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Lucile Romanello

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Lucile Romanello. Three Essays in Empirical Health Economics. Economics and Finance. IEP-Paris, 2012. English. NNT: . tel-01263689

HAL Id: tel-01263689

<https://pastel.hal.science/tel-01263689>

Submitted on 28 Jan 2016

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INSTITUT D'ETUDES POLITIQUES DE PARIS
ÉCOLE DOCTORALE DE SCIENCES PO

Programme doctoral d'économie

Doctorat en Sciences économiques

THREE ESSAYS IN EMPIRICAL HEALTH
ECONOMICS

Lucile ROMANELLO

Thèse dirigée par

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Soutenance le 19 décembre 2012

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Remerciements

Cette thèse n'est certainement pas le résultat d'un travail solitaire. Elle n'a pu voir le jour que grâce à l'aide précieuse de nombreuses personnes.

Je tiens tout d'abord à remercier Bruno Crépon, mon directeur de thèse, pour m'avoir fait confiance, pour avoir toujours été optimiste et surtout pour m'avoir communiqué sa passion pour les évaluations randomisées. Ces projets, qui devaient me prendre "à peine une demi-journée par semaine", m'ont finalement largement occupé pendant ces trois années de thèse.

Je suis également reconnaissante envers Yann Algan, Esther Duflo, Marc Gurgand et Rafael Lalive pour avoir accepté de faire partie de mon jury de thèse.

Je dois d'infinis remerciements à Pauline Givord qui avait déjà accepté de m'encadrer pour mon mémoire de Master et avec qui j'ai eu la chance de co-écrire mon premier article. Ce travail en commun m'a énormément appris et m'a permis de débiter ma thèse dans de bonnes conditions. Merci pour ta rigueur, ton honnêteté et ta patience.

Un immense merci à Roland Rathelot avec qui j'ai co-écrit le dernier chapitre de cette thèse. Merci d'avoir cru en ce projet et de t'être investi ainsi. Travailler à tes côtés a été un plaisir quotidien. Tes encouragements, notamment à la fin de ma thèse, m'ont été très précieux.

Je souhaite également remercier le CREST dans son ensemble pour m'avoir aussi bien accueillie durant ces trois années. Cet environnement exceptionnel m'a permis de m'épanouir dans mon travail. J'ai pu bénéficier de nombreux conseils et de l'aide des uns et des autres. Je remercie tout ceux qui ont su me faire progresser, me dépanner quand j'en avais besoin ou partager mes nombreuses pauses café.

Le séjour que j'ai effectué à l'OMS de Bamako a été déterminant dans mon choix de débiter une thèse. Je suis extrêmement reconnaissante envers le Dr. Cisse et sa famille pour m'avoir accueillie à Bamako.

Sans données, les travaux empiriques qui constituent cette thèse n'auraient pas été possible. Je remercie la CNAV pour m'avoir donné la possibilité de mettre en place l'expérimentation qui constitue un chapitre de cette thèse. Je tiens également à remercier Marcel Goldberg et Marie Zins de l'INSERM pour m'avoir donné accès à la base de données GAZEL et m'avoir permis de pouvoir mener à bien mes travaux. Leurs conseils et les échanges que nous avons pu avoir entre nos disciplines m'ont toujours été utiles.

Ces années de thèse ont également été l'occasion de travailler en équipe sur des projets d'expérimentation. Je tiens à remercier tout particulièrement les assistants de recherche du projet PresaJe, Virginie Kergoat, Joël Dutertre, Didier Dugast

de la Mission locale de Sénart ainsi que Pierre Chauvin et Sophie Lessieur de l'INSERM. Si les travaux que nous avons conduit ensemble ne figurent pas dans cette thèse pour des raisons de calendrier, ils ont indiscutablement constitué une expérience extrêmement enrichissante pour moi en me permettant de me plonger dans des considérations beaucoup plus opérationnelles et de découvrir une autre facette de la recherche.

Enfin, mes remerciements vont à tout ceux qui, bien qu'éloignés du monde de la recherche, m'ont toujours encouragée et m'ont permis de mener à bien cette thèse.

Table des matières

1	Introduction générale	1
1.1	Développement de l'offre et insuffisance de la demande	1
1.2	Comprendre les déterminants de la demande	4
1.2.1	Des biens trop coûteux ?	5
1.2.2	Un manque d'information ?	6
1.2.3	Des individus peu rationnels ?	8
1.2.4	Quelques éléments de réponse	9
1.3	Evaluer des programmes visant à augmenter la demande	11
1.3.1	Méthode d'évaluation	11
1.3.2	Le rôle de l'information	13
1.3.3	L'approche communautaire	14
1.3.4	L'espoir d'une amélioration ?	15
1.4	Mesurer l'effet de changements organisationnels sur la santé	17
1.4.1	Dépréciation du capital santé	17
1.4.2	Des difficultés méthodologiques	19
1.4.3	Stratégie d'identification	21
1.4.4	Contributions	22
2	A field experiment on the demand for prevention among elderly	25
2.1	Introduction	26
2.2	Experimental design	31
2.2.1	The program	31
2.2.2	The randomizations	32
2.2.3	Sample selection	37
2.3	Results	39
2.3.1	Overview	39
2.3.2	Acting on demand	41
2.3.3	Changing the cost	42
2.3.4	Providing information	45
2.4	Additional Findings on the Decision-making process	48
2.4.1	Non-response and selection bias	49
2.4.2	Summary statistics	56
2.4.3	Decision-making process	58
2.5	Conclusion	67
3	An evaluation of a Community-based Information Campaign on Health Demand in Mali	77
3.1	Introduction	77
3.2	Background	81
3.2.1	The Malian health system	81
3.2.2	The program	82

3.3	Data	87
3.4	Identification Strategy	90
3.5	Results	95
3.6	Conclusion	99
4	Organizational Change and Workers' Health :	
	Lessons from the 2000 Reform in the French Energy Utilities	103
4.1	Introduction	104
4.2	Institutional background	108
4.3	Data and descriptive statistics	112
	4.3.1 The GAZEL database	112
	4.3.2 Descriptive Statistics	112
4.4	Empirical approach	118
	4.4.1 Identification strategy	118
	4.4.2 Econometric model	122
4.5	Results	124
	4.5.1 Impact on working conditions	124
	4.5.2 Impact on health	124
4.6	Robustness checks	130
4.7	Conclusion	134
	Bibliographie	137

