)	0.15 (0.34)
Bank finance	-0.17*** (0.02)	0.24 (0.51)	-0.15*** (0.01)	-0.54** (0.27)	-0.14*** (0.01)	-0.24 (0.23)
Received public aid	-0.16*** (0.02)	0.75 (0.57)	-0.15*** (0.01)	0.02 (0.28)	-0.16*** (0.01)	-0.24 (0.23)
Size						
Number of employees: 0 (default)						
Number of employees: [1-5]	-0.36*** (0.02)	0.46 (0.63)	-0.26*** (0.01)	0.53 (0.35)	-0.24*** (0.01)	-0.63** (0.31)
Number of employees: [5-10]	-0.26*** (0.05)	0.94 (0.88)	-0.18*** (0.03)	0.26 (0.50)	-0.20*** (0.03)	-0.62 (0.41)
Number of employees: >=10	-0.04 (0.06)	2.13** (1.06)	0.03 (0.04)	0.95* (0.55)	0.01 (0.04)	1.16*** (0.44)
Plan to hire new employees	-0.22*** (0.02)	-0.66 (0.48)	-0.14*** (0.01)	-0.09 (0.23)	-0.12*** (0.01)	0 (0.20)
Entry mode						
Firm takeovers	-0.42*** (0.03)	-1.89*** (0.73)	-0.28*** (0.02)	-1.04*** (0.35)	-0.24*** (0.02)	-0.72*** (0.26)
Urban region	-0.06*** (0.02)	0.43 (0.46)	0 (0.01)	0.14 (0.25)	-0.01 (0.01)	0.25 (0.21)
Sector fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time (months) fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	2,318,431	5,213	4,236,782	11,526	5,605,137	15,477
Prob > chi2 (Wald test)	0.00	0.00	0.00	0.00	0.00	0.00

SOURCE: SINE.

Table 2.4: Cloglog estimates on firm exit of WOFs and CFs (time span: 6 years)

	Unmatched CFs	Matched CFs	WOFs	Chow test p-value I vs. III	Chow test p-value II vs. III
	Model I	Model II	Model III		
Entrepreneur characteristics					
Sociodemographic Status					
French	-0.96*** (0.01)	-0.84* (0.48)	-2.02***(0.54)	0.012	0.148
Male	-0.56*** (0.01)	-0.45 (0.31)	0 (0.39)	0.039	0.185
Age under 35 (base)					
Age between 35 and 49	-0.46*** (0.01)	-0.61** (0.29)	-0.78** (0.34)	0.082	0.352
Age over 50	-0.45*** (0.01)	-0.64 (0.51)	-1.52** (0.59)	0.069	0.396
Lower than A-diploma (base)					
A-level diploma	-0.24*** (0.01)	-0.66 (0.42)	0.58 (0.49)	0.019	0.030
A-level diploma plus 2 years of education	-0.22*** (0.02)	-0.58 (0.40)	-0.52 (0.65)	0.086	0.395
A-level diploma over 2 years of education	-0.28*** (0.01)	-0.76***(0.37)	0.05 (0.53)	0.025	0.034
Risk-aversion					
Opportunity entrepreneurship	-0.62*** (0.01)	-0.80***(0.30)	-0.65* (0.38)	0.084	0.395
Part-time entrepreneurship	-0.01 (0.01)	-0.72* (0.43)	-0.14 (0.46)	0.086	0.239
Entrepreneurial Skills					
Prior management experience	-0.06*** (0.01)	0.24 (0.35)	0.56 (0.42)	0.051	0.381
Received entrepreneurial training	-0.25*** (0.01)	-0.19 (0.31)	-0.66* (0.39)	0.047	0.213
Entrepreneurs in close social network	-0.35*** (0.01)	-0.25 (0.28)	-0.43 (0.35)	0.086	0.263
Small-firm experience (base)					
Medium-firm experience	0.03*** (0.01)	0.88*** (0.31)	-0.10 (0.39)	0.086	0.051
Large-firm employees	-0.65*** (0.04)	-0.05 (0.91)	-1.05 (1.12)	0.068	0.252
Firm Characteristics					
Financing					
Capital need: <16k (base)					
Capital need: 16k-80k	-0.14*** (0.01)	-0.11 (0.33)	-0.42 (0.38)	0.074	0.209
Capital need: >80k	-0.19*** (0.02)	0.85 (0.49)	-1.14 (0.76)	0.075	0.036
Bank finance	-0.15*** (0.01)	0.07* (0.32)	-0.46 (0.42)	0.054	0.362
Received public aid	-0.25*** (0.01)	-0.87***(0.27)	-0.67* (0.35)	0.085	0.283
Size					
Number of employees: 0 (base)					
Number of employees: [1-5]	-0.35*** (0.01)	-0.05 (0.37)	0.74 (0.48)	0.020	0.364
Number of employees: [5-10]	-0.32*** (0.03)	0.33 (0.51)	-0.52 (0.90)	0.073	0.212
Number of employees: >=10	-0.11*** (0.04)	0.94 (0.55)	2.66*** (0.90)	0.011	0.292
Plan to hire new employees	-0.16*** (0.01)	-0.35* (0.27)	0.26 (0.33)	0.054	0.160
Entry mode					
Firm takeovers	-0.28*** (0.02)	-1.11***(0.37)	-0.89* (0.46)	0.070	0.241
Urban region	-0.11*** (0.01)	0.40 (0.30)	-0.05 (0.36)	0.086	0.241
Sector fixed effects	Yes	Yes	Yes		
Cohorts fixed effects	Yes	Yes	Yes		
Time (months) fixed effects	Yes	Yes	Yes		
Number of firms	101,850	180	180		
Number of observations	5,594,371	10,050	10,766		
Prob > chi2 (Wald test)	0.00	0.00	0.00		

NOTE: Standard errors in parentheses. Significant at ** 5%, *** 1% confidence levels. SOURCE: SINE

6. Robustness checks

6.1. Alternative estimation procedures

One assumption of the discrete-time cloglog model used in this article is the proportionality of hazards (PH), i.e., the hazard ratio for any two new firms is constant over time. The effect of each covariate is then interpreted as a shift of the baseline hazard. If the PH assumption is violated, by hazard ratios decreasing over time, the overall hazard ratio for the risk factor will be underestimated. Mata and Portugal (1994), among others, show that the firms' baseline hazard exhibits negative duration dependence, i.e. the hazard ratio decreases with the firm's age. The processes of competition and learning lead inefficient firms to exit the market (Jovanovic, 1982). To account for this violation of the PH assumption through market selection, I run a stratified Cox model, which assumes that the treatment hazard ratio (exponentiated parameter of *WOF*) is constant across strata (firm's age, in months). I also run a discrete-time logistic model to allow for other covariates with non-proportional hazards (Jenkins *et al.*, 1995; Allison, 1982).

Both the stratified Cox and logistic regression results confirm my main findings that WOFs have higher survival probabilities than CFs. The coefficient of *WOF* for the entire 6-year period, on matched samples, equals -0.50 for the cloglog model, -0.49 for the stratified Cox model, and -0.54 for the logistic model. Similarly to the cloglog regression results, the stratified Cox model and the logistic model show that, on the matched samples, the survival advantage of WOFs over CFs tends to increase over time. Concerning determinants of WOF and CF survival, the stratified Cox model does not perform well due to the high number of strata (72 months). Nevertheless, the results from these models confirm that some entry resources impact WOF and CF survival similarly, while others impact either WOFs (entrepreneur *aged over 50*) or CFs (*part-time* entrepreneur with *A-level diploma plus more than 2 years of higher education* and motivated by *opportunity*). The detailed results are provided in Appendix 2.D.

6.2. Alternative matching procedures

In addition to the one-to-one propensity score matching, without replacement, used in this article, I estimate a one-to-three propensity score matching, with replacement, to increase the precision of the estimations. I also use a Mahalanobis distance metric to match CFs to WOFs. Contrary to propensity score matching procedures which reduce the distribution of covariates into a single dimension (the propensity score), the Mahalanobis matching procedure creates pairs on covariate values, thus lowering the omitted variable bias and achieving a better covariate balance (King and Nielsen, 2019). The main results remain un-

changed.

7. Conclusion

In this article, I compare the survival patterns of WOFs and CFs and seek to answer the following three research questions. First, do survival probabilities differ between WOFs and CFs? Second, how do survival probabilities of WOFs and CFs evolve? Third, how do entrepreneur-level and firm-level resources at entry impact the survival rates of WOFs and CFs? To perform this analysis, I use a matched sample of WOFs and CFs over an observational period of 72 months. I run a cloglog model to assess the difference between WOF and CF survival probabilities and compare the impact of the entrepreneur and firm resources at entry.

The results show that WOFs survive longer than CFs regardless of whether they have different or similar entry resources. The survival advantage of WOFs over CFs is driven by systematic differences in resources at entry in the first 2 years, and then is driven by the specific governance mode of WOFs. These results show that WOFs are not rare due to the fact that they exit earlier than CFs. In fact, WOFs present a survival advantage over both unmatched and matched CFs. These results also lower the endogeneity bias at stake in the comparative analyses of WOF and CF performance. The systematic differences in entry resources between WOFs and CFs cannot fully explain the survival advantage of WOFs over CFs, suggesting that the governance mode of WOFs, characterised by democratic decision-making, plays a non-negligible role in their survival performance. These results are robust to alternative estimation methods and matching procedures.

The limitations of this analysis are threefold. First, the sample of WOFs is small (i.e., 181 WOFs). Thus, one should be cautious about generalizing the results. A bigger and more representative sample would provide more precise estimations and insights. However, the low number of WOFs studied in this analysis must be put into perspective, given that previous empirical studies have, until recently, studied only dozens of WOFs (e.g., Pencavel (2013)). Second, I do not control for unobserved firm-level heterogeneity. Accounting for a frailty effect at the firm-level would lower the omitted variable bias. Third, due to data availability concerns, I do not control for competing risks of exit. Firm exits are not necessarily a bad thing, and the lower survival rate of CFs compared to WOFs does not say anything about the quality of the working conditions, the returns on investment, and the environmental impact of a firm's production.

Appendix

2.A Data sources and sampling

As it is the case for many other French statistical surveys, SINE is declared by the public authorities as a survey of recognized general interest and is conducted under the auspices of the Ministry of Economics, Finance, and Industry and is subject to law N°51-711 (June 7, 1951). Article 7 of this law specifies the mandatory nature of the SINE survey and specifies sanctions imposed with a failure to respond. It also guarantees the anonymity of respondents listed in the final publicly available dataset. The SINE databases are made available to researchers upon application and accessed through remote computing systems where all analysis is conducted on secure servers. All tables and results must be approved by the INSEE to preserve firm and employee confidentiality before being extracted off the secure servers.

The scope of the SINE surveys aims at all for-profit firms in industry, construction, distribution, and services, but does not include agricultural and financial sectors, firms with occasional activity, firms living less than one month, or seasonal businesses.

Table 2.A.1: Descriptive statistics on SINE surveys

Cohorts	Number of firms studied in our paper	Number of firms surveyed by SINE	Response rate	Sample rate
1994	22,149	30,778	NA	NA
1998	23,338	27,136	77%	30%
2002	33,945	47,668	84%	NA
2006	46,304	56,010	74.5%	38%
2010	44,807	52,053	NA	41.7%
2014	39,368	45,515	60%	31%

I have access to the CGSCOP's records in virtue of a collective convention signed between the CGSCOP (*Confédération Générale des Sociétés Coopératives et Participative*) and the research laboratory EconomiX (*CNRS, UMR 7235*).

Table 2.A.2: Sampling of WOFs by cohorts

Cohorts	Sample (SINE)	Population (CGSCOP)	%
1994	17	181	9.4
1998	15	113	13.3
2002	29	123	25.6
2006	26	170	15.3
2010	45	189	23.8
2014	49	194	25.3
Total	181	970	18.7

Figure 2.A.1: Number of WOF entries (left-scale) and of CFs entries (right-scale)
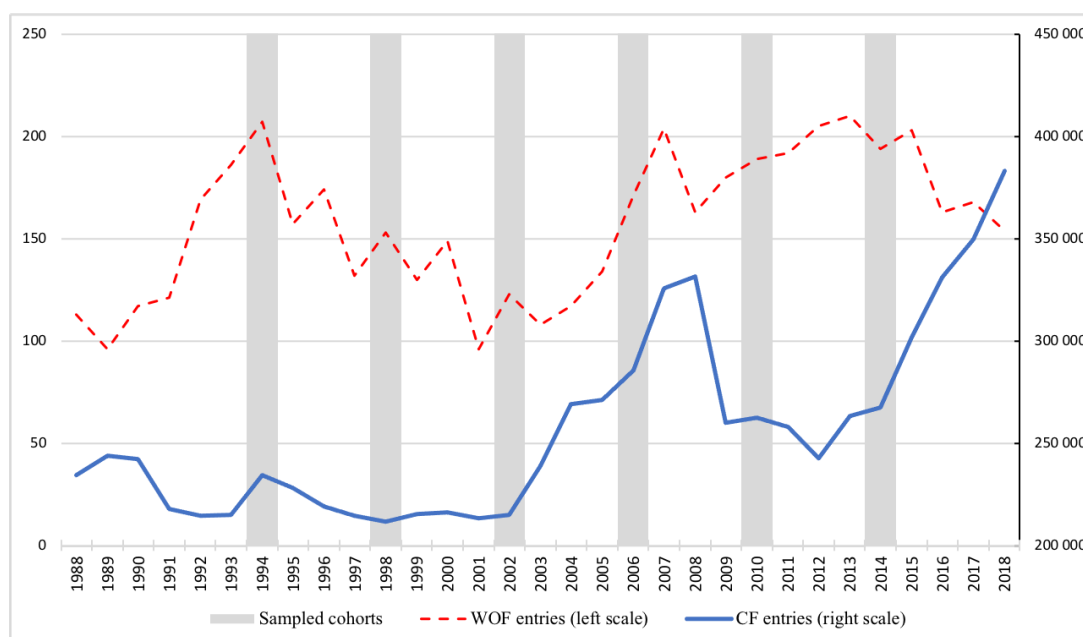
SOURCES: CGSCOP, FARE.

Table 2.A.3: Sampling of WOFs by sectors

Sectors	Sample (1)	Population (2)	Population (3)
Manufacturing	19.34	14.23	14.94
Construction	18.78	23.09	19.62
Transport	2.21	2.37	2.36
Services	58.01	52.06	53.65
Other sectors	1.66	8.25	9.43

NOTE: Column (1) displays the proportion of WOF entries across sectors in the SINE databases for all cohorts (1994, 1998, 2002, 2006, 2010, 2014). Column (2) displays the proportion of WOF entries across sectors in the CGSCOP's records for the years: 1994, 1998, 2002, 2006, 2010, and 2014. Column (3) displays the proportion of worker-owned firm entries across sectors in the CGSCOP's records for the whole period from 1994 to 2014.

2.B Survival functions and log-rank tests

Table 2.B.1: Log-rank tests of survival functions equality between WOFs and CFs on un-matched sample

Variable	Graphically lowest survival function	Chi2	P-value	WOFs		CFs	
				Firms (total)	Exits	Firms (total)	Exits
Total		6.50	0.011	181	28%	101,850	37%
5-year cohorts							
1994	WOFs	0.92	0.339	17	35%	6,332	47%
1998	WOFs	0.82	0.364	15	20%	8,582	32%
2002	WOFs	0.42	0.517	29	34%	14,266	40%
2006	WOFs	3.22	0.073	26	23%	20,859	41%
2010	WOFs	0.75	0.387	45	27%	27,449	33%
2014	WOFs	1.43	0.232	49	27%	24,362	33%
Sectors (NACE 1-digit)							
Manufacturing	WOFs	1.25	0.264	35	26%	8,391	35%
Construction	WOFs	2.93	0.087	34	26%	15,981	42%
Transport	WOFs	0.28	0.596	4	25%	4,322	35%
Services	WOFs	3.48	0.062	105	29%	64,690	37%
Others	-	0.10	0.754	3	33%	8,466	27%
Entry mode							
Ex nihilo	WOFs	2.66	0.103	131	31%	88,263	37%
Converted	WOFs	3.26	0.071	50	20%	13,580	31%
Entry size (number of workers at birth)							
0	WOFs	2.14	0.144	26	23%	47,323	37%
[1-5)	WOFs	1.73	0.189	120	29%	47,045	36%
[5-10)	WOFs	4.93	0.026	22	9%	5,088	33%
>=10	WOFs	0.00	0.996	13	38%	2,394	37%

Figure 2.B.1: Survival functions by mode of governance before matching by cohorts
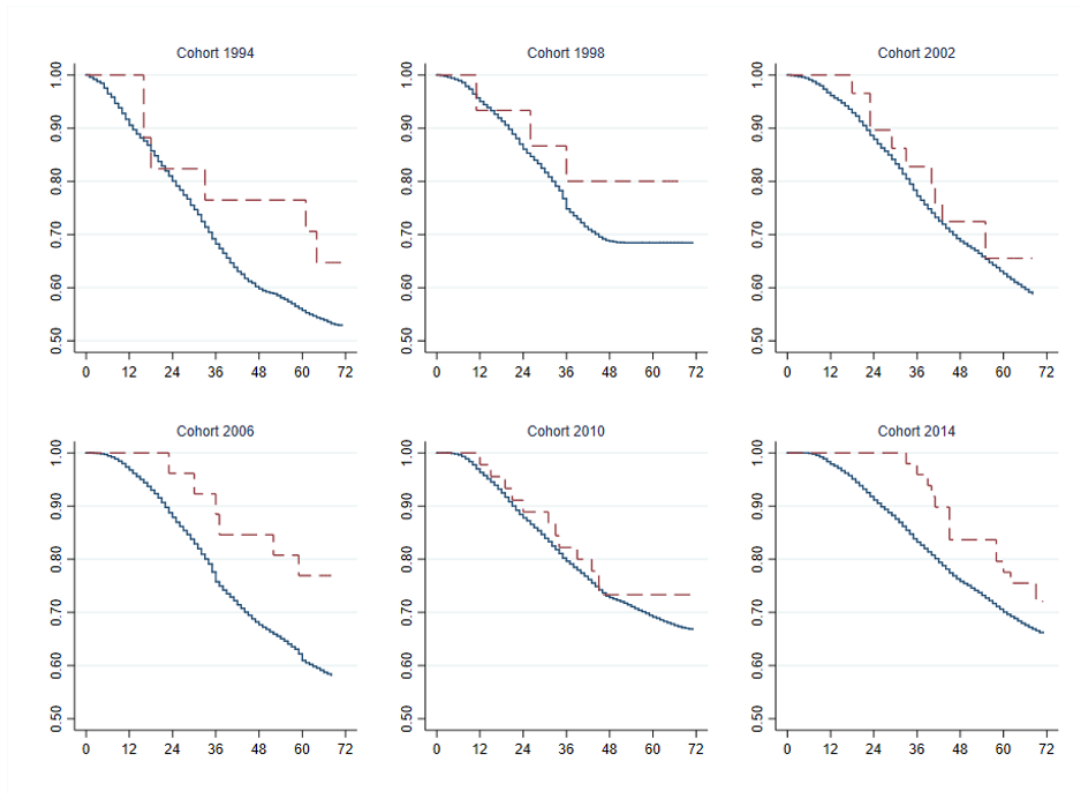
Figure 2.B.2: Survival functions by mode of governance before matching by sectors
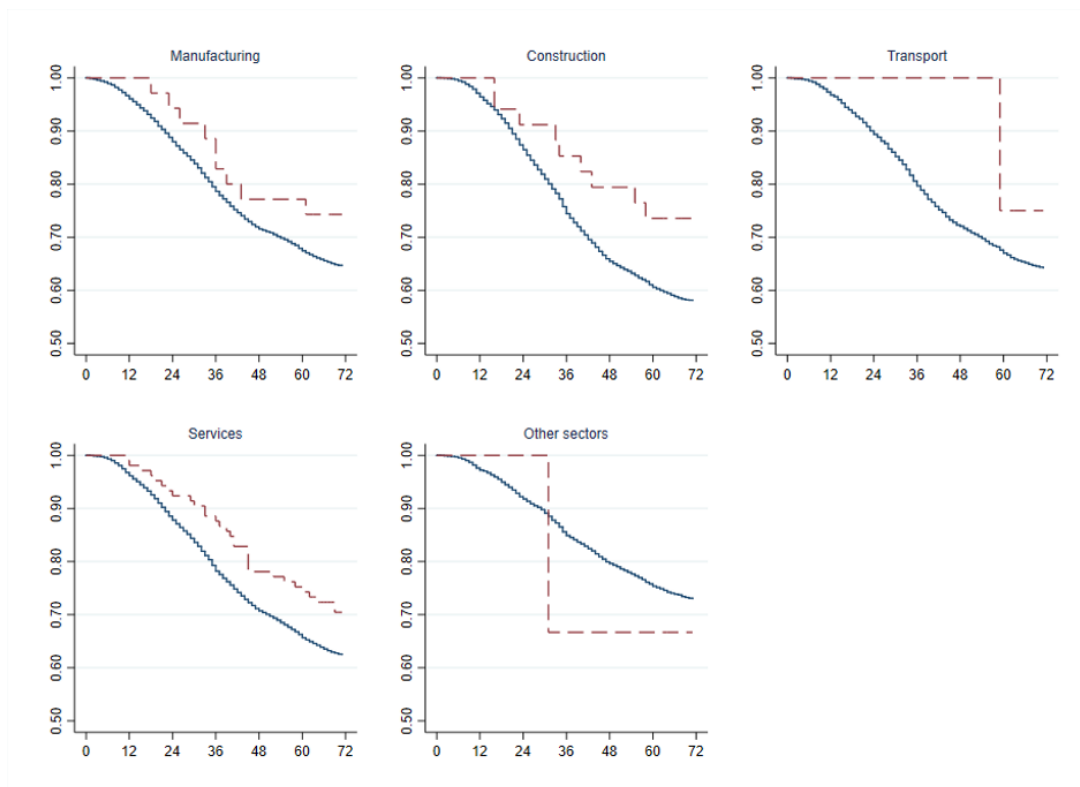
Figure 2.B.3: Survival functions by mode of governance before matching by size
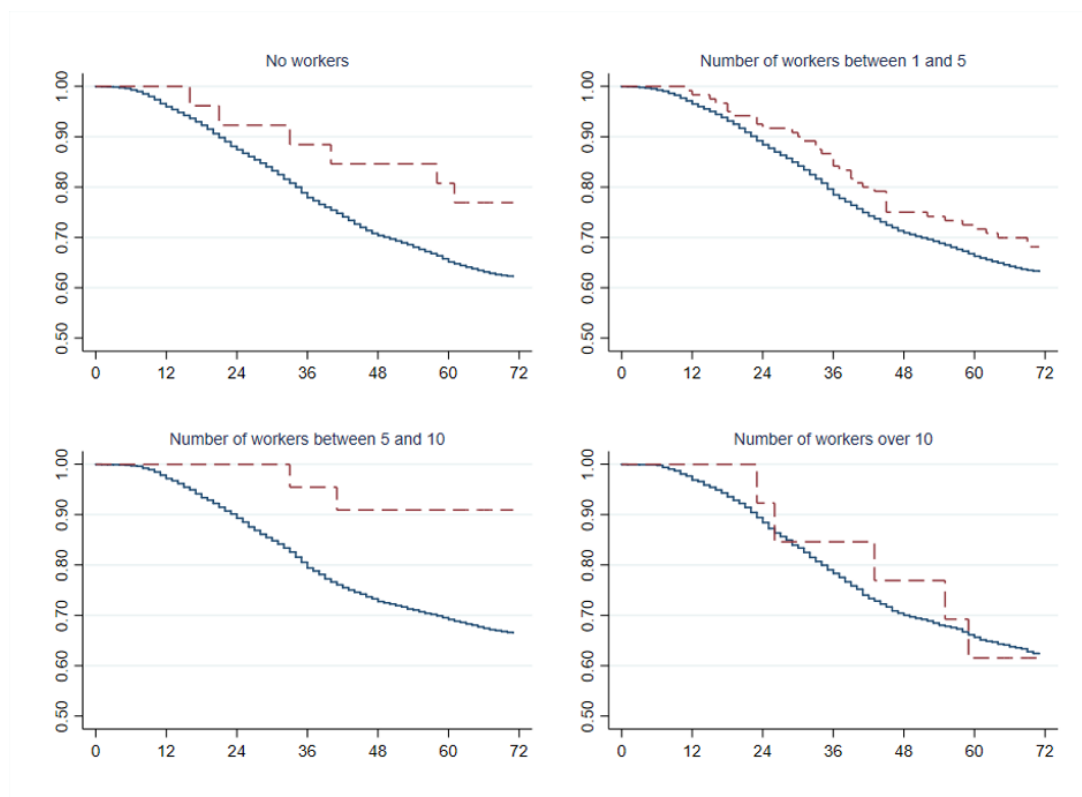
Figure 2.B.4: Survival functions by mode of governance before matching by entry mode
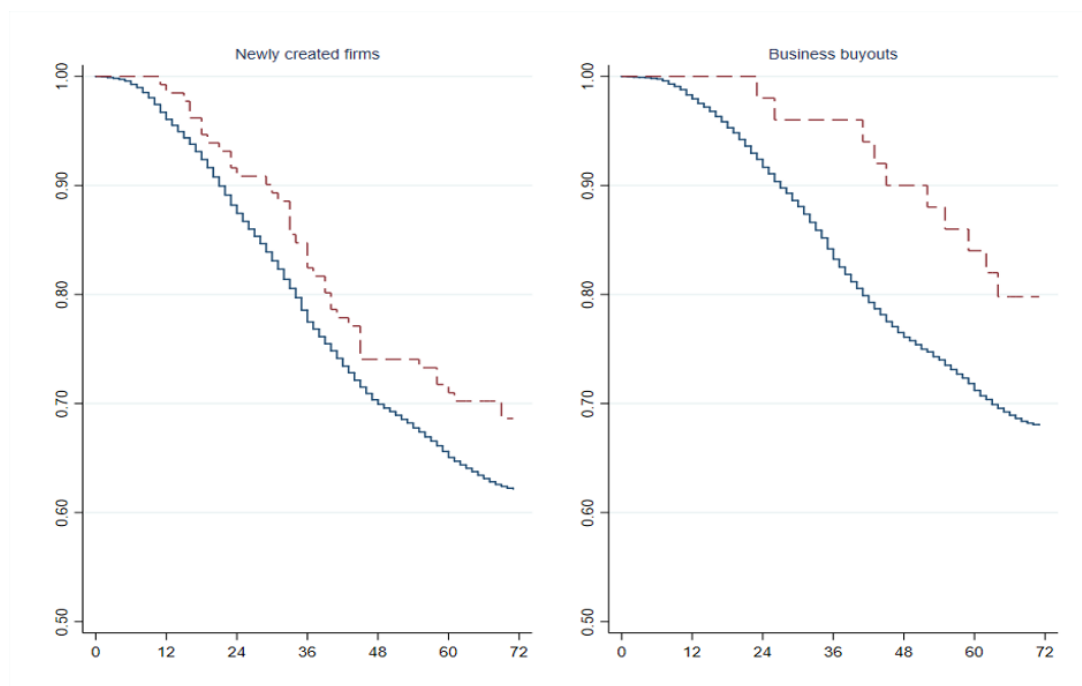
2.C Identification of WOFs

Another source than the CGSCOP's records for identifying the WOFs is the use of codes of ownership status from SIRENE register (and which is available in the SINE databases). Despite the fact that WOFs have three devoted codes ("5458," "5558," "5658"), this identification procedure is not reliable for WOFs due to numerous wrong categorizations. When registering at the Business Formalities Centers (Centres de Formalités des Entreprises), many WOFs are wrongly categorized as CFs, and some CFs are wrongly categorized as WOFs. This is likely to be due to the lack or biased information on WOFs among administrators and even sometimes among entrepreneurs. Instead of the 150 WOFs identified in the SINE databases with the CGSCOP's records, one finds 96 WOFs using codes of ownership status among which only 80 firms belong also to the CGSCOP's records.

The misleading categorization of WOFs through the codes of ownership status has been reinforced since the 2000s. The law n° 2001-624 (July 17, 2001) created a new type of firm called SCIC (Société Coopérative d'Intérêt Collectif) which is a multi-stakeholder firm. The law n°2014-856 (July 31, 2014) created another type of new firm called CAE (Coopérative d'Activité et d'Emploi) which is a hybrid firm between entrepreneur cooperatives and worker cooperatives. These new types of firms do not have any specific code of ownership status. Instead, they are computed as WOFs whereas their ownership status is not devoted to workers (in the case of SCICs) or they gather workers without any joint-activity (in the case of CAEs). The CGSCOP's records enable to take into account only WOFs (SCOP), avoiding clubbing them together with SCICs, CAEs, or wrongly categorized CFs.

2.D Alternative estimation procedures

Table 2.D.1: WOF probability

	(1)	(2)
Entrepreneur characteristics		
Sociodemographic Status		
French	1.05** (0.46)	0.01 (0.71)
Male	-0.02 (0.18)	-0.18 (0.27)
Age under 35 (base)		
Age between 35 and 49	0.14 (0.17)	0.48* (0.25)
Age over 50	-0.23 (0.26)	0.59 (0.40)
Lower than A-diploma (base)		
A-level diploma	0.28 (0.23)	0.01 (0.34)
A-level diploma plus 2 years of education	0.63*** (0.24)	0.13 (0.36)
A-level diploma over 2 years of education	1.11*** (0.21)	0.13 (0.32)
Risk-aversion		
Opportunity entrepreneurship	-0.37** (0.17)	-0.06 (0.27)
Part-time entrepreneurship	-0.26 (0.23)	-0.16 (0.34)
Entrepreneurial Skills		
Prior management experience	-0.31 (0.19)	-0.18 (0.29)
Received entrepreneurial training	-0.15 (0.17)	-0.05 (0.26)
Entrepreneurs in close social network	-0.37*** (0.16)	-0.10 (0.24)
Small-firm experience (base)		
Medium-firm experience	-0.53*** (0.17)	-0.03 (0.25)
Large-firm employees	0.56 (0.49)	0.25 (0.77)
Firm Characteristics		
Financing		
Capital need: <16k (base)		
Capital need: 16k-80k	0.39** (0.18)	-0.19 (0.28)
Capital need: >80k	-0.40 (0.27)	0.07 (0.40)
Bank finance	-0.20*** (0.18)	0.01 (0.27)
Received public aid	1.66 (0.19)	0 (0.28)
Size		
Number of employees: 0 (base)		
Number of employees: [1-5]	1.76*** (0.23)	0.20 (0.33)
Number of employees: [5-10]	2.37*** (0.32)	0.25 (0.45)
Number of employees: >=10	2.51*** (0.37)	-0.41 (0.53)
Plan to hire new employees	0.39** (0.16)	0.05 (0.23)
Entry mode		
Firm takeovers	0.83*** (0.19)	-0.06 (0.28)
Urban region	-0.18 (0.16)	0.11 (0.25)
Sector fixed effects	Yes	Yes
Cohorts fixed effects	Yes	Yes
Number of observations	100,469	360
Pseudo-R2	0.1357	0.0311

NOTE: Standard errors in parentheses. Significant at ** 5%, *** 1% confidence levels. Dependent variable is a binary that equals 1 if the firm is a WOF, and 0 if it is a CF. Column (1) displays the estimates before any matching. Column (2) provides the estimates after the one-to-one propensity score matching.

Table 2.D.2: Logit estimates of WOFs and CFs on the matched sample

	Year 1 - Year 2 (1)	Year 1 - Year 4 (2)	Year 1 - Year 6 (3)
WOF	-0.33 (0.40)	-0.49** (0.23)	-0.54*** (0.21)
Entrepreneur characteristics			
Sociodemographic Status			
French	-1.31** (0.59)	-1.42*** (0.35)	-1.53*** (0.31)
Male	-1.29*** (0.37)	-0.25 (0.25)	-0.22 (0.22)
Age under 35 (base)			
Age between 35 and 49	-0.67 (0.43)	-0.62*** (0.23)	-0.55*** (0.21)
Age over 50	-0.43 (0.72)	-0.46 (0.36)	-0.77** (0.37)
Lower than A-diploma (base)			
A-level diploma	-0.44 (0.64)	0.04 (0.31)	-0.09 (0.28)
A-level diploma plus 2 years of education	-0.09 (0.55)	-0.15 (0.36)	-0.44 (0.34)
A-level diploma over 2 years of education	-1.31** (0.67)	-0.11 (0.35)	-0.27 (0.28)
Risk-aversion			
Opportunity entrepreneurship	-0.39 (0.41)	-0.8*** (0.23)	-0.67*** (0.22)
Part-time entrepreneurship	-1.12 (0.69)	-0.38 (0.36)	-0.2 (0.28)
Entrepreneurial Skills			
Prior management experience	0.58 (0.51)	0.06 (0.31)	0.17 (0.27)
Received entrepreneurial training	-1.03* (0.53)	-0.42 (0.26)	-0.43* (0.23)
Entrepreneurs in close social network	0.19 (0.46)	-0.10 (0.26)	-0.19 (0.19)
Small-firm experience (base)			
Medium-firm experience	0.25 (0.57)	0.41 (0.26)	0.40* (0.24)
Large-firm employees	-0.81 (1.15)	-0.44 (0.56)	-0.40 (0.58)
Firm Characteristics			
Financing			
Capital need: <16k (base)			
Capital need: 16k-80k	-0.74 (0.44)	0 (0.26)	-0.22 (0.23)
Capital need: >80k	-1.18* (0.86)	0.59 (0.42)	0.09 (0.36)
Bank finance	0.21 (0.52)	-0.47* (0.27)	-0.18 (0.23)
Received public aid	-0.02 (0.46)	-0.46* (0.25)	-0.66*** (0.21)
Size			
Number of employees: 0 (base)			
Number of employees: [1-5)	0.31 (0.66)	0.21 (0.31)	0.28 (0.28)
Number of employees: [5-10)	0.87 (0.89)	-0.21 (0.52)	0.20 (0.39)
Number of employees: >=10	2.39** (0.93)	0.93* (0.49)	1.12*** (0.41)
Plan to hire new employees	-0.78* (0.41)	-0.16 (0.23)	-0.09 (0.20)
Entry mode			
Firm takeovers	-2.15*** (0.61)	-1.26*** (0.33)	-0.94*** (0.25)
Urban region	0.14 (0.49)	-0.04 (0.26)	0.14 (0.22)
Sector fixed effects	Yes	Yes	Yes
Cohorts fixed effects	Yes	Yes	Yes
Number of observations	8,422	15,613	20,816

NOTE: Standard errors in parentheses. Significant at ** 5%, *** 1% confidence levels. Dependent variable is a binary that equals 1 if the firm is a WOF, and 0 if it is a CF.

Table 2.D.3: Stratified Cox estimates of WOFs and CFs on the matched sample

	Year 1 - Year 2 (1)	Year 1 - Year 4 (2)	Year 1 - Year 6 (3)
WOF	-0.30 (0.43)	-0.46* (0.24)	-0.49** (0.21)
Entrepreneur characteristics			
Sociodemographic Status			
French	0.47 (1.18)	-0.31 (0.54)	-0.51 (0.45)
Male	-0.96** (0.47)	0.09 (0.32)	0.09 (0.27)
Age under 35 (base)			
Age between 35 and 49	-0.02 (0.46)	-0.27 (0.25)	-0.24 (0.21)
Age over 50	0.29 (0.73)	-0.11 (0.36)	-0.41 (0.36)
Lower than A-diploma (base)			
A-level diploma	-0.83 (0.70)	0.1 (0.33)	0 (0.29)
A-level diploma plus 2 years of education	-0.22 (0.65)	-0.08 (0.39)	-0.33 (0.36)
A-level diploma over 2 years of education	-1.58** (0.79)	-0.15 (0.37)	-0.23 (0.29)
Risk-aversion			
Opportunity entrepreneurship	0.46 (0.48)	-0.33 (0.27)	-0.25 (0.24)
Part-time entrepreneurship	-1.19* (0.67)	-0.35 (0.35)	-0.14 (0.27)
Entrepreneurial Skills			
Prior management experience	0.84 (0.58)	0.25 (0.32)	0.34 (0.28)
Received entrepreneurial training	-0.66 (0.54)	-0.10 (0.28)	-0.10 (0.24)
Entrepreneurs in close social network	0.66 (0.50)	0.14 (0.24)	0 (0.20)
Small-firm experience (base)			
Medium-firm experience	0.63 (0.62)	0.58** (0.27)	0.56** (0.23)
Large-firm employees	-0.35 (1.35)	-0.08 (0.58)	-0.10 (0.58)
Firm Characteristics			
Financing			
Capital need: <16k (base)			
Capital need: 16k-80k	-0.71 (0.47)	0 (0.28)	-0.21 (0.24)
Capital need: >80k	-1.42 (0.87)	0.60 (0.42)	0.15 (0.36)
Bank finance	0.23 (0.54)	-0.54* (0.28)	-0.24 (0.23)
Received public aid	0.74 (0.62)	0.02 (0.28)	-0.24 (0.22)
Size			
Number of employees: 0 (base)			
Number of employees: [1-5]	0.46 (0.72)	0.52 (0.38)	0.62* (0.35)
Number of employees: [5-10]	0.94 (0.94)	0.25 (0.54)	0.61 (0.42)
Number of employees: >=10	2.12** (1.03)	0.94* (0.55)	1.15** (0.45)
Plan to hire new employees	-0.65 (0.43)	-0.09 (0.23)	0 (0.2)
Entry mode			
Firm takeovers	-1.87*** (0.68)	-1.03*** (0.33)	-0.71*** (0.25)
Urban region	0.43 (0.53)	0.14 (0.27)	0.24 (0.22)
Sector fixed effects	Yes	Yes	Yes
Cohorts fixed effects	Yes	Yes	Yes
Number of observations	8,422	15,613	20,816

NOTE: Standard errors in parentheses. Significant at ** 5%, *** 1% confidence levels. Dependent variable is a binary that equals 1 if the firm is a WOF, and 0 if it is a CF.

Table 2.D.4: Logit estimates on firm exit of WOFs and CFs (time span: 6 years)

	Matched CFs (1)	Matched WOFs (2)
Entrepreneur characteristics		
Sociodemographic Status		
French	-0.84** (0.42)	-2.02*** (0.53)
Male	-0.44 (0.29)	0 (0.38)
Age under 35 (base)		
Age between 35 and 49	-0.61** (0.29)	-0.77** (0.33)
Age over 50	-0.65 (0.52)	-1.52*** (0.59)
Lower than A-diploma (base)		
A-level diploma	-0.66 (0.41)	0.58 (0.55)
A-level diploma plus 2 years of education	-0.58 (0.38)	-0.52 (0.76)
A-level diploma over 2 years of education	-0.76** (0.34)	0.05 (0.55)
Risk-aversion		
Opportunity entrepreneurship	-0.79*** (0.31)	-0.65* (0.38)
Part-time entrepreneurship	-0.72* (0.38)	-0.14 (0.44)
Entrepreneurial Skills		
Prior management experience	0.24 (0.37)	0.56 (0.46)
Received entrepreneurial training	-0.19 (0.29)	-0.66 (0.44)
Entrepreneurs in close social network	-0.25 (0.27)	-0.43 (0.35)
Small-firm experience (base)		
Medium-firm experience	0.88*** (0.32)	-0.10 (0.42)
Large-firm employees	-0.05 (0.88)	-1.06 (0.98)
Firm Characteristics		
Financing		
Capital need: <16k (base)		
Capital need: 16k-80k	-0.11 (0.32)	-0.42 (0.40)
Capital need: >80k	0.86* (0.48)	-1.14 (0.90)
Bank finance	0.07 (0.33)	-0.46* (0.48)
Received public aid	-0.87*** (0.27)	-0.66 (0.39)
Size		
Number of employees: 0 (base)		
Number of employees: [1-5]	-0.04 (0.37)	0.74 (0.48)
Number of employees: [5-10]	0.34 (0.51)	-0.52 (0.94)
Number of employees: >=10	0.95* (0.53)	2.67*** (0.94)
Plan to hire new employees	-0.35 (0.26)	0.22 (0.35)
Entry mode		
Firm takeovers	-1.11*** (0.37)	-0.9** (0.43)
Urban region	0.40 (0.30)	-0.05 (0.42)
Sector fixed effects	Yes	Yes
Cohorts fixed effects	Yes	Yes
Number of observations	10,050	10,766

NOTE: Standard errors in parentheses. Significant at ** 5%, *** 1% confidence levels.