Introduction générale

Sommaire

1.1 Développement de l'offre et insuffisance de la demande . . .	1
1.2 Comprendre les déterminants de la demande	4
1.2.1 Des biens trop coûteux ?	5
1.2.2 Un manque d'information ?	6
1.2.3 Des individus peu rationnels ?	8
1.2.4 Quelques éléments de réponse	9
1.3 Evaluer des programmes visant à augmenter la demande . .	11
1.3.1 Méthode d'évaluation	11
1.3.2 Le rôle de l'information	13
1.3.3 L'approche communautaire	14
1.3.4 L'espoir d'une amélioration ?	15
1.4 Mesurer l'effet de changements organisationnels sur la santé	17
1.4.1 Dépréciation du capital santé	17
1.4.2 Des difficultés méthodologiques	19
1.4.3 Stratégie d'identification	21
1.4.4 Contributions	22

1.1 Développement de l'offre et insuffisance de la demande

Condition nécessaire à la liberté pour certains parce qu'elle permet de développer des "capabilités" (Sen, 1983) ou composante essentielle du "capital humain" pour

d'autres (Becker, 1962), la santé constitue une préoccupation majeure des décideurs publics. Il existe aujourd'hui un réel consensus sur la volonté de favoriser l'accès de tous à des services de santé de qualité. L'offre de santé, que ce soit dans les pays développés ou dans les pays en développement, s'est alors largement développée au cours des dernières années.

Cependant, des biens dont la capacité à améliorer l'état de santé des individus ne fait aujourd'hui plus de doute, demeurent sous-utilisés (Duflo et Banerjee, 2011). Les pouvoirs publics rencontrent d'importantes difficultés à faire accepter à leur population les services qu'ils mettent à leur disposition. Alors même que les politiques centrées sur l'offre ont contribué à susciter l'espoir d'une amélioration de la santé et des conditions de vie des individus, les obstacles semblent plutôt être du côté de la demande. Au Mali, pays sur lequel porte le Chapitre 3 de cette thèse, la persistance d'une situation sanitaire précaire réside, en partie, dans les faibles taux d'utilisation des services de santé de premier niveau (*CSCOM*) et ceci, malgré les décennies écoulées de plans de développement sanitaire. Premier niveau de santé, ces centres pourraient pourtant jouer un rôle clé dans la prise en charge sanitaire des populations. Au Mali, le recours à ces structures de soins est la première alternative pour seulement 18% des ménages (Thome, 2002). Ce chiffre témoigne d'une importante insuffisance du côté de la demande, et ceci malgré un renforcement de l'offre. La sous-fréquentation des structures de premier niveau contribue grandement à maintenir une situation sanitaire précaire.

Les exemples d'innovations technologiques rendues accessibles aux habitants des pays en développement et pour lesquelles le niveau de demande reste très faible sont malheureusement nombreux. Le plus célèbre exemple, de par son ampleur, est peut-être celui de la Malaria. Cette maladie, qui tue deux millions de personnes chaque année, principalement en Afrique subsaharienne (Crooper et al., 2004), n'est pas sans conséquence sur l'économie des pays africains dans lesquels elle sévit. La Malaria pourrait être responsable d'un ralentissement de 1 à 2 points de la croissance du PIB de ces Etats entre 1965 et 1990 (Gallup et Sachs, 2001). Il existe pourtant des moyens simples pour lutter contre cette maladie. Les moustiquaires imprégnées

d'insecticides, par exemple, s'avèrent être une mesure préventive efficace en permettant une réduction importante de la mortalité, notamment des enfants âgés de moins de 10 ans, et ceci pour un coût limité (Wiseman et al., 2006 ; Aikins et al., 1998). Cependant, les populations concernées n'ont que très peu recours à ces biens. Le traitement de l'eau ou encore la vaccination constituent deux autres exemples d'innovations sous-utilisées dont les bénéfices excèdent pourtant largement les coûts (Duflo et Banerjee, 2011). Le Chapitre 3 de cette thèse s'intéressera lui aux consultations prénatales et aux accouchements assistés pour lesquels la demande reste encore faible dans les pays en développement alors qu'ils pourraient permettre une réduction conséquente de la mortalité maternelle et infantile. En 2000, selon l'Organisation Mondiale de la Santé, une femme mourrait chaque minute des complications d'une grossesse ou d'un accouchement.

La problématique d'une insuffisance de la demande est tout aussi présente dans les pays développés, en particulier lorsqu'il s'agit de mesures préventives. Bien que la situation sanitaire des habitants des pays développés ne soit en rien comparable à celle des plus pauvres, on retrouve pourtant de nombreuses similitudes dans les comportements de demande de santé. Si ces dernières ne sont pas flagrantes à première vue, c'est simplement parce que les habitants des pays développés ne sont pas responsables d'une large partie des décisions concernant leur propre santé (Duflo et Banerjee, 2011). Dans les pays développés, la vaccination des enfants ou encore le traitement de l'eau ne résultent pas de choix individuels mais sont pris en charge par l'Etat. Ce dernier, par les politiques de santé publique, met en place des incitations suffisamment fortes pour orienter les décisions individuelles. Cependant, lorsque ces mécanismes incitatifs sont trop faibles, la procrastination ou le manque d'information peut également conduire à une sous-utilisation des mesures préventives dont l'effet positif a pourtant été démontré. Le Chapitre 2 de cette thèse se concentre sur les mesures visant à adapter le logement des personnes retraitées. Il a été démontré que de petites adaptations du lieu de vie pouvaient considérablement limiter les risques de chute (Jensen et al., 2006 ; Haines et al., 2004) et de dépendance (Cutler, 2001). Confrontés au défi du vieillissement, les décideurs publics ont cherché

à développer l'offre de services préventifs. Ainsi, en France, l'Assurance retraite a mis en place les Plans d'Actions Personnalisés (PAP). Ces plans consistent en une évaluation rigoureuse et approfondie de la situation du retraité afin d'identifier ses besoins et de lui proposer des solutions adaptées. L'objectif est de parvenir à faire adhérer les bénéficiaires à une démarche de prévention afin de retarder le risque de perte d'autonomie et de permettre leur maintien à domicile le plus longtemps possible. Cependant, la demande des retraités pour ces mesures préventives reste très faible. Aujourd'hui, ce sont seulement 15 000 personnes sur des millions de retraités qui bénéficient d'une adaptation de leur logement alors même que ce programme pourrait constituer un moyen efficace et peu coûteux de lutter contre la dépendance.

Ces quelques faits plaident pour une étude approfondie des comportements de demande de santé. Le Chapitre 2 de cette thèse se fixera pour objectif de comprendre les incitations qui conduisent les individus à investir dans leur santé. Une fois ces déterminants mieux identifiés, il s'agira d'évaluer la capacité de programmes à augmenter la demande de santé (Chapitre 3). Enfin, si l'état de santé d'un individu est en partie déterminé par ses choix, nous montrerons que d'autres facteurs, et notamment l'environnement et les conditions de travail, peuvent également avoir de lourdes conséquences sur l'état de santé (Chapitre 4).

1.2 Comprendre les déterminants de la demande

Parvenir à apporter des éléments de réponse quant aux déterminants de la demande de santé constitue le premier objectif de cette thèse. La conception de la santé ainsi adoptée se rapproche de celle développée par [Grossman \(1972b\)](#). La santé y est alors considérée comme un capital pouvant augmenter par la réalisation d'investissements. Il s'agit ici de brièvement passer en revue les principaux déterminants mis en avant par la littérature empirique. On se concentrera alors sur trois pistes explicatives d'une insuffisance de la demande en soulignant les problématiques majeures avant d'apporter quelques éléments de réponse.

1.2.1 Des biens trop coûteux ?

Au premier rang des déterminants figure le prix. Un large pan de la littérature sur les déterminants de la demande s'est concentré sur l'effet du prix. Considérant la santé comme un bien normal, l'objectif de ces travaux a été de chercher à tester les prédictions d'un modèle classique standard dans lequel les décisions de consommation d'individus supposés rationnels résultent d'une comparaison des coûts et des bénéfices. Dans un tel modèle, le niveau de demande est donc directement corrélé au prix (Giné, Townsend et Vickery, 2008). C'est également à cette conclusion que parviennent Cohen et Dupas (2010) lorsqu'elles étudient la sensibilité de la demande de prévention au prix. Dans une évaluation randomisée conduite au Kenya, elles montrent que la demande de moustiquaires imprégnées contre le paludisme est très largement sensible au prix. Lorsqu'ils se concentrent sur les traitements visant à prévenir les infections intestinales au Kenya, Kremer et Miguel (2007) confirment le rôle du prix dans la demande. L'introduction d'un mécanisme de partage des coûts, impliquant un investissement de la part des individus, conduit à une diminution de la demande de 80%, et ceci alors même que sont conduites parallèlement des campagnes d'information visant à sensibiliser les populations concernées.

Les coûts pouvant constituer un obstacle à la demande ne sont pas seulement de nature financière. Le modèle de demande de santé de référence, développé par Grossman (1972b), incluait déjà le coût d'opportunité en temps. Plusieurs études empiriques ont mis en avant le coût d'opportunité comme une possible barrière aux investissements en santé (Ensor et Cooper, 2004 ; Holtmann, 1972). Ce coût d'opportunité prend non seulement en compte le temps de transport ou la distance mais également le temps d'attente. Dans les zones rurales des pays en développement, pendant la saison des récoltes notamment, la visite au centre de santé d'une mère pour une consultation prénatale ou la vaccination d'un enfant est directement interprétée comme une demi-journée de travail de perdue alors même que l'utilité de la visite n'est pas toujours directement perçue (Toure, 2002). A partir de données sur la Côte d'Ivoire, Dor, Gertler et Van Der Gaag (1987) utilisent le fait que les soins soient gratuits pour isoler l'effet propre du temps de trajet sur le recours aux soins.

Ils parviennent à montrer que ce dernier joue un rôle important dans les comportements de demande, en particulier pour les individus les plus pauvres. Dans les pays développés, où les coûts monétaires assumés par l'individu pour sa santé ont largement diminué du fait de la mise en place de systèmes d'assurance public ou privé, les coûts en temps peuvent constituer un facteur déterminant de la demande de santé (Acton, 1975). On peut ainsi raisonnablement supposer que les coûts engendrés par la complexité des procédures administratives associées à la demande d'une prestation de santé influenceront négativement le niveau de demande. Par ailleurs, certains modèles de demande de santé sont parvenus à expliquer une sous-utilisation des services en incorporant l'idée de "stigma" dans la fonction d'utilité. Ce dernier constitue alors un coût non monétaire assumé par l'individu (Frank, 2004). Cette approche a notamment permis d'expliquer les faibles taux de recours aux soins pour les personnes atteintes de troubles mentaux (Frank et McGuire, 2000) .

1.2.2 Un manque d'information ?

Au-delà du prix, la question du rôle de l'information dans les comportements de demande a toujours été une préoccupation centrale des économistes. Ces derniers ont reconnu l'imparfaite information des consommateurs et la possibilité pour les professionnels de santé d'exploiter cette dernière comme une faille centrale du marché de la santé (Kenkel, 1990). Ce manque d'information concerne non seulement l'offre de santé mise à la disposition des consommateurs mais aussi les bénéfices et les coûts associés à chacun des produits. Comme le soulignent Duflo et Banerjee (2011), la santé est un domaine particulier, d'une immense complexité, où l'acquisition de connaissances restent le plus souvent difficile. Le développement des nouvelles technologies de l'information et en particulier d'internet ne semble pas permettre de surmonter ces difficultés (Becker et al., 2003). De nombreuses études ont pu montrer que la perception des bénéfices associés à certains produits de santé est très largement biaisée. Ainsi, dans un article au sujet de la vaccination en Inde, Das et Das (2003) montrent que les faibles taux de vaccination sont la conséquence directe de l'imparfaite information des populations quant à la capacité des vaccins à prévenir certaines maladies. Tout comme les bénéfices, le risque est également

très souvent mal perçu par les individus (Viscusi, 1990). Les faibles niveaux de demande, notamment pour les mesures préventives, pourraient alors résulter d'un manque d'information biaisant ainsi l'arbitrage entre les bénéfices et les coûts. Favoriser l'accès à l'information pourrait améliorer la perception des risques et des bénéfices réels de la prévention et permettre ainsi de se rapprocher d'un niveau d'investissement optimal.