Table 2.D.5: Stratified Cox estimates on firm exit of WOFs and CFs (time span: 6 years)

	Matched CFs (1)	Matched WOFs (2)
Entrepreneur characteristics		
Sociodemographic Status		
French	-0.08 (0.67)	-0.06 (1.31)
Male	-0.28 (0.36)	0.51 (0.43)
Age under 35 (base)		
Age between 35 and 49	-0.42 (0.33)	-0.23 (0.37)
Age over 50	-0.61 (0.58)	-0.51 (0.59)
Lower than A-diploma (base)		
A-level diploma	-0.63 (0.41)	0.87 (0.55)
A-level diploma plus 2 years of education	-0.55 (0.42)	-0.28 (0.76)
A-level diploma over 2 years of education	-0.85** (0.40)	0.24 (0.54)
Risk-aversion		
Opportunity entrepreneurship	-0.44 (0.44)	-0.18 (0.42)
Part-time entrepreneurship	-0.71* (0.39)	-0.12 (0.42)
Entrepreneurial Skills		
Prior management experience	0.50 (0.45)	0.68 (0.49)
Received entrepreneurial training	0.06 (0.36)	-0.23 (0.45)
Entrepreneurs in close social network	0.02 (0.30)	-0.31 (0.35)
Small-firm experience (base)		
Medium-firm experience	1.06*** (0.33)	0.05 (0.42)
Large-firm employees	0.17 (0.86)	-0.50 (1.2)
Firm Characteristics		
Financing		
Capital need: <16k (base)		
Capital need: 16k-80k	-0.02 (0.86)	-0.57 (0.41)
Capital need: >80k	0.99* (0.52)	-1.06 (0.79)
Bank finance	-0.09 (0.36)	-0.42 (0.43)
Received public aid	-0.54 (0.33)	-0.01 (0.42)
Size		
Number of employees: 0 (base)		
Number of employees: [1-5]	0.34 (0.50)	1.05* (0.63)
Number of employees: [5-10]	0.73 (0.63)	-0.11 (0.95)
Number of employees: >=10	1.07* (0.62)	2.08** (1.01)
Plan to hire new employees	-0.38 (0.27)	0.29 (0.34)
Entry mode		
Firm takeovers	-1.04** (0.41)	-0.3 (0.42)
Urban region	0.56 (0.34)	0.08 (0.39)
Sector fixed effects	Yes	Yes
Cohorts fixed effects	Yes	Yes
Number of observations	10,050	10,766

NOTE: Standard errors in parentheses. Significant at ** 5%, *** 1% confidence levels.

2.E   Alternative matching procedures

Figure 2.E.1: Survival functions by mode of governance after matching (PSM 1:3)
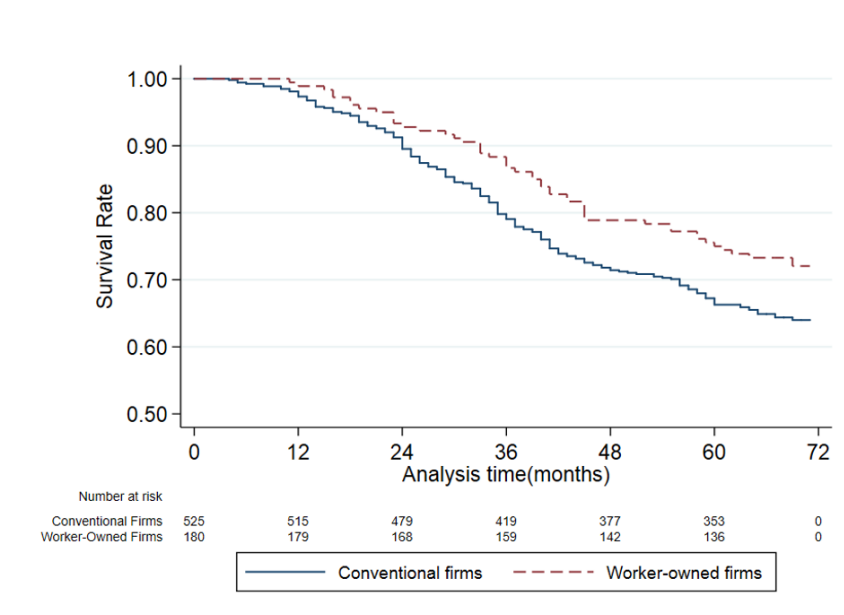
Figure 2.E.2: Survival functions by mode of governance after matching (Mahalanobis)
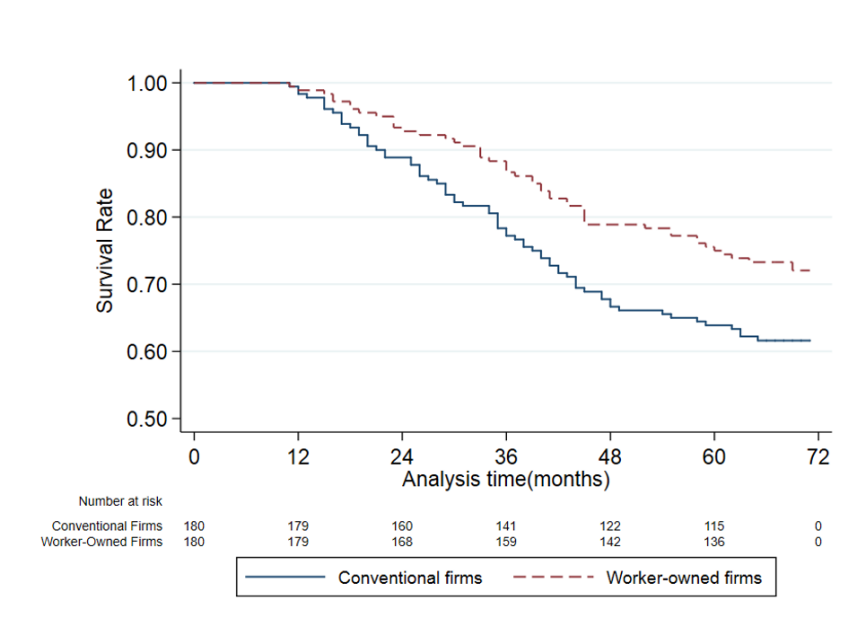
Chapter 3

Survival Advantage of Worker Buyouts over Newly Created Worker-Owned Firms

Summary of the chapter

Various theories predict that firm buyouts survive longer than newly created firms. This study seeks to know whether it is the case for worker-owned firms, i.e., firms owned and controlled mostly by their workers. I conduct a comparative survival analysis of French worker-owned firms distinguished by their entry mode (i.e., newly created, worker buyouts of sound conventional firms, worker buyouts of conventional firms in difficulty, or worker buyouts of nonprofit organizations). The hazard of exit is 32% lower for worker buyouts of sound conventional firms than newly created worker-owned firms, 18% for worker buyouts of conventional firms in difficulty, and 64% for worker buyouts of nonprofit organizations. This study confirms that worker buyouts, even of conventional firms in difficulty, have on average a survival advantage over newly created worker-owned firms. Surprisingly, I also show that this survival advantage is similar across sectors with different knowledge intensity but is lower in high capital-intensive sectors than in low capital-intensive ones. This study offers the first survival analysis distinguishing four modes of entry among worker-owned firms. Endogeneity issues limit the scope of the results and should be tackled in future research. Overall, these findings show that worker-owned firms are composed of groups with different survival likelihoods that are obscured if one only looks at the aggregate population. With caution, support agencies could foster worker buyouts of firms in difficulty and of nonprofit organizations as viable forms of entrepreneurship.

Classification

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Contents of the Chapter

1.   Introduction

In France, the share of firm owners aged 50 or older has steadily increased during the last decades (from 42% in 1982 to 46% in 2012). In 2019, almost half of the firms employing at least 10 employees are owned by baby boomers aged 50 or older (Chardon *et al.*, 2021). These firms will either change owners or disappear in the near future. This so-called "silver tsunami" that is common across western developed countries offers a window of opportunity for employee ownership that will not be seen again for many decades. Moreover, the current economic crisis due to the Covid-19 pandemic has dramatically increased the number of "zombie firms," i.e., firms that should have exited during the year but are kept alive by safeguard measures implemented by states. In France, the number of firm failures was 29% lower in 2020 than in 2019 for small businesses (Cros *et al.*, 2020). When those state protections cease, the number of firms to be bought out must increase.

The worker-owned firm movement could benefit from this twofold increase in demand of firm buyouts. Worker-owned firms are small business enterprises (e.g., the biggest French worker-owned firm counts 963 worker-members in 2019) representing a minute proportion of firms in any country (e.g., 1 for 10,000 in France). In the case of buyouts, worker-owned firms have the advantage over conventional firms of ensuring to the entrepreneur-seller of the firm that the firm's legacy and activity will continue and to the worker-members that their job will be secured. Even if various theories have put into question the viability of worker-owned firms, empirical evidence accumulated in the last decades shows that worker-owned firms are viable entrepreneurial forms that present high survival rates. A better understanding of the survival of worker-owned firms, distinguishing those that are newly created and those that are converted, would bring valuable insights on the role that worker-owned firms could play in the next years and decades.

Various theories predict that firm buyouts survive longer than newly created firms. This study seeks to know whether it is the case for worker-owned firms, i.e., firms owned and controlled mostly by their workers (Dow, 2018*a*). Worker-owned firms are often referred to as labor-managed firms, worker cooperatives, producer cooperatives, or self-managed firms. Worker-owned firms are an alternative structure of ownership to conventional or investor-owned firms where control and return rights are distributed mostly to investors (Ellerman, 2007; Hansmann, 1996). French legislation defines the operations and status of worker-owned firms in accordance with the principles of the International Cooperative Alliance which defines cooperative identity. Hence, in French worker-owned firms (called SCOPs), worker-members own at least 65% of votes at the shareholders' meeting (i.e., control rights). The votes at the shareholders' meeting are not proportional to the number of shares owned but follow the principle of "one person equals one vote." Therefore, each shareholder has one

vote whatever their capital invested in the firm. Worker-members also own at least 51% of the equity (i.e., profit rights). The value of each shareholder's capital is fixed at its acquisition value. No capital gain is possible when the shares are redeemed in the event of the departure of the employee shareholder. In the event of net profits on liquidation (fund surplus, liquidation bonus), French law prohibits the distribution of these profits to worker-members. The surplus must be transferred to cooperative organizations or support agencies. These features of French worker-owned firms are common among countries with legislation devoted to worker-owned firms based on the principles of the International Cooperative Alliance, which ensures a certain degree of generality of the results of this article.

There are multiple ways to create a worker-owned firm. I refer to "newly created firms" as worker-owned firms (WOFs) created from scratch, and to "worker buyouts" (WBOs) as worker-owned firms created from an existing firm. Worker buyouts form a heterogeneous category. Following the operational categorization of worker-owned firms' support agencies and previous studies (e.g., Pérotin (2004); Olsen (2013), I distinguish three types of WBOs by their mode of entry: WBOs of sound conventional firms, WBOs of ailing conventional firms, and WBOs of nonprofit organizations (mostly volunteer organizations and other types of cooperatives such as consumer cooperatives). Following CGSCOP (2015), I define an ailing firm as a firm that faces important economic difficulties and that is subject or not to legal proceedings (i.e., conciliation, safeguard, rehabilitation, or liquidation proceedings). I do not consider family-owned firms as a mode of entry since, to the best of my knowledge, no worker-owned firms are family-owned in France.

This article offers a comparative survival analysis of French worker-owned firms distinguished by their entry mode. I use the records of the CGSCOP (the national support agency of French WOFs) which contains yearly information on the total population of worker-owned firms over the period of 1989 to 2018. My empirical strategy is based on a semiparametric complementary log-log survival model.

This study confirms that worker buyouts, even of conventional firms in difficulty, have on average a survival advantage over newly created worker-owned firms. After controlling for firm's entry size and industrial, regional, and yearly fixed effects, the hazard of exit is 32% lower for WBOs of sound conventional firms than newly created WOFs, 18% for WBOs of conventional firms in difficulty, and 64% for WBOs of nonprofit organizations. Surprisingly, I also show that this survival advantage is similar across sectors with different knowledge intensity but is lower in high capital-intensive sectors than in low capital-intensive ones.

While some evidence exists on the effect of entrepreneurial characteristics of firm takeovers and newly created firms' survival patterns (Xi *et al.*, 2020; Manjón-Antolín and Arauzo-Carod, 2008) Arauzo-Carod, 2008), this article is, to the best of my knowledge, the first survival analysis distinguishing four modes of entry among worker-owned firms. Previ-

ous studies comparing worker-owned firms of different entry modes have provided hazard rates without regressing them on any covariates (Pérotin, 2004, 1987). Previous studies on worker-owned firms' survival have also relied on aggregate descriptive comparisons (Olsen, 2013; Ben-Ner, 1988a) or have not distinguished between their different modes of entry (Batstone, 1983; Staber, 1989; Estrin and Jones, 1992; Arando *et al.*, 2009; Burdín, 2014). Contrary to previous studies, this article relies on appropriate microdata for four modes of entry and applies semiparametric survival analysis techniques.

The findings of this paper are important for policy makers and support agencies of worker-owned firms. Fostering worker buyouts, even of conventional firms in difficulty, might be a sustainable way to develop the worker-owned firm movement. This paper also helps to inform nonprofit organizations that becoming a worker-owned firm is a viable entrepreneurial form.

The rest of this article is organized as follows. Section 2. reviews the theoretical and empirical literature on the factors of firm survival. Section 3. describes the data. Section 4. discusses the methodology. The main results are discussed in Section 5.. Robustness checks are displayed throughout the presentation of results. Section 6. concludes.

2.   Firm survival factors: Theoretical framework and previous evidence

I review the rationale and previous evidence of the negative effect of firms' characteristics at entry or buyout (i.e., size and age) over their hazard rates and their life cycles. I also stress the expected differences in firm survival between entry modes due to sectoral characteristics.[1]

2.1.   Firm life cycle

Previous evidence shows that worker-owned firms suffer from a "liability of adolescence" (Olsen, 2013) rather than a "liability of newness" (Stinchcombe, 1965). In this case, the risk of exit does not monotonically decrease with the firm's age. Rather, worker-owned firms face one or two years of low-risk honeymoon after birth before their risk of exit peaks at 3-5 years and then declines steadily over time. This honeymoon period might be due to a greater

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[1]Because I investigate the effect of the economic environment on the survival of worker-owned firms, personal characteristics of the entrepreneur(s) are not considered in this study, though several studies show that they may be rather decisive for a firm's post-entry development (Xi *et al.*, 2020; Vivarelli, 2004). In addition to these characteristics at stake in different entry modes of conventional firms, there might be specific entrepreneur characteristics or workers' motives that differ between entry modes of worker-owned firms such as democratic skills or psychological commitment (Pérotin, 2004).

commitment and solidarity among the workers following the firm's entry. Burdín (2014) finds that the risk of exit of Uruguayan worker-owned firms peaks in year 2. Pérotin (2004) finds that it peaks in year 3 in France. Staber (1989) finds that it peaks in year 5 in Canada. Pérotin (2004) and Staber (1989) also find that the risk of failure of worker-owned firms increases again around year 15, suggesting that they face a "mid-life crisis." This crisis might be due to the departure of the firm's founders or an increase in the heterogeneity of workers (Batstone, 1983).

The non-monotonic age dependency of failure risk is common to newly created WOFs and WBOs, but there still might be differences in the level of hazard rates they face. Pérotin (2004) provides evidence that hazard rates of newly created WOFs are 2 times higher than those of WBOs of sound firms and 1.5 times higher than those of WBOs of ailing firms. Nevertheless, many theoretical arguments defend that the age dependency of firm survival reduces and even vanishes over firm life cycle. For instance, financial constraints are more pronounced for young firms than for mature firms with an established track record (Honjo, 2000). Young firms are more vulnerable to selection pressures than existing firms due to a "lack of formal goals, clear boundaries, and unambiguous technologies" (Amburgey and Rao, 1996). In line with the organizational ecology approach, Pérotin (2004) and Staber (1989) stress that WBOs might have organizational inertia that hinders adaptation when the environment changes, which newly created WOFs do not share. Thus, WBOs would exit earlier than newly created WOFs, counterbalancing their survival advantage.

Whatever their mode of entry, the hazard rates of worker-owned firms are expected to have an inverted U-shaped form. Newly created WOFs are expected to suffer more from liability of adolescence than WBOs, entailing a survival advantage of the latter. However, this advantage is expected to reduce over the firm life cycle. Hence, my first hypothesis:

H1: The survival advantage of worker buyouts over newly created worker-owned firms is expected to reduce over firm life cycle.

2.2. Firm characteristics at entry

Greater access to resources at firm's entry entails a survival advantage. Industrial organization literature shows that firm's entry size monotonically increases firm survival and post-entry performance (Agarwal and Audretsch, 2001; Mata and Portugal, 1994). Larger firms should be able to survive longer because, if they find themselves to be less efficient than they had expected, they may get smaller before they exit. Besides, in the case of large size at entry, more periods with bad results will be needed to eliminate the a priori positive profit expectation because entry size signals the priors of entrepreneurs (larger size at entry indicating greater a priori expectations of success). Small firms employ less capital-intensive

methods (Acs and Audretsch, 1990) and, therefore, variable costs represent a greater proportion of total costs. If output prices go down, these differences in the composition of cost implies that smaller firms would exit first. WBOs are typically larger than newly created WOFs at entry. The survival advantage resulting from size might be balanced by higher organizational and informational costs. Conversion of existing firms (whether conventional or nonprofit) into worker-owned firms requires organizational changes and modifications of workers' psychological commitment to the firm that are more easily satisfied in small worker teams. Nevertheless, the effect of entry size on the survival of worker-owned firms is expected to be positive whatever their mode of entry. Hence, my second hypothesis:

H2: Firm entry size is expected to increase worker-owned firms' survival regardless of their entry mode.

By definition, firm buyouts are older and more experienced than newly created firms, thus ensuring more resources to the former that is likely to result in a survival advantage. However, it is not obvious that the pre-conversion lifespan of WBOs significantly impacts their hazards of exit. Different types of buyouts must be distinguished here. According to numerous case studies, WBOs of ailing firms represent a radical and substantial change – a crisis that shrinks the number of workers, modifies the investment strategy, renews the networks of buyers, changes the process of production, and incites workers and managers to participate in democratic governance (Bassi and Fabbri, 2019; Monni *et al.*, 2017; Azzelini, 2016; Grégoire and Delalieux, 2015). Conventional firms are in difficulty precisely because their capabilities accumulated over their lifespan are inefficient, and thus, do not imply a competitive advantage once the conventional firms are bought out by their workers. In fact, almost all WBOs of ailing firms in my sample are born with a different identification number than the firm they rescued, while such a change of identification number is not legally mandatory. For WBOs of nonprofit organizations, the change is expected to be less radical than for WBOs of ailing firms, but still entails a substantial change of the firm's goals and technology (Billaudeau and Moysan, 2019). Conversion of nonprofit organizations into worker-owned firms implies entering into competitive markets and employing mostly wage workers instead of mostly volunteers (Salamon and Sokolowski, 2018). The pre-conversion age effect might significantly increase the survival of only WBOs of sound firms because their conversion entails continuing with the same workforce and investment strategy. In this case, converting into worker-owned firms is more a formal than a substantive change (Barbot-Grizzo, 2019; Murphy, 2017). Workers and managers are accompanied by the regional support agencies for several years to ensure the smoothest conversion possible (Charmettant and Renou, 2021). Therefore, the pre-conversion lifespan is expected to increase converted worker-owned firms' survival, especially of WBOs of sound conventional

firms. Hence, my third hypothesis:

H3: Pre-conversion lifespan is expected to increase worker buyouts' survival.