Cependant, si donner de l'information peut s'avérer dans certains cas efficace pour augmenter la demande, cette politique peut également avoir des effets limités ou négatifs. En effet, Simon (1955) s'opposait déjà aux théories classiques supposant la rationalité substantive des individus pour souligner, au contraire, les limites de cette dernière. D'autres travaux, en Sciences cognitives notamment, s'appuient sur ses thèses et montrent que les capacités cognitives des individus restent partiellement limitées ce qui peut avoir pour conséquence d'amoinrir les effets de l'information. Lorsqu'il s'agit de décisions complexes, les individus ont tendance à n'utiliser qu'une partie de l'information disponible¹. Marois et Ivanoff (2005) montrent qu'il existe des limites fonctionnelles, une sorte de "goulot d'étranglement", qui perturbent l'absorption d'informations nouvelles. Par ailleurs, des études empiriques ont mis en avant l'existence d'une aversion à l'information, les individus préférant parfois ignorer la vérité plutôt que de se heurter à cette dernière. Alors qu'informer les individus quant à leur possible contamination par le VIH en effectuant des tests gratuits constitue aujourd'hui l'une des principales orientations pour réduire l'épidémie, Thornton (2008) montre, dans une expérimentation randomisée au Malawi, que seulement 34% des personnes vont spontanément chercher les résultats de leur test. Lerman et al. (1996) parviennent à la même conclusion et montrent que 40% des femmes ayant une forte probabilité de développer un cancer refusent d'être testées. Fondé sur des faits empiriques soulignant que les individus refusent fréquemment de recevoir des informations quant à leur état de santé alors même que ces dernières sont gratuites, Koszegi (2003) a modélisé le processus décisionnel des patients en intégrant cette aversion à l'information. Le fait d'être plus fortement

1. Voir Conlisk (1996) pour une revue de la littérature sur cette question.

affecté négativement par les mauvaises nouvelles que positivement par les bonnes conduit ainsi les individus à avoir une demande de prévention sous-optimale.

1.2.3 Des individus peu rationnels ?

L'aversion à l'information ne constitue pas le seul biais cognitif pouvant conduire à une insuffisance de la demande de prévention. De nombreuses études sont venues rompre avec la théorie classique en soulignant les biais cognitifs qui peuvent parfois conduire les individus à prendre des décisions jugées contraires aux prédictions d'un modèle standard. DellaVigna (2007) passe en revue les preuves empiriques de ces déviations et revient sur leurs conséquences économiques. Dans son ouvrage, Kahneman (2011) propose une explication de ces comportements. Selon lui, notre mode de réflexion serait composé de deux systèmes distincts dont le premier inconscient, plus rapide et plus intuitif, aurait la suprématie sur le second pourtant plus réfléchi et dicterait nos décisions malgré ses défaillances. Il s'agit ici de revenir sur deux de ces nombreux biais et de s'interroger sur la façon dont ils peuvent influencer les comportements de demande de prévention.

Les travaux des chercheurs, en psychologie notamment, ont permis de mettre en avant l'existence d'une préférence pour le présent qui conduit les individus à repousser les actions engendrant un coût immédiat et des bénéfices futurs (Thaler, 1981 ; O'Donoghue et Rabin, 1999). Le faible niveau de demande serait alors le résultat de comportements de procrastination. Par exemple, on peut supposer que les personnes retraitées reconnaissent avoir besoin d'adapter leur logement. Cependant, parce que cette action engendre un coût à la fois psychologique et monétaire pour des bénéfices sous-estimés et non immédiats, elles repoussent sans cesse leur décision d'investissement. Une expérimentation randomisée conduite auprès de paysans au Kenya a permis de mettre en avant ces comportements de procrastination (Duflo, Kremer et Robinson, 2009). Une faible subvention, visant à réduire les coûts immédiats et à les égaliser aux coûts futurs, a conduit à une hausse de la demande d'engrais, permettant ainsi d'augmenter la récolte.

Par ailleurs, différentes études, notamment en économie expérimentale ou en

marketing, ont pu également souligner le rôle du *framing* de l'information en montrant que ce dernier pouvait avoir un effet significatif sur la demande. Les individus seraient alors sensibles à des manipulations de la forme de l'information alors même que le contenu ne change pas. Des chercheurs ont tenté de retrouver ces résultats par la mise en place d'expérimentation. Dans une étude conduite sur le marché du crédit en Afrique du Sud, Bertrand et al. (2010) montrent que des manipulations, comme par exemple l'ajout d'une photo, peuvent avoir un effet significatif sur la demande alors même qu'elles n'apportent aucune information quant aux caractéristiques du produit. Cependant, Dupas (2009b) ne parvient pas aux mêmes conclusions lorsqu'elle s'intéresse à la demande de prévention contre la Malaria au Kenya. Testant deux hypothèses fondées sur des modèles comportementaux, elle montre que faire varier la forme de l'information sur les bénéfices associés au bien ou faire s'engager les individus verbalement à acquérir le bien n'a aucun effet sur la demande de moustiquaires. Dans leur article, Bertrand et al. (2010) soulignent cependant que les effets psychologiques de ces manipulations restent très sensibles au contexte ce qui explique en partie pourquoi certaines manipulations peuvent influencer la demande alors que d'autres non.

1.2.4 Quelques éléments de réponse

Par la mise en place d'une évaluation randomisée, le Chapitre 2 de cette thèse souhaite contribuer au débat sur les déterminants de la demande mais aussi sur le processus décisionnel des agents. Ce travail se concentre sur les mesures préventives visant à adapter le logement des personnes retraitées pour en réduire les risques et limiter ainsi la probabilité de tomber dans la dépendance. Ce projet a été conduit en partenariat avec la Caisse Nationale d'Assurance Vieillesse (CNAV) qui, au cours des dernières années, a cherché à développer son offre de services par la mise en place, notamment, des plans d'action personnalisés (PAP). Ces derniers consistent en la visite d'un professionnel au domicile de la personne retraitée afin d'établir une évaluation de ses besoins et de préconiser des solutions adaptées. Cependant, les programmes, tels que celui proposé par la CNAV afin de permettre aux personnes retraitées de rester autonomes chez elles le plus longtemps possible, restent très peu

demandés par les populations concernées. Il s'agissait alors d'apporter des éléments de réponse concrets à la CNAV afin qu'elle puisse ensuite élaborer une campagne nationale visant à augmenter le recours à son programme.