2.3. Sectoral characteristics

Debt and equity are the two means through which conventional firms can raise capital beyond auto-investment. But the equity leverage in worker-owned firms is very limited since they do not allow investors to have an important voice in decision-making. [2] Therefore worker-owned firms rely mainly on debt to raise capital. In addition, worker-owned firms might suffer from the so-called "horizon problem" (Furubotn and Pejovich, 1972). Because of the lack of recoupable claims on the firm's shares, workers in worker-owned firms can only recover their investment while they are present in the firm, thus leading to an adverse selection of short-term investments over long-term investments. Worker-owned firms would then underinvest in the long term. The increase in capital requirements should hamper the survival of worker-owned firms (Mikami and Tanaka, 2010). Evidence shows that capital intensity has a negative effect on the entries of worker-owned firms (Podivinsky and Stewart, 2007; Ben-Ner, 1988a). This effect is expected to be stronger for newly created WOFs than WBOs, leading us to predict that, everything else being equal, newly created WOFs will concentrate in low capital-intensive sectors while WBOs will be evenly spread in low and high capital-intensive sectors (Ben-Ner, 1988b). WBOs are expected to enjoy better access to financial resources than newly created WOFs because they offer an existing track record of credit history and can use their immobilizations as collateral (Olsen, 2013). Also, sunk costs might have already been made in WBOs. However, the conversion into worker-owned firm implies that the workers buy the shares of the existing firm and provide capital from their own earnings to make necessary investment, which might lower the incentive for creation, especially for WBOs of firms in difficulty where the necessary investments might be higher than in other forms of WBOs. Despite this caveat, the negative effect of capital intensity on the survival rate of worker-owned firms is expected to be higher for newly created WOFs than WBOs. Hence, my fourth hypothesis:

H4: The survival advantage of worker buyouts is expected to be higher in high capital-

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[2]In France, for instance, external investors that are not worker-owned firms cannot legally own more than 35% of votes at the annual shareholder meeting. In virtue of the principle "one person equals one vote," external investors have one vote regardless of the number of shares they own in the firm. Exceptions can be decided by each worker-owned firm to distribute a number of votes proportional to the shares owned by external investors. But even in that case, the external investors can only have a minor share of profit since the dividends due to members, whether workers or not, cannot exceed 33% of the total profit of the firm. The remuneration of the dividend is fixed to the average remuneration of bonds of the last three years.

intensive sectors than in low capital-intensive sectors.

The pre-conversion lifespan of WBOs provides them with resources, especially human capital, lacking in newly created WOFs. Workers in WBOs have acquired experience in their market such as the volatility of demand, or they might have developed specific knowledge tied to the firm's technology. On the contrary, newly created WOFs must face informational costs on market structure and demand. This informational asymmetry between WBOs and newly created WOFs is likely to provide a survival advantage to the former, which is also likely to get stronger in high knowledge-intensive sectors. These sectors are indeed characterized by high skill-activities requiring a high investment in labor or human capital. However, the effect of pre-conversion lifespan might not be significant for WBOs of ailing or nonprofit firms as already discussed in section 2.2. Moreover, the workers creating a worker-owned firm from scratch in a given sector might have past experience in this sector, thus counterweighting the survival advantage of WBOs. Despite these caveats, my fifth hypothesis is as follows:

H5: The survival advantage of worker buyouts is expected to be higher in high knowledge-intensive sectors than in low knowledge-intensive sectors.

3.   Data and descriptive statistics

The dataset covers the entire population of French worker-owned firms from 1989 to 2018 (4,416 firms). The lifespan of worker-owned firms is measured in years. The available firm-level information includes the worker-owned firms' year of entry, year of exit, industry class (European NACE classification), region of creation (NUTS-2), number of worker-members at entry (i.e., workers that are associates to the worker-owned firm in which they work), and mode of entry (i.e., newly created WOFs, WBOs of sound conventional firms, WBOs of ailing conventional firms, WBOs of nonprofit organizations). The analysis is based on all cohorts of worker-owned firms beginning with 1989. I did not consider firms that were already active at the beginning of the observation period, as their spells are left censored, that is, there is no information on their birth dates.

The dataset is based on the monitoring records of the national confederation of worker-owned firms (CGSCOP). The CGSCOP is a nonprofit organization charged by the French Government to provide the official list of existing worker-owned firms every year. Only the firms registered on this list must conform to obligations listed in special laws and can benefit from fiscal advantages attached to them. Therefore, the entry date, mode of entry, and exit date of each worker-owned firm is monitored by the CGSCOP. Exit comprises failure, degeneration, and closure of sound worker-owned firms, but information on the reason for exit is not

available. This is a potential limitation as cases of successful firms being bought out by another firm are counted as exits. It is also not possible to identify mergers and acquisitions. However, a negligible fraction of worker-owned firm exits can be explained by degeneration or mergers. For instance, Magne (2016, p. 49) counts only 29 French worker-owned firms degenerating into conventional firms over a four-year period. French law also limits the possibilities for the conversions of worker-owned firms into conventional firms without closing the worker-owned firm and opening a new conventional firm.

The categorization of the worker-owned firm entries into four modes of entry has been used by the CGSCOP since the beginning of its monitoring of French worker-owned firms and is made for operational purposes. CGSCOP's regional agencies provide support to worker-owned firms adapted to their mode of entry. They are particularly important in supporting the workers in the creation or buyouts processes. For instance, the WBOs of sound conventional firms usually take a few years during which workers are informed of the legal and organizational specificities of worker-owned firms. The founder-entrepreneur often becomes an external member in the WBO to ensure that the transition goes well and that the firm's activities continue.

To assess my hypothesis on the effects of the firm characteristics at entry, I measure the firm entry size by the logarithm of the number of worker-members at the creation or conversion of the firm. This is a proxy of the total number of workers since the worker-members represent on average 61% of total workers in French worker-owned firms, and this percentage increases over the firm's lifespan(Magne, 2016). To calculate the pre-conversion lifespan, I use the 'first' date of creation of WBOs recorded in the FICUS-FARE database. The FICUS-FARE database is an administrative file containing annual firm-level accounting data of all French firms. Data are collected through annual profit declarations made by the firms to the tax authorities, from annual social data providing information on employees, and from a sample of enterprises surveyed using a specific questionnaire. The FICUS file is available for the period of 1994 to 2007. Since 2008, the FARE file has replaced the FICUS file. The FARE database is available for the period of 2008 to 2018. The access to the FICUS-FARE database is granted by the Committee on Statistical Confidentiality. I use the reports of the French National Office of the Statistics on the State of Sectors (INSEE, 2017) to distinguish between low and high capital-intensive sectors. For distinguishing between low and high knowledge-intensive sectors, I use the classification established by Eurostat on the Knowledge-Intensive Activities (see Table 3.A.4 in the Appendix for more details).

The basic information on the firm-level panel for the final sample is reported in Table 3.A.1 in the Appendix. There are 4,416 different firms, including 1,292 WBOs (29% of total worker-owned firms). As the average number of yearly records per firm is 7.07, the total number of firm-year observations in the data is 31,211, including 9,239 observations of

WBOs. The average failure rate is lower for WBOs (41%) than for newly created WOFs (63%). There are no firms with time gaps and all firms exit only once.

In 2018, the population of worker-owned firms was comprised of 58% newly created WOFs, 27% WBOs of sound firms, 8% WBOs of firms in difficulty, and 8% WBOs of nonprofit organizations. This ratio of 60/40 between newly created WOFs and WBOs is not specific to France. Similar ratios are found in Spain, Italy, and the USA. In all countries where data is available, newly created WOFs always represent a large majority share of worker-owned firm population (Olsen, 2013).

Figure 3.1 plots the number of entries and exits of newly created WOFs and different types of WBOs for the period of 1989 to 2018. Figure 3.1 shows that worker-owned firms' entries have temporal patterns specific to their mode of entry. Newly created WOFs reveal a cyclic pattern with no trend, while WBOs present no clear cyclical patterns. The Pearson correlation coefficients between entry and exit series are 31% for newly created WOFs, 34% for WBOs of sound firms, -8% for WBOs of ailing firms, and 48% for WBOs of nonprofit organizations. These numbers suggest that factors impacting the survival of WBOs of ailing firms might significantly differ from the factors impacting the other entry modes of worker-owned firms.

WBO entries of sound conventional firms or nonprofit organizations present a slight positive trend over the period of 1989 to 2018. The distribution between the four entry modes has known a cyclical evolution in France. Ben-Ner (1988a) reports that WBOs stood for 40% of worker-owned firms in the late 1970s. Pérotin (1987) also reports that in 1984, WBOs of ailing firms stood for 39% of worker-owned firm entries, and WBOs of sound firms for 9%. This proportion of WBOs is mainly due to a wave of creations following the political left-wing protest of May 1968 and highly mediatized cases of workers striking and then taking over the production against the will of the managers and investors such as the firm LIP (Gourgues, 2020; Demoustier, 1984, pp. 32-34). The proportion of WBOs slightly decreased during the 1980s and 1990s to reach 20% of all WOFs, before slightly increasing in the 2000s to finally get back to 40% of worker-owned firms today. The recent increase is due to a steady slight increase of WBOs of sound conventional firms and nonprofit organizations rather than the wave that explains the proportion of 40% in the late 1970s, and is also due to the decrease in the number of newly created WOFs in the 2010s. The trend of worker-owned firm exits is null with about 75% of exits concerning only newly created WOFs within the period.

Figure 3.1: Time Series of Worker-Owned Firms' Entries and Exits by Mode of Entry
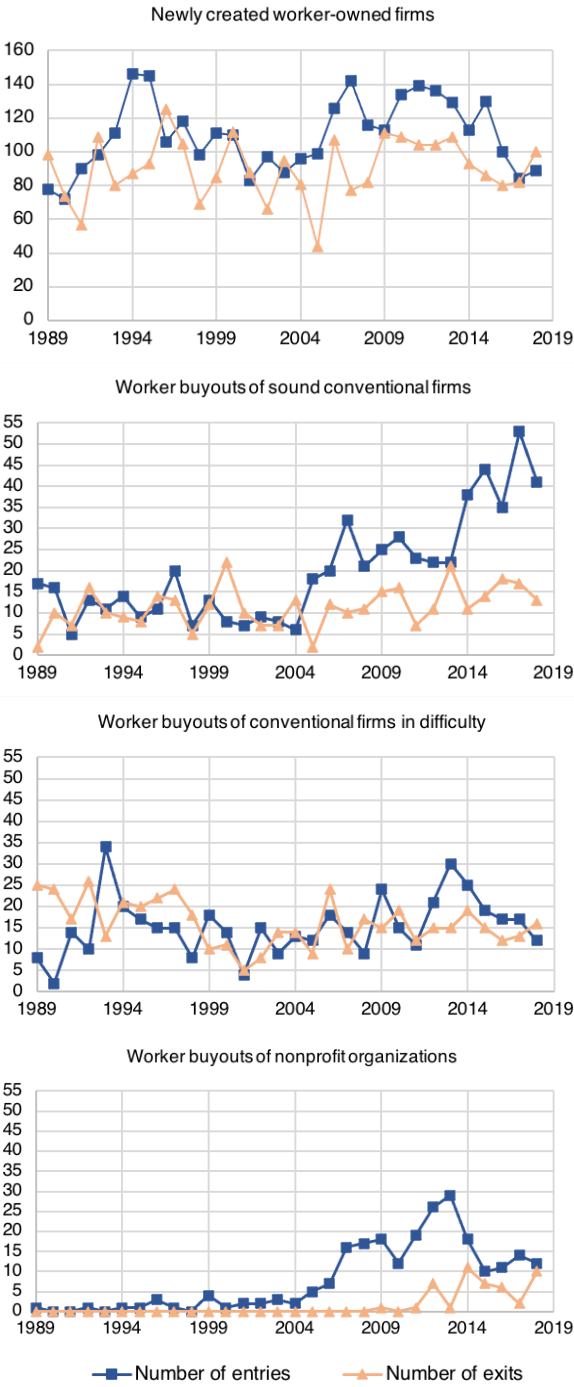
4. Methodology

The OLS approach is not suited for survival analysis because 1) OLS estimators provide the probability that the firm exits in year t unconditionally on having survived until year t, 2) OLS estimators ignore the right-censoring of observations (i.e., some firms are still in operation at the end of my sample period) resulting in biased estimates, 3) the resulting predicted probabilities of firm exits are not always meaningful as they may lie outside the [0,1] interval and the corresponding estimated variances can be negative.

The continuous-time proportional hazards model of Cox (1972) is popular in firm survival studies and used by (Burdín, 2014) on worker-owned firms. However, the Cox model is not suited for my survival analysis. First, it requires survival time to be a continuous variable and firms to be ordered exactly regarding their exit time. In my dataset, these requirements are not verified, as firm survival times are grouped into discrete one-year intervals, resulting in "ties." In the presence of tied survival times, the coefficients and standard errors of the Cox model are biased (Cox and Oakes, 1984), even when corrected by the Breslow's or Efron's method. Second, the Cox model does not allow controlling for unobserved firm heterogeneity due to computational difficulties. A failure to account for that heterogeneity leads to biases in the estimated effects of firm characteristics on the hazard of exit and to a frailty effect, i.e., a spurious negative duration dependence of the estimated Cox hazard function (Heckman and Singer, 1984).

Due to the incomplete and discrete nature of the duration data, discrete-time hazard models are the more appropriate and preferred choice for my comparative analysis of firm survival (Lancaster, 1990).

Let a firm-survival spell j be complete (cj = 1) or right-censored/incomplete (cj = 0) and the number of years a firm survives (i.e., the time to a failure event) T be used in the definition of the discrete time survival function which is the probability of firm survival at least t years:

$$S_j(t) = Pr(T_j > t) = \prod_{k=1}^{t} (1 - h_{jk}) \tag{3.1}$$

where $T_j = min\{T_j^*, C_j^*\}, T_j^*$ is a latent failure time, C_j^* is a latent censoring time for the firm survival spell j, and h is the discrete time hazard rate of ending the survival spell, that is, exiting, in t years, conditional on survival for t-1 years which is defined as:

$$h_j(t) = Pr(t - 1 < T_j \leq t)/Pr(T_j > t - 1) \tag{3.2}$$

When a binary dependent variable $y_j k$ is defined to take a value of 1 if firm-survival spell j ends in year t and 0 otherwise, its log-likelihood function is given by:

$$\log L = \sum_{j=1}^{J} \sum_{k=1}^{t} [y_{jk} \log h_{jk} + (1 - y_{jk}) \log(1 - h_{jk})] \tag{3.3}$$

where the contribution to the log-likelihood of a right-censored firm survival spell j is the discrete-time survival function, equation 3.1, and of a completed firm survival spell j in interval t is the discrete time density function (the probability of ending the spell in t years).

Equation 3.3 implies that discrete time hazard models for grouped duration times can be estimated using standard regression models for binary choice panel data (Jenkins *et al.*, 1995). To be fully estimable, the log-likelihood function requires the specification of a functional form for the discrete time hazard rate that links exit probabilities to explanatory variables. Following Fernandes and Paunov (2015), I consider three functional forms: the complementary log-log (cloglog) as my preferred functional form, and the probit and logit forms as robustness checks. For the probit and logit models, the discrete time hazard rate is distributed, respectively, as an inverse cumulative gaussian (normal) and a logistic function (the log of the odds ratio). A stacked binary choice model using a cloglog link function with time-specific intercepts is the exact discrete-time analogue of the continuous-time Cox proportional hazards model while the probit and logit models do not impose this proportionality assumption (Hess and Persson, 2011). Thus, the cloglog model assumes that the impact of a regressor on survival is the same regardless of firm age and proportional shift of the baseline hazard function common to all survival spells. In addition to the year fixed effects (i.e., firm lifespan), the baseline hazard is estimated with sector and region fixed effects that allow for unrestricted changes in the hazard rates by sectors and regions. The models are estimated by maximum likelihood.

According to Prentice and Gloeckler (1978), if we consider that the discrete hazard follows a cloglog distribution, the discrete representation of a continuous time proportional hazard can be written as:

$$h_t(X_{jt}) = 1 - exp[-exp(\alpha_t + \beta' X_{jt} + \epsilon_j)] \tag{3.4}$$

where α_t is the baseline hazard, X_{jt} is a vector summarizing the characteristics of a firm survival spell, and $\epsilon_j = \log v$ is the unobserved individual heterogeneity (frailty term) which is a random variable with a mean of zero. The vector of firm characteristics X_{jt} in equation (4) includes firm's mode of entry, size at entry, dummies for years (i.e., firm lifespan), sectors (i.e., 18 NACE 1-digit sectors), and regions (i.e., 27 NUTS-2 regions). The occurrence of specific differences in the survival advantage of WBOs are tested through Chow tests for equality of coefficients in different types of sectors.

While the identification of entry modes is straightforward, it forbids the use of firm fixed effects. Failing to account for significant unobserved individual heterogeneity leads one to

underestimate the magnitude of the coefficients and to misinterpret them, since the proportionate effect of a given covariate on the hazard rate is no longer constant and independent of survival time (Jenkins, 2004). While I display, in section 5., the estimates of a non-frailty PH cloglog model, Table 3.A.6 in the Appendix provides cloglog estimates with Normal and Gamma distributions of the frailty term.

5.   Results

5.1.   Nonparametric estimates

Figures 3.2 and 3.3 report nonparametric estimates of the survival and the hazard functions, respectively, for four entry modes of worker-owned firms, pooling all cohorts of created worker-owned firms during the period of 1989 to 2018.

Figure 3.2: Nonparametric Estimates of Survival Functions
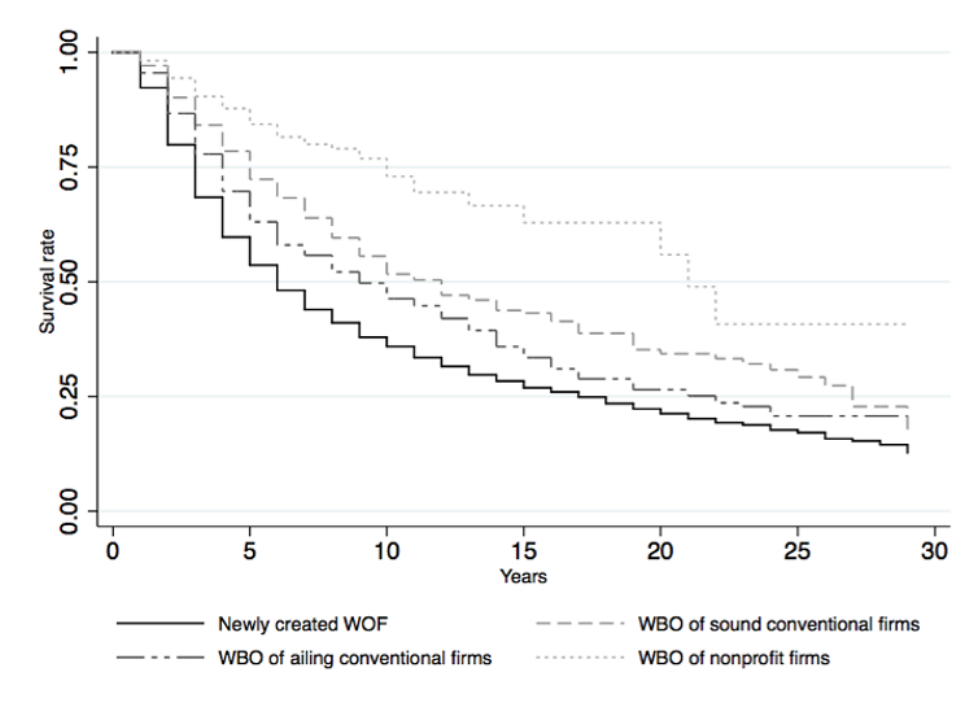
NOTE: Kaplan-Meier survival estimates of worker-owned firms according to their mode of entry, 1989-2018. WOF: worker-owned firms. WBO: worker buyouts.
SOURCE: Author's calculations using CGSCOP's records.

Figure 3.2 shows that newly created WOFs have lower survival odds: after five years, 54% of them survive, compared to 72% of WBOs of sound firms, 63% of WBOs of firms in difficulty, and 84% WBOs of nonprofit organizations. Based on the log-rank test results (Chi2=14.74, P=0.0001), I reject the null hypothesis of the survival function equality between newly created WOFs and WBOs of firms in difficulty and, a fortiori, any other worker buyout entry

mode. WBOs benefit from a survival advantage relative to newly created WOFs. Indeed, 50% of the newly created WOFs survive until year 7, whereas 50% of the WBOs of sound firms survive until year 12, 50% of the WBOs of ailing firms survive until year 10, and 50% of the WBOs of nonprofit organizations survive until year 21. Studying the Israeli kibbutzim from 1924 to 1992, Russell and Hanneman (1995) report that 50% of the worker-owed firms survive until year 4. This low value of the survival median might be explained by the high proportion of newly created WOFs in Israel. Using Spanish data, Thomas and Cornforth (1989) observe that 50% of worker-owned firms survive until year 5 in the 1975-1981 period, while 50% worker-owned firms survive until year 3 in the 1982-1983 period. This decrease in survival median might be due to an increase in the share of newly created firms in the Spanish worker-owned firm population in 1982 and 1983.

Figure 3.3: Nonparametric Estimates of Hazard Functions
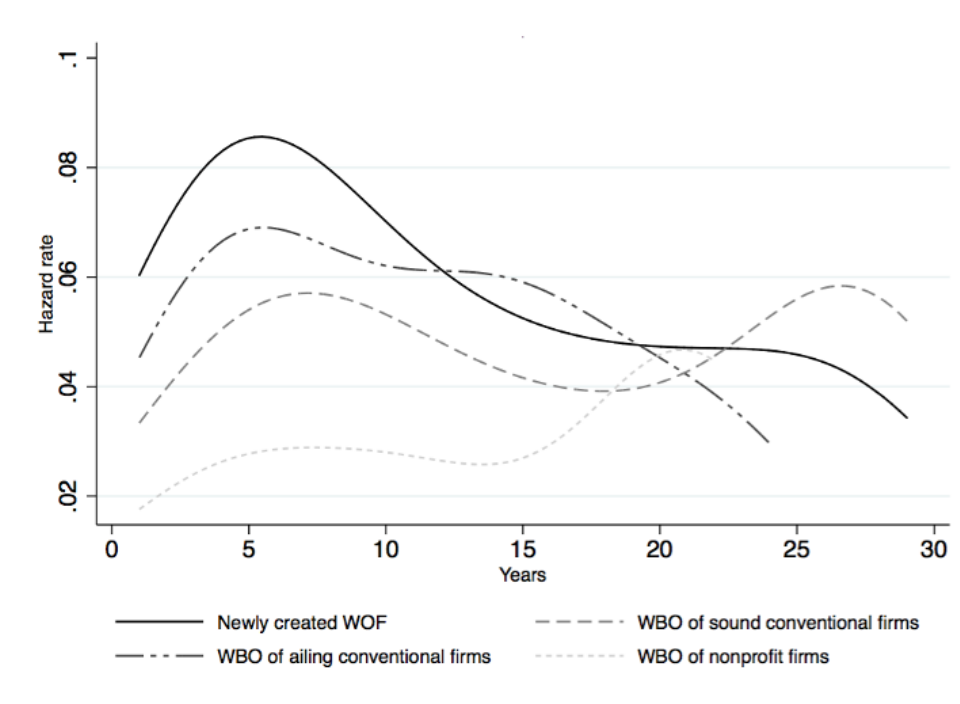
NOTE: smoothed hazard estimates (gaussian kernel) of worker-owned firms according to their mode of entry, 1989-2018. WOF: worker-owned firms. WBO: worker buyouts.
SOURCE: Author's calculations using CGSCOP's records.

According to Figure 3.3, the hazard functions of newly created firms and worker buyouts of firms in difficulty exhibit an inverted U-shape and cross at year 12. Hazard functions of WBOs of sound firms and nonprofit organizations have a wave form but, up to year 15, present an inverted-U shape. All entry types of WOFs experience a honeymoon period during the first years of their lifespan before reaching a peak at years 5-6. The pattern of greater vulnerability of adolescent WOFs observed in the data is consistent with the "liability of adolescence" observed by Pérotin (2004). The dissimilarity observed by Pérotin (2004) that after

year 10, the newly created WOFs have lower hazard ratios than WBOs of sound or ailing firms is confirmed here around year 12 for the latter and year 23 for the former. Note that before year 5 and after year 20, the confidence intervals of hazard ratios grow extensively, necessitating a cautious interpretation of the order and forms of the hazard ratios curves. In line with the findings of Pérotin (2004), I conclude from Figure 3 that the higher early exit risks of newly created worker-owned firms compared to those of worker buyouts is consistent with higher barriers to entry for the former compared to the latter. The hazard curve for newly created WOFs has the highest peak and the greatest drop thereafter. Contrary to the observations of Pérotin (2004) the hazard rates of newly created WOFs do not grow again after year 12 but they decrease slower.

Overall, worker buyouts have a survival advantage over newly created worker-owned firms that reduces over the firm's lifespan. This result confirms my hypothesis 1. The dissimilarities both in the general shape and in the level of hazard curves of different entry modes show that WOFs form a heterogeneous population comprising groups with different survival likelihoods that are obscured if one only looks at the aggregate survival curve of WOFs.

Table 3.A.2 in the Appendix provides a further exploratory analysis of the data, reporting the results of log-rank tests by 5-year cohorts, sectors, and entry sizes. WBOs of ailing firms exhibit relatively better performance than newly created WOFs in all cohorts, especially at the beginning of the period studied (1989-1998), and in all sectors, especially in manufacturing and construction. WBOs also exhibit better survival performance than newly created WOFs for all classes of entry size, except beyond 20 worker-members. The crossing of the survival functions of WBOs and newly created WOFs with at least 20 worker-members might be due to the low number of newly created WOFs (i.e., 12) relative to WBOs (i.e., 69). The higher performance of newly created WOFs over WBOs might also be due to higher barriers to entry.

Caution should be exercised before drawing definitive conclusions from Table 3.A.2 and Figures 3.2 and 3.3 because nonparametric estimates do not account for other factors that may also affect firm survival and also because, given the small number of total worker-owned firms, 5-year cohorts or sector specific survival functions are imprecisely estimated. For these reasons, I provide a more precise econometric test of the differences in survival between WBOs and newly created WOFs, estimating semiparametric models in the next subsections.

5.2. Semiparametric estimates of firms characteristics at Entry

Table 3.1 presents the cloglog estimates of the effect of the firm entry mode on the hazard of firm exit. Table 3.1 shows that WBOs of any type have higher survival chances than newly created WOFs. Expressed in terms of hazard ratios (computed as the exponential of the co-

efficients), the marginal effects of firm entry modes in column (2) imply that the hazard of exit is 32% lower for WBOs of sound conventional firms than newly created WOFs, 18% for WBOs created from rescuing conventional firms in difficulty, and 64% for WBOs of nonprofit organizations.

Table 3.1: Cloglog Estimates on Mode of Entry and Firm Exit, 1989-2018.

	(1)	(2)	(3)
Firm Entry Mode (default: Newly created WOFs)			
WBOs of sound conventional firms	-0.515***	-0.389***	-0.695***
	(0.068)	(0.076)	(0.164)
WBOs of ailing conventional firms	-0.318***	-0.200**	-0.317**
	(0.069)	(0.082)	(0.146)
WBOs of nonprofit organizations	-1.091***	-1.029***	-0.989***
	(0.143)	(0.153)	(0.310)
Firm Entry Size (log)		-0.174***	-0.109
		(0.038)	(0.091)
1-digit industry fixed effects	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Log pseudolikelihood	-8,617.087	-7,634.317	-1,313.224
Observations	31,166	28,298	5,975

NOTE: Standard errors clustered at the firm level are in parentheses. Significant at ** 5%, *** 1% confidence levels. Column (3) displays the estimates for WOFs with at least 6 worker-members at the firm entry.

Table 3.1 shows that there is a negative and significant relationship between firm entry size and the hazard of firm exit. In column (2), the increase of one point in the log of firm entry size entails a 16% decrease in hazard of firm exit. This result confirms my hypothesis 2 and implies that the bigger the firm at entry, the longer the firm survives.

On average, WBOs are bigger at entry than newly created WOFs. With 2.9 worker-members on average at entry, newly created WOFs are smaller than WBOs of sound firms (i.e., 7 worker-members at entry), WBOs of ailing firms (i.e., 11 worker-members at entry), and WBOs of nonprofit organizations (i.e., 6.5 worker-members at entry). Even if the estimates of column (2) control for the logarithm of firm size at entry, one may still be concerned that the results may be an artifact of the different size composition of worker-owned firms according to their mode of entry. To rule out this possibility, column (3) of Table 3.1 reports the cloglog estimates excluding worker-owned firms with less than 6 worker-members at entry. It is worth noting that in this case estimates were performed with 750 firms (i.e., 17% of the original sample). Despite this loss of information, results remain qualitatively unchanged. WBOs exhibit higher survival chances than newly created WOFs, even excluding very small firms, and firm entry size has the expected negative effect on hazard exits. I have run estimations with a quadratic term (not significant at usual thresholds) of firm entry size or with firm entry size as a categorical variable distinguishing very small (<6), small (6-10),

medium (11-20), and large firms (>20). I have also estimated column (2) with NACE 2-digits sector fixed effects. None of these modifications altered the results. I also estimated probit, logit, and Cox PH models (cf. Table 3.A.5 in the Appendix). The results remain unchanged.

Table 3.2 reports the cloglog estimates of the pre-conversion of lifespan on hazard rates for each type of worker buyout over the period 1994-2018. A quadratic term of pre-conversion lifespan is included to catch a potential non-linear effect. The number of observations for WBOs of ailing firms are too low (i.e., 10) to estimate any effect. The estimates of Table 3.2 show that pre-conversion lifespan has an inverted U-shaped effect on the hazard of exit of WBOs of sound conventional firms and of nonprofit organizations. A one-year increase of pre-conversion lifespan decreases on average the exit hazard of WBOs of sound firms by 8%. The effect of pre-conversion lifespan becomes positive (0.1%) on exit hazard at year 27.[3] Until year 27, as expected, the pre-conversion lifespan has a strong positive effect only on the survival of WBOs of sound conventional firms. This result confirms my hypothesis 3 and suggests that a share of the survival advantage of WBOs over newly created WOFs is due to pre-conversion lifespan.

Table 3.2: Cloglog Estimates of Pre-conversion Lifespan and Firm Exit, 1994-2018.

	WBOs of sound firms	WBOs of nonprofit organizations	All WBOs
	(1)	(2)	(3)
Pre-conversion Lifespan	-0.079***	-0.060	-0.030
	(0.029)	(0.055)	(0.021)
Pre-conversion Lifespan^2	0.001***	0.0004	0.0003*
	(0.000)	(0.0005)	(0.0002)
Firm Entry Size (log)	-0.299*	-0.409	-0.188
	(0.162)	(0.455)	(0.136)
1-digit industry fixed effects	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Log pseudolikelihood	-249.576	-96.413	-396.706
Number of observations	1,245	703	2,319
Number of firms	218	113	376
Sampling (%)	39.3	50.4	30.6

NOTE: Standard errors clustered at the firm level are in parentheses. Significant at * 10%, ** 5%, *** 1% confidence levels. Sampling refers to the percentage of sampled firms in the population of worker buyouts by entry mode. WBOs: worker buyouts.

5.3. Semiparametric estimates by sectors

Columns (1) and (2) of Table 3.3 present the cloglog estimates for low and high capital-intensive sectors. The Chow test statistic for parameter equality of the firm entry mode

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[3]The threshold of year 27 is calculated as follows: $-\beta_1/(2 \times \beta_2)$ where β_1 and β_2 are the coefficients of pre-conversion lifespan and pre-conversion lifespan ^{2}, respectively.

variable between models (1) and (2) is equal to 8.41 (p=0.015) and allows us to reject the null hypothesis of parameter equality at the 5% threshold. Therefore, I conclude that the survival advantage of WBOs over newly created WOFs is stronger in low capital-intensive sectors than in high capital-intensive sectors. This result is contrary to my hypothesis 4 and might be due to a problem of endogeneity. The newly created WOFs in high capital-intensive sectors could be more able to survive because they have overcome the barrier to entry of capital requirements. Thus, the newly created WOFs in low and high capital-intensive sectors are not strictly comparable, the latter being more likely to survive than the former. The number of firms in these sectors sustains this interpretation. Indeed, there are more newly created WOFs in low capital-intensive sectors (i.e., 1,058) than in high capital-intensive sectors (i.e., 784), whereas it is the contrary for WBOs, with 368 and 444 firms in low and high capital-intensive sectors, respectively. The high number of worker buyouts in high capital-intensive sectors is due to the overrepresentation of WBOs of ailing firms in those sectors. In low capital-intensive sectors, the estimates of table 3 comprehend 204 WBOs of sound firms, 135 WBOs of ailing firms, and 29 WBOs of nonprofit organizations. In high capital-intensive sectors, the estimates of table 3 comprehend 169 WBOs of sound firms, 246 WBOs of ailing firms, and 29 WBOs of nonprofit organizations. It is noteworthy that the coefficient for the WBOs of ailing firms is only significant at the 10% level in low capital-intensive sectors, suggesting that these firms do not entail on average a survival advantage in high capital-intensive sectors because of their high capital requirement costs. The traumatic episode during the 1980s, when worker-owned firms flourished as a response to the economic crisis, has led to a very high number of failures of these recoveries (e.g., the emblematic company of Manufrance). This episode tarnished the image of WOFs in France (Charmettant and Renou, 2021). In response, and to avoid bad publicity, the strategy of support agencies might have changed and now select more carefully which WBOs of ailing firms to support.

Columns (3) and (4) of Table 3.3 present the cloglog estimates for low and high knowledge-intensive sectors with 2-digit sectoral fixed effects. The Chow test statistic for parameter equality of the firm entry mode variable between models (3) and (4) is equal to 2.10 (p=0.350) and does not allow us to reject the null hypothesis of parameter equality at the usual thresholds. Therefore, I conclude that the survival advantage of WBOs over newly created WOFs is similar in low and high knowledge-intensive sectors. This result is contrary to my hypothesis 5, suggesting that investment in labor is independent of the entry mode of WOFs.

The effect of sectoral characteristics of knowledge- and capital-intensity are assumed to be constant over time. However, the period studied (1989-2018) includes a major economic crisis in 2008-2009 that might have structurally altered the effect of sectoral characteristics. According to log-rank tests, the survival functions of newly created WOFs and WBOs of

Table 3.3: Cloglog Estimates by Types of Sectors, 1989-2018.

	Capital-intensity		Knowledge-intensity	
	Low	High	Low	High
	(1)	(2)	(3)	(4)
Firm Entry Mode (default: Newly created WOFs)				
WBOs of sound conventional firms	-0.334**	-0.293**	-0.378***	-0.322*
	(0.133)	(0.122)	(0.085)	(0.191)
WBOs of ailing conventional firms	-0.272*	-0.204	-0.161*	-0.382*
	(0.143)	(0.125)	(0.093)	(0.201)
WBOs of nonprofit organizations	-1.357***	-0.687*	-0.929***	-1.050***
	(0.473)	(0.372)	(0.217)	(0.239)
Firm Entry Size (log)	-0.208***	-0.026	-0.151***	-0.304***
	(0.068)	(0.057)	(0.043)	(0.091)
1-digit industry fixed effects	No	No	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Log pseudolikelihood	-2,482.357	-2,114.338	-6,097.222	-1,441.026
Observations	8,610	7,559	22,425	5,804

NOTE: Standard errors clustered at the firm level are in parentheses. Significant at * 10%, ** 5%, *** 1% confidence levels. Low capital-intensive sectors (column 1) refer to Construction and Wholesale and retail trade. High capital-intensive sectors refer to Manufacturing, Transportation and storage, and Information and communication. Knowledge-intensive sectors are defined at the NACE 2-digit level and listed in Table in the Appendix.

sound firms are significatively higher in the 2010-2018 period than in the 1989-2007 period, suggesting that the economic environment, and especially the 2008-2009 economic crisis, has positively impacted the survival rates of WOFs. Therefore, I estimate a cloglog model for the time periods before and after 2008-2009. The results are presented in Table 3.A.3 in the Appendix. The results are roughly similar before and after the 2008-2009 economic crisis, suggesting that the survival advantage of WBOs over newly created WOFs depends more on firm and sectoral characteristics than on the business cycle characteristics.

6. Conclusion

The findings of this article show that worker-owned firms are composed of groups with different survival likelihoods that are obscured if one only looks at the aggregate population. Worker buyouts survive on average longer than newly created worker-owned firms, both unconditionally and conditionally on firm entry size. The hazard of exit is 32% lower for worker buyouts of sound conventional firms than newly created worker-owned firms, 18% for worker buyouts of conventional firms in difficulty, and 64% for worker buyouts of nonprofit organizations. With caution, support agencies could foster worker buyouts of firms in difficulty and of nonprofit organizations as viable forms of entrepreneurship. Contrary to my hypotheses, the survival advantage of worker buyouts over newly created worker-owned

firms is stronger in low capital-intensive sectors than in high capital-intensive sectors. This result suggests that high barriers to entry (i.e., capital requirements) positively impact the survival likelihood of newly created worker-owned firms. No significant difference in survival advantage is found between low and high knowledge-intensive sectors.

One limitation of this paper is that I am unable to assess the effect of entry mode over firm survival because of endogeneity. The firms that are converted into worker-owned firms, especially worker buyouts of ailing firms, might be selected by the CGSCOP in such way that they are more likely to survive to avoid bad publicity. Similarly, the choice of organizational structure (worker-owned or investor-owned) is hardly exogeneous. Organizational structure should be carefully chosen by the workers and investors by trading off returns and risk of investment. The choice of entry mode is not exogenous and might be correlated with omitted variables. This endogeneity issue tempers the aforementioned practical implications and should be tackled in further research. Another limit concerns the identification of entry modes. Depending on the legislation and the monitoring ability of support agencies, the mode of entry of worker-owned firms might be defined differently in other countries. For instance, Vieta (2015) uses another typology of Italian worker buyouts: "labor conflict," "employee stock ownership plan," and "negotiated." Future research comparing survival of worker-owned firms with different modes of entry in other countries and periods would test the robustness of my results.

Concerning the differences of survival rates between worker-owned firms and conventional firms, the survival differences across entry modes of conventional firms decrease over a 5-year period whereas it takes more than 20 years for the survival rates of worker buyouts of ailing firms and of nonprofit organizations to equal those of newly created worker-owned firms. Conventional buyouts have a survival rate of 70-80% at year 5 while the survival rate of newly created conventional firms is 50% (Xi *et al.*, 2020). Worker buyouts have roughly similar survival rates to converted conventional firms, while newly created worker-owned firms have higher survival rates than newly created conventional firms. A proper comparative survival analysis between worker-owned firms and conventional firms, taking into account their mode of entry, could provide valuable insights into the question of whether worker-owned firms survive longer than conventional firms.

Appendix

Table 3.A.1: Descriptive Survival Statistics

Entry mode	Total	Mean	Min.	Median	Max.
All worker-owned firms					
No. of firms	4,416				
Times at risk	31,211	7.07	1	5	29
Failures	2,591	0.59	0	1	1
Worker-owned firms newly created					
No. of firms	3,189				
Times at risk	22,037	6.91	1	5	29
Failures	2,062	0.65	0	1	1
Worker buyouts of sound conventional firms					
No. of firms	555				
Times at risk	4,021	7.25	1	5	29
Failures	226	0.41	0	0	1
Worker buyouts of ailing conventional firms					
No. of firms	448				
Times at risk	3,544	7.91	1	5	29
Failures	253	0.56	0	1	1
Worker buyouts of nonprofit organizations					
No. of firms	224				
Times at risk	1,609	7.18	1	6	29
Failures	50	0.22	0	0	1

SOURCE: Author's calculations using CGSCOP's records.

Table 3.A.2: Log-rank tests of survival functions equality between newly created WOFs and WBOs of firms in difficulty

Variable	Graphically lowest survival function	Chi2	P-value	Newly created WOFs		WBOs of firms in difficulty	
				Firms	Exits	Firms	Exits
5-year cohorts							
1989-1993	Newly created WOFs	3.95	0.047	448	87%	68	79%
1994-1998	Newly created WOFs	10.61	0.001	613	83%	75	73%
1999-2003	Newly created WOFs	0.22	0.640	490	72%	61	72%
2004-2008	Newly created WOFs	1.13	0.288	578	67%	66	65%
2009-2013	Newly created WOFs	2.98	0.084	651	50%	101	39%
2014-2018	Newly created WOFs	0.02	0.879	516	20%	90	20%
Total	Newly created WOFs	15.21	0.000	3,296	63%	461	55%
Sectors (NACE 1-digit)							
Manufacturing	Newly created WOFs	6.98	0.008	388	69%	209	55%
Construction	Newly created WOFs	7.73	0.005	714	71%	113	59%
Trade	Newly created WOFs	2.25	0.134	344	66%	22	50%
PST* activities	Newly created WOFs (crossing at t=13)	0.83	0.363	689	54%	27	41%
Information and communication	Newly created WOFs (crossing at t=3)	0.19	0.661	316	56%	18	50%
Total	Newly created WOFs	13.49	0.000	2,451	63%	389	55%
Entry size (number of worker-members at birth)							
<6	Newly created WOFs	4.95	0.026	3,042	62%	218	51%
6-10	Newly created WOFs	3.18	0.074	186	68%	105	56%
11-20	Newly created WOFs (crossing at t=16)	0.38	0.536	56	63%	69	64%
>20	WBOs of ailing firms	6.66	0.001	12	17%	69	57%
Total	Newly created WOFs	5.49	0.019	3,296	63%	461	55%

*PST means Professional, Scientific, and Technical activities.