L'expérimentation a consisté à envoyer, à des groupes constitués aléatoirement, différents flyers contenant chacun une incitation particulière. L'échantillon total est constitué de plus de 40 000 retraités résidant en Ile-de-France. A la suite de la réception du dépliant, les personnes intéressées avaient la possibilité de contacter par téléphone l'Assurance retraite afin de bénéficier du programme. Parallèlement, un questionnaire permettant de collecter des informations complémentaires quant à l'intérêt porté au programme et à la perception des risques a également été envoyé à l'ensemble de l'échantillon. Les 14 traitements peuvent être résumés en deux catégories et ont principalement consisté à changer aléatoirement le coût du programme en allouant des subventions de différents montants ou en agissant sur les coûts non-matérielles et à donner de l'information en faisant varier son contenu et sa forme.

Les résultats présentés dans le Chapitre 2 tendent à montrer que donner de l'information constitue la politique la plus efficace pour augmenter la demande de prévention. En ce qui concerne l'effet des coûts, on parvient seulement à montrer un effet du traitement visant à prendre en charge la totalité des coûts financiers liés à l'adaptation du logement. Les réductions d'un montant inférieur ou encore conditionnelles à un engagement rapide n'ont pas d'effet significatif sur la demande. Par ailleurs, l'effet d'une prise en charge des coûts demeure inférieur à celui de l'information. Ces résultats viennent partiellement rompre avec ceux obtenus par des études antérieures, notamment conduites dans les pays en développement, soulignant non seulement le rôle crucial du prix dans les comportements de demande de prévention mais aussi les forts effets provoqués par l'accord d'une faible subvention (Holla et Kremer, 2009). Il est cependant nécessaire de prendre en compte des éléments de contexte. La population ciblée par cette étude, à savoir des personnes retraitées, est certainement moins contrainte financièrement que ne le sont les populations des pays en développement. On parvient cependant à constater des similitudes dans les

comportements de demande et notamment une disposition à payer pour des mesures préventives quasi nulle. Cette étude a également permis de confirmer les résultats précédemment mis en avant par Bertrand et al. (2010) quant à l'effet des manipulations de la forme de l'information. Alors même que le contenu du message reste inchangé, la façon dont il est présenté conduit à des différences significatives dans les comportements de demande. Par ailleurs, ce travail a non seulement pu analyser la décision de recourir ou non au programme mais également fournir des résultats complémentaires, par l'analyse des réponses apportées aux questionnaires, quant au processus décisionnels des individus. La perception du risque ou l'intention de recourir au programme, deux étapes préalables à la décision, ne semblent pas réagir aux mêmes déterminants que la décision elle-même. Ces résultats laissent supposer qu'il peut alors être pertinent de concevoir le processus décisionnel des agents comme un processus dynamique et optimal de combiner les différentes incitations.

1.3 Evaluer des programmes visant à augmenter la demande

Après s'être intéressé à la question des déterminants de la demande et avoir montré le rôle crucial de l'information, le troisième Chapitre de cette thèse propose d'évaluer un programme visant à modifier les comportements en matière de santé. Il se fixe alors pour objectif de mesurer l'impact d'une campagne d'information et de vaccination sur le recours aux soins de santé primaire au Mali. Se posent alors plusieurs questions auxquelles il convient de répondre avant d'évoquer les résultats obtenus dans le Chapitre 3.

1.3.1 Méthode d'évaluation

Dans un premier temps, évaluer pose la question de la méthodologie utilisée. Si l'on souhaite mesurer l'impact d'une campagne d'information comme se propose de le faire le Chapitre 3, on se heurte nécessairement à des difficultés méthodologiques liées notamment au fait que ce type de programmes s'adresse généralement à un public bien particulier. L'estimation de l'effet du traitement s'en trouve alors biaisée

par un effet de sélection.

La méthode adoptée dans ce chapitre, mais aussi dans le Chapitre 4, est celle des différence-de-différence. Il faut alors déterminer le contrefactuel correspond à la situation qui aurait prévalu en l'absence du programme. On surmonte ainsi les biais d'un estimateur qui résulterait d'une comparaison entre un groupe de bénéficiaires et un groupe de non-bénéficiaires ou d'une simple comparaison temporelle. Dans le cas simple où l'on a deux périodes, deux groupes et aucune caractéristique observable, l'estimateur correspond à :

$$\begin{aligned} \tau = & [E[Y_i|G_i = 1, T_i = 1] - E[Y_i|G_i = 1, T_i = 0]] \\ & - [E[Y_i|G_i = 0, T_i = 1] - E[Y_i|G_i = 0, T_i = 0]] \end{aligned}$$

Il s'agit alors de la différence entre l'évolution de l'*outcome* dans le groupe traité ($G_i = 1$) et l'évolution de ce même *outcome* dans le groupe contrôle. Cette méthode implique l'hypothèse selon laquelle les évolutions auraient été similaires en l'absence du programme. Cette hypothèse, impossible à vérifier, peut cependant être partiellement validée par le parallélisme de l'évolution de la variable d'intérêt dans le groupe traité et le groupe contrôle avant la mise en place du programme.

Si la méthodologie de différence-de-différence et son application empirique sont relativement simples, la difficulté réside dans la capacité à définir un groupe de contrôle qui soit crédible. Ce Chapitre, tout comme le Chapitre 4, exploitent des expériences naturelles qui génèrent des sources de variation exogènes. Ainsi, dans ce Chapitre, l'identification repose sur le fait que la campagne de vaccination et d'information évaluée n'a pas eu lieu au même moment dans l'ensemble des districts de santé maliens. En effet, pour des raisons de logistique principalement, il a été décidé de réaliser ce programme en trois vagues (2002, 2003 et 2004). Ainsi, les districts dans lesquels a eu lieu la campagne seulement en 2004 peuvent constituer un groupe de contrôle crédible lorsque l'on souhaite évaluer l'effet du programme dans les groupes traités les années précédentes. Cependant, les districts n'ont pas été affectés aléatoirement au traitement mais en fonction du taux de prévalence du

Tétanos dans la région. L'identification repose alors sur l'hypothèse selon laquelle l'évolution des taux de consultations prénatales et d'accouchements assistés, variables d'intérêt dans ce Chapitre, aurait été la même en l'absence du programme. L'étude des *trends* de ces deux variables avant la mise en place du programme et leur parallélisme permettent de valider cette hypothèse identifiante.