Table 3.A.3: Nonparametric Estimates of Survival Functions

Variables	All Sectors		Low Capital-Intensive Sectors		High Capital-Intensive Sectors		Low Knowledge-Intensive Sectors		High Knowledge-Intensive Sectors	
	1989-2007	2010-2018	1989-2007	2010-2018	1989-2007	2010-2018	1989-2007	2010-2018	1989-2007	2010-2018
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Firm Entry Mode (base: newly created WOFs)										
WBOs of sound conventional firms	-0.335***	-0.337***	-0.516**	-0.121	-0.289	-0.063	-0.292**	-0.352***	-0.424	-0.274
	(0.117)	(0.115)	(0.211)	(0.214)	(0.180)	(0.214)	(0.125)	(0.132)	(0.340)	(0.266)
WBOs of ailing conventional firms	-0.274**	-0.069	-0.440**	-0.005	-0.349*	-0.065	-0.224*	-0.027	-0.292	-0.275
	(0.117)	(0.133)	(0.203)	(0.236)	(0.179)	(0.229)	(0.130)	(0.155)	(0.314)	(0.330)
WBOs of nonprofit organizations	N/A	-0.611***	N/A	-1.022**	N/A	-0.102	N/A	-0.511**	N/A	-0.640**
		(0.167)		(0.480)		(0.392)		(0.230)		(0.282)
Firm Entry Size (log)	-0.154***	-0.259***	-0.177**	-0.247**	-0.013	-0.142	-0.119**	-0.257***	-0.418***	-0.287*
	(0.051)	(0.065)	(0.085)	(0.118)	(0.076)	(0.114)	(0.058)	(0.078)	(0.150)	(0.147)
Sector fixed effects	Yes	Yes	No	No	No	No	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Log pseudolikelihood	-3,811.376	-3,018.370	-1,339.258	-854.878	-1,121.463	-744.796	-3,047.994	-2,400.294	-686.838	-546.190
Observations	12,577	12,944	4,299	3,451	3,587	3,089	10,070	10,117	2,393	2,519

Standard errors are clustered at the firm level. Significant at * 10%, ** 5%, *** 1% confidence levels. Sector fixed effects are at the 1-digit level (NACE rev.2) for columns (1)-(2) and at the 2-digits level (NACE rev.2) for columns (7)-(10).

Table 3.A.4: Typology of the Sectors according to their Knowledge Intensity

High knowledge-intensive sectors	Low knowledge-intensive sectors
Manufacture of basic pharmaceutical products	Crop and animal production, hunting and related service activities
Manufacture of computer, electronic and optical products	Forestry and logging
Air transport	Fishing and aquaculture
Publishing activities	Other mining and quarrying
Motion picture, video and television program production	Manufacture of food products
Programming and broadcasting activities	Manufacture of beverages
Telecommunications	Manufacture of textiles
Computer programming, consultancy and related activities	Manufacture of wearing apparel
Information service activities	Manufacture of leather and related products
Financial service activities	Manufacture of wood and of products of wood and cork, except furniture
Insurance, reinsurance and pension funding, except compulsory social security	Manufacture of articles of straw and plaiting materials
Activities auxiliary to financial services and insurance activities	Manufacture of paper and paper products
Legal and accounting activities	Printing and reproduction of recorded media
Activities of head offices; management consultancy activities	Manufacture of chemicals and chemical products
Architectural and engineering activities	Manufacture of rubber and plastic products
Scientific research and development	Manufacture of other non-metallic products
Advertising and market research	Manufacture of basic metals
Other professional, scientific and technical activities	Manufacture of fabricated metal products
Veterinary activities	Manufacture of electrical equipment
Employment activities	Manufacture of machinery and equipment n.e.c.
Travel agency, tour operator reservation service and related activities	Manufacture of motor vehicles, trailers and semi-trailers
Public administration and defense; compulsory social security	Manufacture of other transport equipment
Education	Manufacture of furniture
Human health activities	Other manufacturing
Creative, arts and entertainment activities	Repair and installation of machinery and equipment
Libraries, archives, museums and other cultural activities	Electricity, gas, steam and air conditioning supply
Activities of membership organizations	Sewerage
	Waste collection, treatment and disposal activities; materials recovery
	Remediation activities and other waste management services
	Construction of buildings
	Civil engineering
	Specialized construction activities
	Wholesale and retail trade and repair of motor vehicles and motorcycles
	Wholesale trade, except of motor vehicles and motorcycles
	Retail trade, except of motor vehicles and motorcycles
	Land transport and transport via pipelines
	Water transport
	Warehousing and support activities for transportation
	Postal and courier activities
	Accommodation
	Food and beverage service activities
	Real estate activities
	Activities of head offices; management consultancy activities
	Rental and leasing activities
	Security and investigation activities
	Services to buildings and landscape activities
	Office administrative, office support and other business support activities
	Social work activities without accommodation
	Sports activities and amusement and recreation activities
	Repair of computers and personal and household goods
	Other personal service activities

SOURCE: Metadata of Eurostat, Annex 8 – Knowledge Intensive Activities by NACE rev.2, available at https://ec.europa.eu/eurostat/cache/metadata/en/htec_esms.htm#data_rev15808294 88131. I list only the sectors that are available in my dataset of worker-owned firms. The classification of sectors as knowledge intensive is based on the share of tertiary educated people in each sector of industries and services according to NACE at 2-digit level and for all EU Member States.

Table 3.A.5: Semiparametric estimates with or without proportional hazards (PH) assumption.

	PH assumption		Non-PH assumption	
	Cloglog	Cox	Probit	Logit
	(1)	(2)	(3)	(4)
Firm Entry Mode (default: Newly created WOFs)				
WBOs of sound conventional firms	-0.389***	-0.372***	-0.199***	-0.406***
	(0.076)	(0.073)	(0.038)	(0.079)
WBOs of ailing conventional firms	-0.200**	-0.188**	-0.099**	-0.208**
	(0.082)	(0.078)	(0.042)	(0.086)
WBOs of nonprofit organizations	-1.029***	-0.995***	-0.493***	-1.062***
	(0.153)	(0.150)	(0.068)	(0.157)
Firm Entry Size (log)	-0.174***	-0.166***	-0.090***	-0.182***
	(0.038)	(0.036)	(0.019)	(0.039)
1-digit industry fixed effects	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	No	Yes	Yes
Log pseudolikelihood	-7,634.32	-17,190.91	-7,637.18	-7,634.81
Observations	28,298	28,342	28,298	28,298

NOTE: Standard errors clustered at the firm level are in parentheses. Significant at ** 5%, *** 1% confidence levels. Colum (1) is similar to column (2) of table 1. Column (2) reports the estimates of the Cox PH model with Breslow correction for ties. Columns (3) and (4) report the estimates of the probit and logit link functions.

Table 3.A.6: Cloglog Estimates of Frailty Effects

	No frailty	Normally distributed frailty	Gamma distributed frailty
	(1)	(2)	(3)
Firm Entry Mode (default: Newly created WOFs)			
WBOs of sound conventional firms	-0.389***	-0.684***	-0.710***
	(0.076)	(0.188)	(0.131)
WBOs of ailing conventional firms	-0.200**	-0.363**	-0.386***
	(0.082)	(0.155)	(0.137)
WBOs of nonprofit organizations	-1.029***	-1.523***	-1.450***
	(0.153)	(0.348)	(0.221)
Firm Entry Size (log)	-0.174***	-0.277***	-0.269***
	(0.038)	(0.080)	(0.060)
α_ϵ		1.420	
		(0.483)	
ρ		0.551	
		(0.168)	
γ variance			1.454***
			(0.356)
1-digit industry fixed effects	Yes	Yes	Yes
Region fixed effects	Yes	Yes	No
Year fixed effects	Yes	Yes	Yes
Log pseudolikelihood	-7,634.317	-7,626.659	-7,643.742
Observations	28,298	28,342	28,342

NOTE: Significant at ** 5%, *** 1% confidence levels. Column (1) is similar to column (2) of table 1. For the column (2), the likelihood ratio test for ρ displays Chi2(1)=15.31, P=0.000. For the column (3), the likelihood ratio test of the γ variance displays Chi2(1)=27.27, P=0.000. These LR tests indicate the significant presence of unobserved individual heterogeneity and lead to interpret cautiously the estimates provided in column (1). Results remain unchanged: worker buyouts keep surviving longer than newly created worker-owned firms.

General Conclusion

WOFs represent an implementation of democracy in firms and, as such, are likely to be immune to institutional harassment or socialwashing. WOFs have also been supported by citizens, politicians, and economists from across a wide ideological spectrum. However, WOFs represent a minute proportion of firms in our contemporary economies. This rarity of WOFs is the seminal question of the economic academic literature since the 1960s. To provide new insights into the question of how the economic performance of WOFs might explain their relative rarity compared to CFs, this thesis compares how sunk costs impact WOF prevalence, how entry resources impact WOF survival, and how WOF survival differs according to entry modes. Through a better understanding of the drivers and barriers to WOFs' economic performance, this thesis also seeks to foster fruitful reflections on efficient policies that would support the WOF movement in France and abroad.

To conclude this thesis, I review the main results obtained in the different Chapters as well as their contributions to the literature and their limitations. I also sketch directions for future research.

1. Main results, contributions, and limitations

1.1. Relatively high sunk costs of physical capital nip WOF entries in the bud

In Chapter 1, I study the determinants of WOF entry. I seek to test the theoretical prediction made by Mikami and Tanaka (2010) that the likelihood of WOF entry is the highest when the sunk costs of human capital are dominant and the sunk costs of physical capital are negligible. To perform this analysis, I use a French panel data set of 4-digit sectors in manufacturing from 2012 to 2016. I use a logit model and proxies of the sunk costs of human capital and physical capital to measure their interaction effect on the prevalence of WOFs across sectors, while controlling for other determinants of WOF prevalence. The results confirm the prediction made by Mikami and Tanaka (2010). The likelihood of WOF entry increases with the difference between sunk costs of human capital and physical capital. The interaction effect between the types of sunk costs is also stronger for worker buyouts than for newly created WOFs.

These results help explain the specific sectoral distribution of WOFs concentrating in light manufacturing and increasingly in services rather than in highly capitalistic industries, which is common to France, Uruguay, the UK, Italy, and Spain. The negative effect of capital

intensity or sunk cost of physical capital at the sectoral level on the creation of WOFs can be understood as a first approximation of the interaction effect studied in Chapter 1. Thus, Chapter 1 refines the role of the sunk cost of physical capital as a barrier to WOF entry by highlighting its interaction with sunk cost of human capital. Chapter 1 also provides new evidence to support the conclusion of Groot and van der Linde (2017) that public policy to promote WOFs should primarily operate in the form of start-up subsidies rather than providing permanent tax subsidies.

The main limitation of Chapter 1 concerns the proxy used for sunk costs. The index used to measure the sunk costs of human capital, already used by Costinot *et al.* (2011) on CFs and Belloc (2017) on WOFs, is calculated from USA data on employment concerning the year 2006 only. Therefore, the proxy of the sunk cost of human capital does not vary temporally. The use of other proxies of the sunk costs of human capital, calculated on French data and that varies temporally, would reinforce the robustness of the results presented in Chapter 1.

1.2. WOFs survive longer than CFs with or without the same entry resources

In Chapter 2, I compare the survival patterns of WOFs and CFs and seek to answer the following three research questions. First, do survival probabilities differ between WOFs and CFs? Second, how do survival probabilities of WOFs and CFs evolve? Third, how do entrepreneur-level and firm-level resources at entry impact the survival rates of WOFs and CFs? To perform this analysis, I use a matched sample of WOFs and CFs over an observational period of 72 months. I run a cloglog model to assess the difference between WOF and CF survival probabilities and compare the impact of the entrepreneur and firm resources at entry on WOF and CF survival probabilities. The results show that WOFs survive longer than CFs whether they have different or similar entry resources. The survival advantage of WOFs over CFs is driven by systematic differences in resources at entry in the first 2 years, and then is driven by the specific governance mode of WOFs.

These results show that WOFs are not rare due to the fact that they exit earlier than CFs. In fact, WOFs present a survival advantage over both unmatched and matched CFs. These results also lower the endogeneity bias at stake in the comparative analyses of WOF and CF performance. Because WOFs face specific entry barriers, as shown for instance in Chapter 1, WOFs and CFs benefit from different resources at entry. These differences cannot fully explain the survival advantage of WOFs over CFs, suggesting that the governance mode of WOFs, characterised by democratic decision-making, play a non-negligible role in their survival performance.

The main limitations of Chapter 2 concern the sampling. First, the sample of WOFs is

small (i.e., 180 WOFs), leading us to be cautious in generalizing the results. A bigger sample would enable more precise estimations. However, the low number of WOFs studied in the Chapter 2 must be put into perspective with previous empirical studies which until recently would study only dozens of WOFs (e.g., Pencavel (2013)). Second, the sample of WOFs might not be fully representative of the overall population of WOFs, though it is extracted from a representative sample of all French firms. Another limitation to Chapter 2, due to data availability concerns, is the absence of control for competing risks of exit. Firm exits are not necessarily a bad thing, and the lower the survival rate of CFs compared to WOFs does not say anything about the firms' quality of life.

1.3. Worker buyouts survive longer than newly created WOFs

In Chapter 3, I compare the survival patterns of WOFs distinguished by their entry mode (i.e., newly created, worker buyouts of sound conventional firms, worker buyouts of conventional firms in difficulty, or worker buyouts of nonprofit organizations). To perform this analysis, I use a panel data set of WOFs from 1989 to 2018 and run a cloglog model to assess the differences in survival probabilities between worker buyouts and newly created WOFs. The hazard of exit is 32% lower for worker buyouts of sound conventional firms than newly created WOFs, 18% lower for worker buyouts of conventional firms in difficulty, and 64% lower for worker buyouts of nonprofit organizations. The results also show that the survival advantage of worker buyouts over newly created WOFs is similar across sectors with different knowledge intensities but is lower in high capital-intensive sectors than in low capital-intensive ones.

These results show that WOFs form a heterogeneous population. According to their entry mode, WOFs present different survival patterns, suggesting that each entry mode faces specific entry barriers and benefits from specific entry resources. Overall, these findings show that WOFs are composed of groups with different survival likelihoods that are obscured if one only looks at the aggregate population. With caution, support agencies could foster worker buyouts of firms in difficulty and of nonprofit organizations as viable forms of entrepreneurship.

The main limitation of Chapter 3 is that I am unable to assess the causal effect of entry mode over firm survival because of endogeneity. The firms that are converted into WOFs, especially worker buyouts of ailing firms, might be selected by the support agencies in such way that they are more likely to survive to avoid bad publicity. More generally, the choice of entry mode is not exogenous and might be correlated with omitted variables. Another limitation concerns the identification of entry modes. Depending on the legislation and the monitoring ability of support agencies, the mode of entry of WOFs might be defined differently in other countries. Future research comparing the survival of WOFs with different

modes of entry in other countries and periods would test the robustness of my results.

2.   Research agenda

2.1.   Extend the analysis of WOFs' performance: Productivity and Space

This thesis analyses how WOFs' performance impacts their rarity, but only the entry and the survival performance of WOFs are investigated. Productivity is a measure of economic performance ignored in this thesis, but which could provide rich insights on WOF rarity. Let productivity be defined as firm's total factor productivity (TFP), i.e., the portion of output not explained by the amount of inputs used in production. The TFP is the residuals of growth efficiency that is not explained by increases in labor or capital and is thus interpreted as a proxy of the efficiency combination of productive factors. Comparing the levels and sources of TFP of WOFs and CFs would enable us to know whether WOFs are more, less, or as productive as CFs, but also to get insights on how the production processes might differ between WOFs and CFs. It is a long-standing discussion in the literature on WOFs, and more broadly about cooperative firms, to know whether there is a tradeoff between economic performance (here, TFP) and WOF's identity; that is, between profit and democracy. The study of the external sources of WOFs' productivity and the comparisons with that of CFs would bring new light to this question. I plan to present such a study at the 2022 IAFEP conference.

Through agglomeration effects, spillovers, and other local externalities, space is another important dimension of economic performance ignored in this thesis. In the Section 2.3.1 of the General Introduction, I display maps of the raw and the relative risks of WOFs in France, showing that WOFs present a specific spatial distribution, i.e., that it is neither random nor similar to that of CFs. This might be a statistical artifact, since WOFs represent a much smaller population than CFs. However, this is unlikely to be the case because of the numerous case studies pointing out to the importance of local communities, territories, and regional dynamics in WOF creations. Using panel data on Spanish Basque Country, Arando et al. (2012) find evidence of positive externalities across all sectors between WOFs and find no evidence of similar externalities flowing from CFs to WOFs. Over the period of 1995-2009 in Spain, Díaz-Foncea and Marcuello (2015) find evidence that unemployment level, wage level, population growth, cooperative culture, and the right-wing political party are the main determinants of WOFs' entry at the regional level. In Andalusian municipalities in Spain, Pérez González and Valiente Palma (2020) conducted a geographically weighted regression concluding that the local variability of territorial characteristics have a higher impact on the proportion of WOFs than on the proportion of CFs, thus confirming a specific link between territory and WOFs. To the best of my knowledge, Hwang et al. (2001) is the first theoretical

article to introduce space into the theory of labor-managed firms and to investigate the optimal production and location decisions of WOFs in linear space. Lambertini (2001) analyzes the price and location behavior of WOFs in a horizontal differentiation setting with linear transportation costs. Shieh (2005) incorporates transportation costs and plant location into the theory of labor-managed firms. With only three econometric studies on WOFs and three theoretical articles, to the best of my knowledge, spatial analysis of WOF performance and rarity is understudied (Mirabel, 2021). The 2022 IAFEP conference is devoted to the impact of participatory economic organizations on local development, acknowledging the importance of inquiring into the spatial dimension of the performance and rarity of WOFs.

2.2. Extend the analysis of WOFs' rarity

As I pointed out in section 1.2., WOFs are rare across the world, and the empirical literature on them is quite scarce. In a structured literature review of the empirical research on employee-owned firms, Mirabel (2021) shows that only six countries (Spain, USA, UK, Israel, Italy, France) make up 79% of the publications and that the concentration of the publications over these Western countries might bias the main stylized facts established about WOFs and the models made to explain them. Other areas of the world are completely ignored (Africa, Oceania) or almost ignored (Eastern Asia, Latin America). Yet, the International Organization of Cooperatives in Industry and Services (Hyungsik, 2017) count 37,000 employees in WOFs in Tanzania, 180,000 in Colombia, 270,000 in Bangladesh, and almost 7 million in India, which is much more than the top six countries mentioned. Accumulating empirical evidence across the world to confirm or refute the stylized facts established in this thesis is the next step in the development of the academic study of WOFs. International comparisons are fruitful to propose efficient policies or government schemes given a particular context, but also to extend our representation of WOFs, especially about the political identity which is often referred to as left-wing in France, Spain, and Italy, but which might take different political colors in countries where the left-right distinction is blurred or overcome by other political identities. The 33rd research congress of the ICA in 2022 was titled "Deepening our cooperative identity" and was held in Seoul, reflecting the will to discuss and broaden the scope of WOFs among the academic and institutional fields. Opening the WOF field to new countries beyond Western countries is a promising pathway to the understanding of the performance and rarity of WOFs.

2.3. Extend the analysis between WOFs and CFs: Employee ownership and profit-sharing schemes

WOFs and CFs can be seen as the two extrema on the scale of the distribution of ownership rights to firms' workers. Crossing the studies of WOF performance and rarity with the studies on the performance of employee ownership or profit-sharing schemes is a reciprocally fruitful perspective. CFs with employee-ownership are usually more numerous than WOFs, such as in the case of France, and this would enable econometric studies on economic performance over large datasets. In the framework of a fellowship received from Rutgers University for the academic year 2021-2022, I am working on an article comparing the productivity of firms with different levels of employee-ownership.

Bibliography

Abramitzky, R. (2008), 'The Limits of Equality: Insights from the Israeli Kibbutz', *Quarterly Journal of Economics* **123**(3), 1111–1159.
URL: *https://academic.oup.com/qje/article-lookup/doi/10.1162/qjec.2008.123.3.1111* 17

Achtenhagen, L., Naldi, L. and Melin, L. (2010), '"Business Growth"—Do Practitioners and Scholars Really Talk About the Same Thing?', *Entrepreneurship Theory and Practice* pp. 289–316. 17, 19

Acs, Z. J. and Audretsch, D. B. (1990), *Innovative and Small Firms*, mit press edn, Cambridge, MA. 124

Agarwal, R. and Audretsch, D. B. (2001), 'Does Entry Size Matter? The Impact of the Life Cycle and Technology on Firm Survival', *Journal of Industrial Economics* **49**(1), 21–43.
URL: *http://doi.wiley.com/10.1111/1467-6451.00136* 91, 123

Ai, C. and Norton, E. C. (2003), 'Interaction terms in logit and probit models', *Economics letters* **80**(1), 123–129. 51, 52

Allison, P. D. (1982), 'Discrete-time methods for the analysis of event histories', *Sociological methodology* **13**, 61–98. 102

Amburgey, T. L. and Rao, H. (1996), 'Organizational Ecology: Past, Present, and Future Directions', *Academy of Management journal* **39**(5), 1265–1286. 123

Angel, P., Jenkins, A. and Stephens, A. (2018), 'Understanding entrepreneurial success: A phenomenographic approach', *International Small Business Journal: Researching Entrepreneurship* **36**(6), 611–636.
URL: *http://journals.sagepub.com/doi/10.1177/0266242618768662* 19

Arando, S., Gago, M., Jones, D. C. and Kato, T. (2015), 'Efficiency in Employee-Owned Enterprises: An Econometric Case Study of Mondragon', *Industrial and Labor Relations Review* **68**(2), 398–425.
URL: *http://journals.sagepub.com/doi/10.1177/0019793914564966* 49

Arando, S., Gago, M., Podivinsky, J. M. and Stewart, G. (2012), 'Do labour-managed firms benefit from agglomeration?', *Journal of Economic Behavior & Organization* **84**(1), 193–200.
URL: *https://linkinghub.elsevier.com/retrieve/pii/S0167268112001527* 21, 150

Arando, S., Peña, I. and Verheul, I. (2009), 'Market entry of firms with different legal forms: an empirical test of the influence of institutional factors', *International Entrepreneurship and Management Journal* **5**(1), 77–95.
URL: *http://link.springer.com/10.1007/s11365-008-0094-z* 122

Assembly, U. N. G. (2019), 'Cooperatives in social development', p. 18.
URL: *https://undocs.org/pdf?symbol=en/A/74/206* 3

Audretsch, D. B., Santarelli, E. and Vivarelli, M. (1999), 'Start-up size and industrial dynamics: some evidence from Italian manufacturing', *International Journal of Industrial Organization* **17**(7), 965–983.
URL: *https://linkinghub.elsevier.com/retrieve/pii/S0167718798000022* 91

Ayres, R. U. (2004), 'On the life cycle metaphor: where ecology and economics diverge', *Ecological Economics* **48**(4), 425–438.
URL: *https://linkinghub.elsevier.com/retrieve/pii/S0921800904000187* 18

Azzelini, D. (2016), 'Labour as a Commons: The Example of Worker-Recuperated Companies', *Critical Sociology* pp. 1–14. 124

Bain, J. S. (1956), *Barriers to new competition*, Harvard University Press, Cambridge, MA. 21

Barbot-Grizzo, M.-C. (2019), 'Une gestion innovante du processus de transmission d'une TPE saine aux salaries sous forme de SCOP', *Recherche en Sciences de Gestion-Management* **132**, 179–205. 124

Barbot-Grizzo, M.-C., Huntzinger, F. and Jolivet, T. (2013), 'Transmission de PME saines en Scop : quelles spécificités ?', *RECMA* (330), 57–71. 85

Bassi, A. and Fabbri, A. (2019), 'Workers BuyOut: why employee-owned enterprises are more resilient than corporate business in time of economic and financial crisis? The case of Emilia-Romagna Region', *CIRIEC Working Papers* p. 28. 124

Batstone, E. (1983), 'Organization and Orientation: A Life Cycle Model of French Co-operatives', *Economic and Industrial Democracy* **4**, 139–161. 23, 122, 123

Belloc, F. (2017), 'What deters labor-owned firm creation? Evidence from Italian manufacturing sectors', *Journal of Comparative Economics* **45**(1), 139–153.
URL: *https://linkinghub.elsevier.com/retrieve/pii/S0147596716300968* 22, 23, 50, 54, 64, 82, 148

Ben-Ner, A. (1988*a*), 'Comparative empirical observations on worker-owned and capitalist firms', *International Journal of Industrial Organization* **6**(1), 7–31.
URL: *https://linkinghub.elsevier.com/retrieve/pii/0167718788900033* xvi, 16, 23, 24, 48, 122, 125, 128

Ben-Ner, A. (1988*b*), 'The life cycle of worker-owned firms in market economies: a theoretical analysis', *Journal of Economic Behavior & Organization* **10**, 287–313. xvi, 10, 16, 22, 25, 47, 48, 59, 86, 125

Billaudeau, V. and Moysan, P. (2019), 'D'une cooperative de consommateurs a la Scop Sadel : concevoir une gouvernance partagee', *RECMA* pp. 56–67. 124

Blinder, A. (2007), 'Offshoring: The next industrial revolution', *Offshoring* pp. 1000–1017. Publisher: Queste istituzioni ricerche. 54

Bonin, J. P., Jones, D. C. and Putterman, L. (1993), 'Theoretical and Empirical Studies of Producer Cooperatives: Will Ever the Twain Meet?', *Journal of Economic Literature* **31**(3), 1290–1320. 22, 33

Bowles, S. and Gintis, H. (1994), 'Credit market imperfections the incidence of worker-owned firms', *Metroeconomica* **45**(3), 209–223. 86

Brown, J. and Quarter, J. (1994), 'Resistance to Change: The Influence of Social Networks on the Conversion of a Privately-Owned Unionized Business to a Worker Cooperative', *Economic and Industrial Democracy* **15**, 259–282. 85

Bruno, S. (2012), 'Directors' Versus Shareholders' Primacy in U.S. Corporations Through the Eyes of History: Is Directors' Power "Inherent"?', *European Company and Financial Law Review* **9**(4).
URL: *https://www.degruyter.com/document/doi/10.1515/ecfr-2012-0421/html* 7

Burdín, G. (2014), 'Are Worker-Managed Firms More Likely to Fail Than Conventional Enterprises? Evidence from Uruguay', *Industrial and Labor Relations Review* **67**(1), 202–238.
URL: *http://journals.sagepub.com/doi/10.1177/001979391406700108* 22, 24, 25, 32, 44, 49, 82, 122, 123, 130

Burdín, G. and Dean, A. (2009), 'New evidence on wages and employment in worker cooperatives compared with capitalist firms', *Journal of Comparative Economics* **37**(4), 517–533.
URL: *https://linkinghub.elsevier.com/retrieve/pii/S0147596709000560* xvi, 16, 22

Carini, C. and Carpita, M. (2014), 'The impact of the economic crisis on Italian cooperatives in the industrial sector', *Journal of Co-operative Organization and Management* **2**(1), 14–23.
URL: *https://linkinghub.elsevier.com/retrieve/pii/S2213297X14000044* xvii, 17

Castanet, V. (2022), *Les Fossoyeurs. Révélations sur le système qui maltraite nos aînés*, fayard edn, Paris. 1

CGSCOP (2015), 'Guide pratique de la reprise d'entreprise par les salariés en Scop'.
URL: *http://base.socioeco.org/docs/res-en-coop_guide − transnational.pdf* 121

CGSCOP (2021), 'Rapport d'activité', p. 48.
URL: *https://www.les-scop.coop/system/files/2021-03/RA%20SCOP%202020-final.pdf* xviii, 25, 33, 84

Chardon, O., Jauneau, Y. and Vidalenc, J. (2021), 'Nearly three-quarters of craftsmen, tradesmen, shopkeepers and heads of business are men', (223). 120

Charmettant, H. and Renou, Y. (2021), 'Cooperative conversion and communalization: Closely observed interactions between the material and the mental', *Annals of Public and Cooperative Economics* **92**(1), 55–77.
URL: *https://onlinelibrary.wiley.com/doi/10.1111/apce.12285* 124, 137

Chassagnon, V. and Hollandts, X. (2014), 'Who are the owners of the firm: shareholders, employees or no one?', *Journal of Institutional Economics* **10**(1), 47–69. Publisher: Cambridge University Press. xii, 8

Coase, R. H. (1937), 'The nature of the firm', *economica* **4**(16), 386–405. Publisher: JSTOR. xi, 6

Commision, E. (2011), 'Single market act twelve levers to boost growth and strengthen confidence'.
URL: *https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A52011DC0206* 2

Conte, M. A. and Jones, D. C. (2015), On the Entry of Employee-Owned Firms: Theory and Evidence from U.S. Manufacturing Industries, 1870–1960, *in* A. Kauhanen, ed., 'Advances in the Economic Analysis of Participatory & Labor-Managed Firms', Vol. 16, pp. 1–31.
URL: *https://www.emerald.com/insight/content/doi/10.1108/S0885-333920150000016001/full/html* xvii, 17, 22, 32, 47, 82, 86, 94

Costinot, A., Oldenski, L. and Rauch, J. (2011), 'Adaptation and the Boundary of Multinational Firms', *The Review of Economics and Statistics* **93**(1), 298–308.
URL: *https://doi.org/10.1162/REST$_a$0072* 38, 53, 54, 148

Cox, D. and Oakes, D. (1984), *Analysis of survival data*, crc press edn. 130

Cox, D. R. (1972), 'Regression Models and Life-Tables', *Journal of the Royal Statistical Society: Series B (Methodological)* **34**(2), 187–202.
URL: *http://doi.wiley.com/10.1111/j.2517-6161.1972.tb00899.x* 130

Cracogna, D., Fici, A. and Henrÿ, H., eds (2013), *International handbook of cooperative law*, springer edn, Heidelberg. xvii, 15, 17

Craig, B. and Pencavel, J. (1992), 'The Behavior of Worker Cooperatives: The Plywood Companies of the Pacific Northwest', *The American Economic Review* p. 24. 50

Croce, A., Martí, J. and Martín-López, S. (2018), 'Are policy measures effective in encouraging the creation of competitive employee-owned firms?', *Economic and Industrial Democracy* p. 0143831X1774568.
URL: *http://journals.sagepub.com/doi/10.1177/0143831X17745688* 49

Cros, M., Épaulard, A. and Martin, P. (2020), 'Les défaillances d'entreprises dans la crise Covid-19 : zombification ou mise en hibernation ?'. 120

de Empleo y Seguridad Social, M. (1990), 'Resumen situación empresas de economía social y sus trabajadores en situación de alta en la seguridad social', pp. 1119–1158. 13

de Jong, J. P. and Marsili, O. (2015), 'Founding a business inspired by close entrepreneurial ties: does it matter for survival?', *Entrepreneurship Theory and Practice* **39**(5), 1005–1025. Publisher: SAGE Publications Sage CA: Los Angeles, CA. 91

Dean, A. (2019), 'Do successful worker-managed firms degenerate?', *Journal of Comparative Economics* **47**(2), 317–329.
   URL: *https://linkinghub.elsevier.com/retrieve/pii/S0147596719300216* 44

Defourny, J. (1992), Comparative Measures of Technical Efficiency for Five Hundred French Workers' Cooperatives, *in* 'Advances in the Economic Analysis of Participatory & Labor-Managed Firms'. 23

Defourny, J., Estrin, S. and Jones, D. C. (1985), 'The Effects of Workers' Participation on Enterprise Performance: Empirical Evidence from French Cooperatives', *International Journal of Industrial Organisation* p. 21. 23

Defourny, J., Lovell, C. A. K. and N'Gbo, G. M. (1992), 'Variation in productive efficiency in French workers' cooperatives', *The Journal of Productivity Analysis* p. 15. 23

Demoustier, D. (1984), *Les coopératives ouvrières de production*, number 18 *in* 'Collection Repères ; Série "Entreprises et branches"', Editions La Découverte, Paris. 128

Dickstein, C. (1988), 'The Role of Cooperative Development Agencies in Developing Worker Cooperatives: Lessons from Philadelphia', *Economic and Industrial Democracy* **9**, 197–224. 86

Domar, E. D. (1966), 'The Soviet collective farm as a producer cooperative', *The American Economic Review* **56**(4), 734–757. Publisher: JSTOR. 23

Dow, G. K. (2003), *Governing the firm: workers' control in theory and practice*, cambridge university press edn. 10, 24, 44

Dow, G. K. (2018*a*), *The labor-managed firm: Theoretical foundations*, cambridge university press edn. xi, xii, xiii, 6, 7, 8, 10, 23, 36, 44, 47, 82, 85, 86, 120

Dow, G. K. (2018*b*), 'The Theory of the Labor-Managed Firm: Past, Present, and Future', *Annals of Public and Cooperative Economics* **89**(1), 65–86.
   URL: *http://doi.wiley.com/10.1111/apce.12194* xvii, 17, 18, 23

Dow, G. K. and Putterman, L. (2000), 'Why capital suppliers (usually) hire workers: what we know and what we need to know', *Journal of Economic Behavior & Organization* **43**, 319–336. 86

Díaz-Foncea, M. and Marcuello, C. (2015), 'Spatial patterns in new firm formation: are cooperatives different?', *Small Business Economics* **44**(1), 171–187.
   URL: *http://link.springer.com/10.1007/s11187-014-9581-5* xvii, 17, 50, 150

Ellerman, D. (2007), 'On the Role of Capital in "Capitalist" and in Labor-Managed Firms', *Review of Radical Political Economics* **39**(1), 5–26. 11, 120

Ellerman, D. (2020), 'Corporations!'.
   URL: *Available at SSRN: https://ssrn.com/abstract=3584245* x, xiv, 3, 10

Ellerman, D. and Gonza, T. (2021), 'Less-known supporters of workplace democracy', *Journal of Participation and Employee Ownership* . Publisher: Emerald Publishing Limited. 3

Estrin, S. and Jones, D. C. (1992), 'The Viability of Employee-Owned Firms: Evidence from France', *Industrial and Labor Relations Review* p. 16. 23, 24, 86, 122

Fakhfakh, F., Magne, N., Mirabel, T. and Pérotin, V. (2022), 'Employee-owned firms in France'. xiv, 10, 49, 83, 85

Fakhfakh, F., Pérotin, V. and Gago, M. (2012), 'Productivity, Capital, and Labor in Labor-Managed and Conventional Firms: An Investigation on French Data', *Industrial and Labor Relations Review* **65**(4), 847–879.
URL: *http://journals.sagepub.com/doi/10.1177/001979391206500404* xvi, 16, 23, 44, 49

FAS (2021), 'Guide de l'épargne et de l'actionnaire salarié, en 2020'.
URL: *https://guide.fas.asso.fr/ accessed in November 2021.* 85

Fee, P. R., Mialon, H. M. and Williams, M. A. (2004), 'What is a Barrier to Entry?', *American Economic Review* **94**(2), 461–465. 21

Fernandes, A. M. and Paunov, C. (2015), 'The Risks of Innovation: Are Innovating Firms Less Likely to Die?', *Review of Economics and Statistics* **97**(3), 638–653.
URL: *https://direct.mit.edu/rest/article/97/3/638-653/58244* 131

Furubotn, E. G. and Pejovich, S. (1972), 'Property rights and economic theory: a survey of recent literature', *Journal of economic literature* **10**(4), 1137–1162. Publisher: JSTOR. 22, 125

Ganotakis, P. (2012), 'Founders' human capital and the performance of UK new technology based firms', *Small Business Economics* **39**(2), 495–515. Publisher: Springer. 91

Geroski, P. A., Mata, J. and Portugal, P. (2010), 'Founding conditions and the survival of new firms', *Strategic Management Journal* **31**(5), 510–529. Publisher: Wiley Online Library. 87

Gimeno, J., Folta, T. B., Cooper, A. C. and Woo, C. Y. (1997), 'Survival of the fittest? Entrepreneurial human capital and the persistence of underperforming firms', *Administrative science quarterly* pp. 750–783. Publisher: JSTOR. 87

Gotz, I. (2017), 'World Co-Operative Monitor', *Journal of Entrepreneurial and Organizational Diversity* **6**(2), 67–74. ix, 2

Gourgues, G. (2020), Chapitre 3. De l'autogestion au rapport salarial. Comprendre l'affaire Lip au-delà de ses mythes, *in* I. Chambost, O. Cléach, S. Le Roulley, F. Moatty and G. Tiffon, eds, 'L'autogestion à l'épreuve du travail', Presses universitaires du Septentrion, pp. 65–82.
URL: *http://books.openedition.org/septentrion/93031* 128

Greene, W. (2010), 'Testing hypotheses about interaction terms in nonlinear models', *Economics Letters* **107**(2), 291–296. 61

Groot, L. and van der Linde, D. (2017), 'The Labor-Managed Firm: Permanent or Start-Up Subsidies?', *Journal of Economic Issues* **51**(4), 1074–1093.
URL: *https://www.tandfonline.com/doi/full/10.1080/00213624.2017.1391592* xxiii, 34, 148

Grossman, S. J. and Hart, O. D. (1986), 'The Costs and Benefits of Ownership: A Theory of Vertical and Lateral Integration', *Journal of Political Economy* **94**(4), 691–719.
URL: *https://www.journals.uchicago.edu/doi/10.1086/261404* 47

Grégoire, M. and Delalieux, G. (2015), 'Les obstacles à la reprise d'entreprise en SCOP après un dépôt de bilan: le cas d'Intercoop', *Entreprendre & Innover* **3**(26). OCLC: 961100050. 124

Guinnane, T. W., Harris, R., Lamoreaux, N. R. and Rosenthal, J.-L. (2008), 'Pouvoir et propriété dans l'entreprise. Pour une histoire internationale des sociétés à responsabilité limitée', *Annales. Histoire, Sciences Sociales* **63**(1), 73–110.
URL: *https://www.cambridge.org/core/product/identifier/S039526490002388X/type/journal$_a$rticle* 7

Gunn, C. (1992), 'Plywood Co-operatives in the United States: An Endangered Species', *Economic and Industrial Democracy* **13**, 525–534. 50

Hansmann, H. (1996), *The ownership of enterprise*, belknap press of the harvard university press edn, Cambridge, MA. xiii, 8, 11, 59, 85, 120

Hart, O. and Moore, J. (1990), 'Property Rights and the Nature of the Firm', *Journal of Political Economy* **98**(6), 1119–1158.
URL: *https://www.journals.uchicago.edu/doi/10.1086/261729* 47

Heckman, J. and Singer, B. (1984), 'The Identifiability of the Proportional Hazard Model', *The Review of Economic Studies* **51**(2), 231.
URL: *https://academic.oup.com/restud/article-lookup/doi/10.2307/2297689* 130

Hess, W. and Persson, M. (2011), 'Exploring the duration of EU imports', *Review of World Economics* **147**(4), 665–692.
URL: *http://link.springer.com/10.1007/s10290-011-0106-x* 90, 131

Hiez, D. (2006), 'Le coopérateur ouvrier ou la signification du principe de double qualité dans les Scop', *Revue Internationale de l'Economie Sociale: Recma* (299), 34–55. Publisher: Institut de l'économie sociale (IES). 11

Honjo, Y. (2000), 'Business failure of new firms: an empirical analysis using a multiplicative hazards model', *International Journal of Industrial Organization* **18**(4), 557–574.
URL: *https://linkinghub.elsevier.com/retrieve/pii/S0167718798000356* 123

Huber, P. J. (1967), Under nonstandard conditions, *in* 'Proceedings of the Fifth Berkeley Symposium on Mathematical Statistics and Probability: Weather Modification; University of California Press: Berkeley, CA, USA', p. 221. 57

Hwang, H., Lin, Y.-S. and Mai, C.-c. (2001), 'On the optimal production and location of a labor-managed firm', *The Annals of Regional Science* (35), 217–226. 150

Hyungsik, E. (2017), 'Cooperative and Employment. Second Global Report. Contribution of cooperatives to decent work in the changing world of work'. xv, 12, 151

ICA, I. C. A. (2015), 'Guidance notes to the cooperative principles'.
URL: *https://www.ica.coop/sites/default/files/2021-11/ICA%20Guidance%20Notes%20EN.pdf* xiii, 8

ILO, I. L. O. (2002), 'R193 - Promotion of Cooperatives Recommendation', **R193**. 3

Insee (1994), 'Système d'information sur les nouvelles entreprises 1994 vague 3 en 1999 fichiers de données', *Centre d'Accès Sécurisé aux Données* . 39

Insee (1998), 'Système d'information sur les nouvelles entreprises 1998 vague 3 en 2003 fichiers de données', *Centre d'Accès Sécurisé aux Données* . 39