1.3.2 Le rôle de l'information

Les résultats présentés dans le Chapitre 2, bien qu'ils aient été obtenus dans un contexte totalement différent, ont permis de souligner le rôle crucial de l'information dans les comportements de demande. Dans les pays en développement, l'information pourrait également constituer un moyen d'augmenter le faible niveau de demande pour des technologies pourtant peu coûteuses et avérées efficaces. De nombreuses études ont montré que le simple fait de donner de l'information pouvait avoir d'importantes conséquences sur les comportements de santé. Ainsi, dans une expérimentation randomisée conduite au Kenya, Dupas (2009a) montre que donner de l'information aux adolescentes sur les risques de contracter le VIH permet de diminuer de 28% le nombre de grossesses, utilisées alors comme un *proxy* de relations sexuelles non protégées. De Walque (2007) trouve des résultats similaires en Ouganda bien qu'il souligne le caractère hétérogène de l'effet en fonction du niveau d'éducation notamment. S'intéressant à une autre problématique de santé majeure dans les pays en développement, à savoir les maladies liées à la consommation d'une eau non potable, Madajewicz et al. (2007) parviennent à la même conclusion quand à la capacité de l'information à modifier en profondeur les comportements de santé. Informer les ménages sur les risques engendrés par la consommation d'une eau contaminée à l'arsenic conduit à une augmentation de 37% de la probabilité qu'ils modifient leur comportement. Les soins prénataux et les accouchements assistés sur lesquels se concentre le Chapitre 3 de cette thèse sont un des domaines où le rôle de l'information a également pu être testé à de nombreuses reprises, notamment dans le cadre du Réseau de Prévention de la Mortalité Maternelle (PMM). Il a ainsi pu être démontré l'effet positif de campagnes d'information sur la proportion d'accouchements assistés (Ensor et Cooper, 2004). Donner de l'information peut avoir un

impact conséquent et contribuer ainsi à améliorer la santé des habitants des pays en développement.

1.3.3 L'approche communautaire

Si l'effet positif de l'information a pu être démontré, se pose cependant la question de la façon dont celle-ci est diffusée. Le Chapitre 2 de cette thèse a également pu mettre en avant l'influence de la forme que revêt l'information sur le processus décisionnel des individus. En effet, la façon dont est véhiculée l'information semble influencer la demande alors même que le contenu du message diffusé reste inchangé. Ainsi, si de nombreux pays d'Afrique sub-saharienne ont inclus la prévention du VIH dans leurs programmes scolaires, cela n'a pas toujours entraîné des effets sur les comportements à risque des adolescents (Dupas, 2009a). L'information, lorsqu'elle n'est pas diffusée par le bon vecteur ou lorsque le message n'est pas adapté, n'a alors aucun impact.

Depuis plusieurs années, l'approche communautaire semble constituer une alternative en santé publique dans les pays en développement. La Charte d'Ottawa, adoptée lors de la première Conférence internationale pour la promotion de la santé en 1986, accorde un rôle central à la communauté en déclarant :

La promotion de la santé passe par la participation effective et concrète de la communauté à la fixation des priorités, à la prise des décisions et à l'élaboration et à la mise en oeuvre des stratégies de planification en vue d'atteindre une meilleure santé. Au coeur même de ce processus, il y a la dévolution de pouvoir aux communautés considérées comme capables de prendre en main leurs destinées et d'assumer la responsabilité de leurs actions.

Ainsi, la pratique du *community-based monitoring* s'est largement répandue au cours des dernières années dans les pays en développement. Consistant à donner un pouvoir de contrôle aux personnes directement bénéficiaires des services publics, elle permettrait d'améliorer la qualité des services fournis mais aussi la situation sanitaire des populations (Portella et Santarelli, 2003). Dans une évaluation randomisée

conduite en Ouganda, Bjorkman et Svensson (2009) montrent que cette pratique a effectivement entraîné une augmentation des efforts fournis par le personnel médical ainsi qu'une plus grande utilisation des services de santé. Cette volonté d'impliquer les communautés se retrouve également lors de la conception de campagnes d'information. Des membres de la communauté sont alors directement chargés de diffuser l'information afin d'assurer une plus grande réceptivité du message. Cette stratégie peut s'avérer efficace et conduire à une augmentation du niveau d'utilisation des structures de soins. C'est le résultat auquel parviennent Srivastava et Bansal (1996), lorsqu'ils évaluent l'impact d'un projet conduit dans la région du Gujarat en Inde, consistant à recruter et à former des femmes issues de la population locale.

1.3.4 L'espoir d'une amélioration ?

Le Chapitre 3 de cette thèse évalue l'impact d'une campagne de vaccination et d'information sur le recours aux soins de santé primaires au Mali. Il part du constat des conséquences dramatiques d'un trop faible recours aux soins sur la mortalité maternelle et infantile en Afrique sub-saharienne. Alors que l'Organisation Mondiale pour la Santé (OMS) estimait à 529 000 le nombre de femmes décédées à la suite d'une grossesse ou d'un accouchement en 2000², [Graham, Bell, Bullough, De Brouwere, and Van Lerberghe \(2001\)](#) montrent que ce chiffre pourrait être diminué de 16 à 33% si les accouchements étaient assistés par un professionnel de santé. Donner naissance dans une structure de santé permettrait notamment de prévenir les quatre sources de complication responsables de la majorité des décès en couches à savoir la dystocie, l'hypertension artérielle ou la pré-éclampsie, l'infection puerpérale et l'hémorragie obstétricale. Ainsi, réduire la mortalité maternelle et infantile ne paraît pas constituer un objectif inatteignable. Au contraire, une amélioration semble possible si les grossesses sont mieux suivies, notamment par la mise en place de consultations prénatales, et si les accouchements sont assistés par du personnel médical suffisamment qualifié. Augmenter le niveau de demande pour ces types de services dans les pays en développement constitue une priorité.