Insee (2002), 'Système d'information sur les nouvelles entreprises 2002 vague 3 en 2007 fichiers de données', *Centre d'Accès Sécurisé aux Données* . 39

Insee (2006), 'Système d'information sur les nouvelles entreprises 2006 vague 3 en 2011 fichiers de données', *Centre d'Accès Sécurisé aux Données* . 39

Insee (2010), 'Système d'information sur les nouvelles entreprises 2010 vague 3 en 2015 fichiers de données', *Centre d'Accès Sécurisé aux Données* . 39

Insee (2013*a*), 'Connaissance locale de l'appareil productif entreprise 2013', *Centre d'Accès Sécurisé aux Données (CASD)* . 29

Insee (2014*a*), 'Système d'information sur les nouvelles entreprises 2014 vague 3 en 2019 fichiers de données', *Centre d'Accès Sécurisé aux Données* . 39

INSEE (2017), 'Les entreprises en France'. 127

Insee, D. (2012), 'Statistique structurelle annuelle d'entreprises issue du dispositif esane 2012 fichiers de données', *Centre d'Accès Sécurisé aux Données (CASD) Diffuseur* . 38

Insee, D. (2013*b*), 'Statistique structurelle annuelle d'entreprises issue du dispositif esane 2013 fichiers de données', *Centre d'Accès Sécurisé aux Données (CASD) [Diffuseur]* . 38

Insee, D. (2014*b*), 'Statistique structurelle annuelle d'entreprises issue du dispositif esane 2014 fichiers de données', *Centre d'Accès Sécurisé aux Données (CASD) [Diffuseur]* . 38

Insee, D. (2015), 'Statistique structurelle annuelle d'entreprises issue du dispositif esane 2015 fichiers de données', *Centre d'Accès Sécurisé aux Données (CASD) [Diffuseur]* . 38

Insee, D. (2016), 'Statistique structurelle annuelle d'entreprises issue du dispositif esane 2016 fichiers de données', *Centre d'Accès Sécurisé aux Données (CASD) [Diffuseur]* . 38

Janser, M. (2018), 'The greening of jobs in Germany: First evidence from a text mining based index and employment register data'. 64

Jenkins, S. (2004), 'Survival analysis', *Unpublished manuscript, Institute for Social and Economic Research, Univ. of Essex, Colchester, UK* . 132

Jenkins, S. P. *et al.* (1995), 'Easy estimation methods for discrete-time duration models', *Oxford bulletin of economics and statistics* **57**(1), 129–138. 102, 131

Jensen, M. C. and Meckling, W. H. (1979), 'Rights and production functions: An application to labor-managed firms and codetermination', *Journal of Business* **4**(3), 469–506. 22

Jones, D. C. (1982), British producer cooperatives, 1948-1968: Productivity and organizational structure, *in* 'Participatory and Self-Managed Firms', publisher: lexington books edn, pp. 175–198. 24

Jones, D. C. (1984), *American producer cooperatives and employee owned firms: An historical perspective*, University of California Press, Berkeley, CA. 48

Jones, D. C. (2018), 'The economics of Participation and Employee Ownership (PEO): an assessment', *Journal of Participation and Employee Ownership* **1**(1), 4–37.
URL: *https://www.emerald.com/insight/content/doi/10.1108/JPEO-02-2018-0004/full/html* 21

Jossa, B. (2014), *Producer cooperatives as a new mode of production*, Routledge. x, 3

Jovanovic, B. (1982), 'Selection and the evolution of industry', *Econometrica: Journal of the econometric society* pp. 649–670. 102

King, G. and Nielsen, R. (2019), 'Why propensity scores should not be used for matching', *Political Analysis* **27**(4), 435–454. 102

Klapper, L. and Richmond, C. (2011), 'Patterns of business creation, survival and growth: Evidence from Africa', *Labour Economics* **18**, S32–S44. 91

Kletzer, L. and Jensen, B. (2007), 'Measuring tradable services and the task content of offshorable services jobs', *Labor in the New Economy, Katharine Abraham, Mike Harper and James Spletzer, eds., University of Chicago Press, forthcoming* . Publisher: Citeseer. 54

Lambertini, L. (2001), 'Spatial competition with profit-maximising and labour-managed firms', *Papers in Reginoal Science* (80), 499–507. 151

Lambru, M. and Petrescu, C. (2014), 'Surviving the crisis: Worker cooperatives in Romania', *Organization* **21**(5), 730–745.
URL: *http://journals.sagepub.com/doi/10.1177/1350508414537807* xvii, 17

Lamoreaux, N. and Rosenthal, J.-L. (2006), 'Contractual Tradeoffs and SMEs Choice of Organizational Form, A View from U.S. and French History, 1830-2000', (w12455), w12455.
URL: *http://www.nber.org/papers/w12455.pdf* 7

Lancaster, T. (1990), *The Econometric Analysis of Transition Data*, cambrige university press edn, Cambridge, MA. 130

Magne, N. (2016), Quelle égalité dans les SCOP ? Analyse quantitative et qualitative de la distribution des salaires et de la flexibilité de l'emploi, Thèse de doctorat, University of Lyon 2. 50, 83, 127

Magne, N. (2017), 'Wage inequality in workers' cooperatives and conventional firms', *European Journal of Comparative Economics* **Vol 14. no. 2**, 607KB. Artwork Size: 607KB Medium: pdf Publisher: Università Carlo Cattaneo - LIUC.
URL: *http://eaces.liuc.it/18242979201702/182429792017140207.pdf* 86

Manjón-Antolín, M. C. and Arauzo-Carod, J.-M. (2008), 'Firm survival: methods and evidence', *Empirica* **35**(1), 1–24.
URL: *http://link.springer.com/10.1007/s10663-007-9048-x* 121

Marcolin, L., Miroudot, S. and Squicciarini, M. (2016), 'Routine jobs, employment and technological innovation in global value chains'. Publisher: OECD Publishing. 64

Marx, K. (1981), *Capital: a critique of political economy: volume III*, International Publishers. 12

Mata, J. and Portugal, P. (1994), 'Life Duration of New Firms', *The Journal of Industrial Economics* **42**(3), 227.
URL: *https://www.jstor.org/stable/2950567?origin=crossref* 102, 123

Mata, J. and Portugal, P. (2002), 'The survival of new domestic and foreign-owned firms', *Strategic Management Journal* **23**(4), 323–343.
URL: *http://doi.wiley.com/10.1002/smj.217* 87

Mihaylov, E. and Tijdens, K. G. (2019), 'Measuring the routine and non-routine task content of 427 four-digit ISCO-08 occupations'. Publisher: Tinbergen Institute Discussion Paper 2019-035/V. 64

Mikami, K. (2014), 'An alternative framework for the analysis of social enterprises', *Journal of Cooperative Organization and Management* **2**(2), 92–97. Publisher: Elsevier. 10

Mikami, K. and Tanaka, S. (2010), 'Sunk Costs of Capital and the Form of Enterprise: Investor-Owned Firms and Worker-Owned Firms', *Annals of Public and Cooperative Economics* **81**(1), 77–104.
URL: *http://doi.wiley.com/10.1111/j.1467-8292.2009.00406.x* xxii, 23, 32, 34, 41, 43, 44, 45, 46, 47, 49, 50, 51, 53, 55, 61, 62, 64, 65, 86, 125, 147, 169

Mirabel, T. (2021), 'Past, present and future of empirical research on employee-owned firms: a structured literature review over 1970–2019', *Journal of Participation and Employee Ownership* **4**(1), 1–25.
URL: *https://www.emerald.com/insight/content/doi/10.1108/JPEO-07-2020-0018/full/html* xv, 12, 15, 20, 21, 23, 82, 151

Modigliani, F. and Miller, M. H. (1958), 'The cost of capital, corporation finance and the theory of investment', *The American economic review* **48**(3), 261–297. Publisher: JSTOR. 45

Monni, S., Novelli, G., Pera, L. and Realini, A. (2017), 'WORKERS' BUYOUT: THE ITALIAN EXPERIENCE, 1986-2016', *The International Entrepreneurship and Sustainability Issues* **4**(4), 14. 124

Monteiro, N. P. and Stewart, G. (2015), 'Scale, Scope and Survival: A Comparison of Cooperative and Capitalist Modes of Production', *Review of Industrial Organization* **47**(1), 91–118.
URL: *http://link.springer.com/10.1007/s11151-015-9464-1* 22, 82

Monteiro, N. P. and Straume, O. R. (2018), 'Are Cooperatives more Productive than Investor-Owned Firms? Cross-Industry Evidence from Portugal', *Annals of Public and Cooperative Economics* **89**(2), 377–414.
URL: *http://doi.wiley.com/10.1111/apce.12201* 49

Murphy, G. B., Trailer, J. W. and Hill, R. C. (1996), 'Measuring performance in entrepreneurship research', *Journal of Business Research* **36**(1), 15–23.
URL: *https://linkinghub.elsevier.com/retrieve/pii/014829639500159X* 17

Murphy, L. (2017), 'No Heir apparent? Exploring the Worker Co-operative Model as a Solution to Family Business Continuity', *The Journal of Entrepreneurial and Organizational Diversity* **6**(2), 20–39.
URL: *http://www.euricse.eu/wp-content/uploads/2018/02/03-Murphy$_V$F.pdf* 124

Narvaiza, L., Aragon-Amonarriz, C., Iturrioz-Landart, C., Bayle-Cordier, J. and Stervinou, S. (2016), 'Cooperative Dynamics During the Financial Crisis: Evidence from Basque and breton Case Studies', *Nonprofit and Voluntary Sector Quarterly* pp. 1–20. 23

Oldenski, L. (2009), 'Export versus FDI: A Task-Based Framework for Comparing manufacturing and services', *Work. Pap., Georgetown Univ*. Publisher: Citeseer. 54

Olsen, E. K. (2013), Sharing Ownership, Profits, and Decision-Making in the 21st Century, *in* 'Sharing Ownership, Profits, and Decision-Making in the 21st Century', Vol. 14 of *Advances in the Economic Analysis of Participatory & Labor-Managed Firms*, pp. 83–107. 21, 22, 44, 49, 121, 122, 125, 128

Orpea (2021), 'Résultats semestriels 20211', p. 51. 1

Palmer, T. (2019), 'State of the sector: US worker cooperatives in 2017', *Journal of Participation and Employee Ownership* **2**(3), 190–201. xvi, 16

Pencavel, J., ed. (2013), *The Economics of Worker Cooperatives*, Edward Elgar Publishing Limited. 85, 103, 149

Pencavel, J., Pistaferri, L. and Schivardi, F. (2006), 'Wages, Employment, and Capital in Capitalist and Worker-Owned Firms', *ILR Review* **60**(1), 23–44.
URL: *http://journals.sagepub.com/doi/10.1177/001979390606000102* xvi, 16, 49

Penrose, E. (1952), 'Biological Analogies in the Theory of the Firm', *American Economic Review* pp. 804–819. 18

Podivinsky, J. M. and Stewart, G. (2007), 'Why is labour-managed firm entry so rare?', *Journal of Economic Behavior & Organization* **63**(1), 177–192.
URL: *https://linkinghub.elsevier.com/retrieve/pii/S0167268106000357* xvi, 16, 22, 23, 32, 50, 64, 82, 94, 125

Prentice, R. L. and Gloeckler, L. A. (1978), 'Regression Analysis of Grouped Survival Data with Application to Breast Cancer Data', *Biometrics* **34**(1), 57.
URL: *https://www.jstor.org/stable/2529588?origin=crossref* 131

Pérez González, M. d. C. and Valiente Palma, L. (2020), 'The "business–territory" relationship of cooperative societies as compared to the conventional business sector in the region of Andalusia', *Annals of Public and Cooperative Economics* p. 19. 150

Pérotin, V. (1987), Conditions of Survival and Closure of French Worker Cooperatives: Some Preliminary Findings, *in* 'Advances in the Economic Analysis of Participatory & Labor-Managed Firms', Vol. 2, pp. 201–224. 23, 122, 128

Pérotin, V. (2004), Early Cooperative Survival: The Liability of Adolescence, *in* 'Advances in the Economic Analysis of Participatory & Labor-Managed Firms', Vol. 8, Emerald (MCB UP), Bingley, pp. 67–86.
URL: *https://www.emerald.com/insight/content/doi/10.1016/S0885-3339(04)08003-2/full/html* 24, 121, 122, 123, 133, 134

Pérotin, V. (2006), 'Entry, exit, and the business cycle: Are cooperatives different?', *Journal of Comparative Economics* **34**(2), 295–316.
URL: *https://linkinghub.elsevier.com/retrieve/pii/S0147596706000217* xvii, xix, 17, 21, 23, 24, 25, 44, 50, 82

Pérotin, V. (2012), The Performance of Workers' Cooperatives, *in* 'The Cooperative Business Movement, 1950 to the Present', pp. 195 – 221. 21, 87

Pérotin, V. (2016), 'What do we really know about worker cooperatives?'. 13, 26

Robé, J.-P. (2011), 'The legal structure of the firm', *Accounting, Economics, and Law* **1**(1). Publisher: De Gruyter. 11

Russell, R. and Hanneman, R. (1995), The formation and dissolution of worker cooperatives in Israel, 1924-1992, *in* R. Russell, ed., 'Utopia in Zion: The Israeli experience with worker collectives', The State University of New York Press, Albany: NY, pp. 57–95. xvii, 17, 24, 25, 133

Salamon, L. M. and Sokolowski, W. (2018), The Size and Composition of the European Third Sector, *in* 'The Third Sector as a Renewable Resource for Europe', Springer International Publishing, Cham, pp. 49–94.
URL: *http://link.springer.com/10.1007/978-3-319-71473-8₃* 124

Schmalensee, R. (2004), 'Sunk costs and antitrust barriers to entry', *American Economic Review* **94**(2), 471–475. 21

Shieh, Y.-N. (2005), 'Location and output of the labor-managed firm under price discrimination', *The Annals of Regional Science* **39**(1), 55–62.
URL: *http://link.springer.com/10.1007/s00168-004-0204-y* 151

Staber, U. (1989), 'Age-dependence and Historical Effects on the Failure Rates of Worker Cooperatives: An Event-history Analysis', *Economic and Industrial Democracy* **10**, 59–80. xvi, 16, 21, 24, 25, 122, 123

Staber, U. (1993), 'Worker Cooperatives and the Business Cycle: Are Cooperatives the Answer to Unemployment?', *American Journal of Economics and Sociology* **52**(2), 129–143.
URL: *http://doi.wiley.com/10.1111/j.1536-7150.1993.tb02521.x* 24

Stigler, G. (1968), *The organization of industry*, University of Chicago Press, Chicago, IL. 21

Stinchcombe, A. (1965), Social structure and organization, *in* J. March, ed., 'Handbook of Organizations', Rand McNally, Chicago, pp. 142–193. 122

Sørensen, J. B. and Phillips, D. J. (2011), 'Competence and commitment: employer size and entrepreneurial endurance', *Industrial and Corporate Change* **20**(5), 1277–1304.
URL: *https://doi.org/10.1093/icc/dtr025* 91

Thomas, A. and Cornforth, C. (1989), 'A Model for Democratic Decision-Making: the Case of Worker Co-operatives', *Economic Analysis and Workers' Management* **1**(XXIII), 1–15. 133

Vanek, J. (1970), *The General Theory of Labor-Managed Market Economies*, cornell university press edn, Ithaca and London. 23, 36

Vieta, M. (2015), 'The Italian Road to Creating Worker Cooperatives from Worker Buyouts: Italy's Worker-Recuperated Enterprises and the Legge Marcora Framework', *SSRN Electronic Journal* .
URL: *http://www.ssrn.com/abstract=2641057* xvii, 16, 139

Vieta, M. (2020), *Workers' self-management in Argentina: contesting neo-liberalism by occupying companies, creating cooperatives, and recuperating autogestión*, number volume 199 *in* 'Historical materialism book series', Brill, Leiden ; Boston. xvii, 12, 17, 48, 49

Vivarelli, M. (2004), 'Are All the Potential Entrepreneurs So Good?', *Small Business Economics* (43), 41–49. 122

Ward, B. (1958), 'The Firm in Illyria: Market Syndicalism', *The American Economic Review* **48**(4), 566–589.
   URL: *http://www.jstor.org/stable/1808268* 23, 44

White, H. (1980), 'A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity', *Econometrica: journal of the Econometric Society* pp. 817–838. Publisher: JSTOR. 57

Williamson, O. E. (1979), 'Transaction-cost economics: the governance of contractual relations', *The journal of Law and Economics* **22**(2), 233–261. Publisher: The University of Chicago Law School. 45

Xi, G., Block, J., Lasch, F., Robert, F. and Thurik, R. (2020), 'The survival of business takeovers and new venture start-ups', *Industrial and Corporate Change* **29**(3), 797–826.
   URL: *https://academic.oup.com/icc/article/29/3/797/5714934* 87, 92, 121, 122, 139

   tocloft

List of tables

List of figures

Abstract

This thesis compares the performance of worker-owned firms (WOFs) and conventional firms (CFs). These firms differ by their distribution of ownership rights and their mode of governance. In WOFs, the ultimate control is held by the suppliers of labor, whereas in CFs the ultimate control is held by the suppliers of capital. WOFs represent an implementation of democracy in firms and, as such, are likely to be immune to institutional harassment and socialwashing. WOFs have also been supported by citizens, politicians, and economists from across a wide ideological spectrum. Despite their attractiveness, WOFs represent a minute proportion of firms in our contemporary economies. This thesis seeks to bring new insights and stylized facts to better understand the rarity of WOFs. Chapter 1 studies how the interaction of the sunk costs of human capital and physical capital impacts the probability of WOF entry. I show that the likelihood of WOF entry is the highest when the sunk cost of human capital is dominant while the sunk cost of physical capital is negligible. Chapter 2 compares the survival patterns of WOFs and CFs. I show that WOFs survive longer than CFs regardless of whether they have different or similar entry resources, and that some entrepreneur and firm characteristics impact WOF and CF survival differently. Chapter 3 compares the survival patterns of WOFs distinguished by their entry mode (i.e., newly created, worker buyouts of sound CFs, worker buyouts of CFs in difficulty, and worker buyouts of nonprofit organizations). I show that any type of worker buyout survives longer than newly created WOFs. Overall, this thesis suggests that the rarity of WOFs is more likely to result from entry barriers specific to WOFs rather than from poor performance compared to CFs.

Keywords: Worker-owned firms, Performance, Sunk costs, Survival, Entry mode

Résumé

Cette thèse compare la performance des coopératives de travailleurs (SCOPs) et des entreprises conventionnelles (ECs). Ces entreprises diffèrent par leur distribution des droits de propriété et leur mode de gouvernance. Au sein des SCOPs, les travailleurs ont le contrôle ultime de leur entreprise, tandis qu'au sein des ECs les investisseurs ont le contrôle ultime. Les SCOPs instituent la démocratie dans le monde économique et, à cet égard, sont moins susceptibles de harcèlement moral institutionnel ou de pratiquer le *socialwashing* que les ECs. Les SCOPs furent et sont encore défendues par des citoyens, des politiques ou des économistes appartenant à une large palette idéologique. Malgré leur attractivité, les SCOPs représentent une fraction minuscule des entreprises dans le monde. Cette thèse entend apporter des éléments nouveaux pour comprendre la rareté des SCOPs. Le Chapitre 1 étudie comment l'interaction des coûts échoués en capital et en travail impacte la probabilité de créer une SCOP. Je montre que la probabilité de créer une SCOP est maximale lorsque le coût échoué en travail est dominant et que le coût échoué en capital négligeable. Le Chapitre 2 compare les profils de survie des SCOPs et des ECs. Je montre que les SCOPs survivent plus longtemps que les ECs indépendamment du fait que leurs ressources à l'entrée diffèrent ou non. Je montre également que certaines caractéristiques de l'entrepreneur et de l'entreprise impactent différemment la survie des SCOPs et des ECs. Le Chapitre 3 compare les profils de survie des SCOPs en distinguant quatre modes d'entrtée (les SCOPs nouvellement créées, les reprises d'entreprises saines, les reprises d'entreprises en difficulté et les reprises d'organisations à but non-lucratif). Je montre que les reprises en SCOPs survivent plus longtemps que les SCOPs nouvellement créées. Dans l'ensemble, cette thèse suggère que la rareté des SCOPs est due à des barrières à l'entrée spécifiques aux SCOPs plutôt qu'à leur prétendue moindre performance vis-à-vis des ECs.

Mots clés : Coopératives, SCOPs, Performance, Coûts échoués, Survie, Mode de création