2. http://unstats.un.org/unsd/mi/goals_2005/goal_5.pdf

Les résultats présentés dans le Chapitre 3 montrent que des moyens peu coûteux peuvent avoir un impact important sur les comportements de demande. Entre 2002 et 2004, le Ministère Malien de la Santé, avec le soutien des organisations internationales, a décidé de mettre en place une campagne de vaccination contre le Tétanos Maternel et Néonatal (TMN) afin d'éradiquer cette maladie qui sévit encore dans les pays les plus pauvres de la planète. Le gouvernement a alors profité de cette occasion pour diffuser, en parallèle de la campagne de vaccination, de l'information sur le Tétanos ainsi que sur les accouchements assistés. 2 330 000 femmes Maliennes en âge de procréer ont été ciblées par cette campagne. Soucieux de suivre les recommandations des institutions internationales sur la nécessité d'impliquer les communautés, le gouvernement a décidé que l'information serait diffusée par un membre du village directement désigné par sa communauté.

Parce que la campagne a été conduite en trois phases, il nous est alors possible d'estimer par différence-de-différence, méthodologie d'évaluation dont le principe a été développé plus haut, son effet sur les taux d'accouchements assistés et de consultations prénatales. On peut alors montrer que la campagne a conduit à une augmentation de 17% du taux d'accouchements assistés et de 25% du taux de consultations prénatales. Ces résultats, en accord avec ceux obtenus précédemment, notamment dans le domaine médical, semblent confirmer la pertinence des orientations adoptées par les institutions internationales. Ils témoignent également de la possibilité de diminuer les taux de mortalité maternelle et infantile par le développement de programmes de prévention peu coûteux tels qu'une campagne d'information. Cependant, ces résultats, obtenus par l'exploitation d'une base de données administratives, ne permettent pas d'isoler l'effet propre de l'implication des communautés dans la campagne.

1.4 Mesurer l'effet de changements organisationnels sur la santé

Si les deux premiers chapitres de cette thèse se sont intéressés aux comportements de demande de santé des individus, le Chapitre 4 se concentre plus particulièrement sur l'effet du travail sur la santé. En particulier, il s'intéresse à l'impact de changements organisationnels au sein des entreprises sur les conditions de travail et la santé des travailleurs. Dans un premier temps, il s'agit ici d'évoquer les difficultés méthodologiques liées à l'identification d'un lien causal entre travail et santé avant de proposer, dans un second temps, une stratégie permettant de surmonter certaines de ces difficultés.

1.4.1 Dépréciation du capital santé

L'idée d'une détérioration du capital santé est déjà présente dans le cadre théorique fondamental développé par [Grossman \(1972b\)](#). Ce dernier définit un taux de dépréciation du stock de capital santé, traité comme exogène dans la version la plus simple du modèle puis comme une fonction négative du stock de capital dans une version plus complexe. Cette dépréciation est tout d'abord naturellement due à l'âge. Elle correspond à un processus biologique sur lequel les agents n'ont aucun contrôle ([Case et Deaton, 2005](#)). Cependant, le taux de dépréciation est également déterminé par l'utilisation que fait l'agent de son capital santé. Dans leur modèle, [Muurinen et Le Grand \(1985\)](#) supposent que les individus ont trois types de capitaux : un capital santé semblable à celui défini par [Grossman \(1972b\)](#), un capital humain correspondant à l'éducation ainsi proche de celui de [Becker \(1962\)](#) et un capital financier. Ces trois capitaux présentent une certaine substituabilité entre eux dans leur capacité à produire des richesses, ce qui implique que les individus étant dotés de capitaux humain et financier moindres peuvent décider de plus exploiter leur capital santé. Les auteurs prédisent ainsi que les personnes les plus pauvres et les moins éduquées verront leur capital santé se déprécier à un taux relativement plus élevé. C'est dans la continuité de cette notion de dépréciation du capital santé que peut être analysé le lien entre travail et santé. L'environnement de travail, les

conditions de travail et son organisation peuvent alors être considérés comme des facteurs pouvant affecter, positivement ou négativement, l'état de santé physique et psychologique des individus.

Avec l'émergence de nouvelles formes d'organisation du travail et une pression de plus en plus accrue dans un contexte de concurrence internationale, la relation entre les caractéristiques de l'environnement de travail et le développement de pathologies spécifiques a été largement étudiée. Ces études se sont principalement ancrées dans deux cadres théoriques. Le premier modèle, développé et testé par [Siegrist \(1996\)](#), s'intéresse à l'équilibre entre l'effort produit par le travailleur et les récompenses qu'il reçoit. Le stress survient alors lorsqu'il existe un déséquilibre entre ces deux dimensions. [Niedhammer et Siegrist \(1998\)](#) soulignent que l'inadéquation entre les efforts produits et les récompenses reçues constitue un bon prédictif du développement de pathologies cardio-vasculaires. Le second modèle a lui été développé par [Karasek \(1979\)](#). Il permet, à l'aide d'un questionnaire, de construire un score à partir de trois dimensions : la demande psychologique qui correspond aux exigences et aux contraintes liées au travail, l'autonomie décisionnelle qui correspond à la marge d'autonomie laissée au travailleur et enfin le soutien social dont le travailleur bénéficie auprès de ses collègues ou de sa hiérarchie. Des travaux, notamment en épidémiologie, ont pu alors montrer que ce score, représentant le degré de "tension au travail" (*job strain*) était fortement corrélé avec la présence de pathologies cardio-vasculaires ([Karasek et al., 1981](#) ; [Theorell et Karasek, 1996](#)), de troubles musculo-squelettiques ou encore de troubles mentaux ([Choi et al., 2008](#)). Ce lien entre conditions de travail et santé a également pu être mis en évidence à un niveau macroéconomique. En utilisant la crise financière ayant eu lieu en Corée du Sud en 1997, [Kim, Muntaner, Khang, Paek, and Cho \(2006\)](#) montrent que la dégradation des conditions de travail due à l'introduction d'une plus forte flexibilité sur le marché du travail a causé une augmentation du nombre de pathologies psychologiques recensées chez les femmes.

1.4.2 Des difficultés méthodologiques

Cependant, au-delà du constat de l'existence de corrélations, l'identification d'un lien causal entre travail et santé s'avère complexe (Gollac et Volkoff, 2006) et pose plusieurs questions méthodologiques. Ces dernières sont principalement de deux ordres. Se pose en premier lieu la question de l'endogénéité. Les conditions et l'environnement de travail sont corrélés avec de nombreuses variables qui elles-mêmes affectent la santé. Ainsi, Ross et Wu (1995) démontrent à nouveau la relation positive entre éducation et santé et soulignent la complexité des mécanismes sous-jacents. Les auteurs identifient trois canaux par lesquels le niveau d'éducation détermine l'état de santé : celui du travail et du statut économique qui en résulte, celui des ressources socio-psychologiques et, enfin, celui du mode de vie. Dans la lignée des travaux de Fuchs (1986) pour qui le mode de vie est responsable de la majeure partie des inégalités de santé, Contoyannis et Jones (2004) développent un modèle économique qui leur permet d'identifier les interactions entre des comportements favorables à la santé et l'état de santé perçu tout en tenant compte de l'hétérogénéité inobservable. Le mode de vie est lui-même fortement corrélé au revenu qui va également affecter l'état de santé (Van Doorslaer et al., 1997 ; Mackenbach et al. 2005). Ces travaux soulignent tous les nombreuses corrélations qu'il existe entre ces différentes variables rendant compliquée l'identification d'un lien causal. Cette difficulté subsiste également lorsque l'on s'intéresse aux changements organisationnels mis en place au sein des entreprises puisque ces derniers sont rarement exogènes et souvent liés à des chocs macroéconomiques.

La seconde difficulté méthodologique qui émerge lorsque l'on travaille sur des problématiques de santé est celle de la mesure. La santé, parce qu'elle est multidimensionnelle (Fuchs, 2004), est complexe à appréhender et ne peut être mesurée dans son intégralité. Si l'Organisation Mondiale de la Santé adopte une notion positive de la santé la définissant comme un "état de bien-être complet", la plupart des mesures utilisées sont elles négatives (Sermet et Cambois, 2002). L'état de santé est appréhendé à travers le taux de mortalité ou les pathologies. Le taux de mortalité, parce qu'il a beaucoup baissé au cours des dernières décennies, ne constitue plus

un indicateur suffisant permettant d'obtenir une mesure précise de l'état de santé. Quant aux pathologies, parce qu'elles nécessitent un diagnostic médical préalable, elles constituent des informations relativement rares pour des échantillons de taille importante.

Ainsi, la grande majorité des travaux utilise des indicateurs de santé perçue. Ces derniers présentent pourtant d'importantes faiblesses (Strauss et Thomas, 1998). Ces faiblesses apparaissent notamment lorsque les indicateurs de santé perçue sont utilisés afin d'étudier le lien entre santé et travail. En effet, plusieurs études empiriques ont mis en avant la tendance des individus à rationaliser leurs comportements sur le marché du travail, notamment leurs absences ou un départ anticipé à la retraite, en déclarant un état de santé plus mauvais qu'il ne l'est en réalité (Currie et Madrian, 1999). Ce biais déclaratif est connu sous le nom de "*justification hypothesis*" (Chirikos et Nestel, 1984). Baker, Stabile et Deri (2001) montrent alors que ce biais est fortement corrélé avec le statut sur le marché du travail des individus, l'état de santé étant directement utilisé comme la justification de ce statut. Par ailleurs, il est traditionnellement demandé aux personnes interrogées d'évaluer leur état de santé en se situant sur une échelle présentant généralement quatre modalités. Les réponses obtenues par de tels questionnaires sont alors le reflet de la perception qu'ont les individus de leur état de santé. Or, cette perception mais aussi la définition de ce qu'est une "bonne" santé sont fortement corrélées avec les croyances, les valeurs et le statut socio-économique. De plus, Sutton et al. (1999) montrent que le biais des mesures de santé perçue est corrélé avec le taux d'utilisation des services de santé. Enfin, il a été démontré la capacité des individus à s'adapter à leur état de santé alors même que celui-ci se dégrade. Ainsi, des individus ayant développé des pathologies chroniques telles que le diabète ou encore des handicaps moteurs, ont tendance à évaluer leur bien-être de façon similaire à la population générale (Frank, 2004). Cette capacité d'adaptation aux changements tend également à biaiser les mesures de santé perçue.

1.4.3 Stratégie d'identification

Le dernier Chapitre de cette thèse cherche à surmonter certaines des difficultés méthodologiques soulignées ci-dessus afin d'identifier un lien causal entre changements organisationnels, conditions de travail et santé des travailleurs. Les changements dans la législation européenne visant à introduire un marché commun au sein de l'Union Européenne sont alors utilisés comme une source de variation exogène.

La libéralisation des marchés de l'énergie a débuté dès 1996 par l'adoption d'une première Directive européenne (96/92/CE, 19 Décembre 1996) puis s'est intensifiée par l'adoption d'une seconde en 2003 (2003/54/CE, 26 Juin 2003). Selon la volonté du Conseil d'Etat, ces directives ont été transposées en droit français de façon à permettre une ouverture progressive des marchés de l'énergie à la concurrence. Elles ont ainsi donné naissance à trois actes législatifs : lois 2000-108 (10 Février 2001), 2003-108 (3 Janvier 2003) et 2004-804 (9 Août 2004). En 2007, le secteur de l'énergie est totalement ouvert à la concurrence. Ces changements législatifs n'ont pas été sans conséquence sur l'organisation de l'ancien monopole national EDF-GDF. Ils ont notamment impliqué la séparation stricte des activités de production, de transport et de distribution. Sont alors créées deux nouvelles entités en charge du transport (RTE et GRT) et deux autres chargées d'assurer la distribution de l'électricité et du gaz (ErDF et GrDF). Elles possèdent un service commun qui reste monopole d'Etat alors que la production est, quant à elle, ouverte à la concurrence.

Dans ce dernier Chapitre, est défendue l'idée selon laquelle ces changements organisationnels ont été asymétriques entre les différents services. Les employés du secteur de la distribution et des transports, resté monopole, ont été plus profondément affectés par la restructuration de l'entreprise et ceci pour deux raisons principalement. Tout d'abord, la concurrence, de par sa faible ampleur, n'a que très partiellement affecté les agents en charge des activités de production, notamment dans les années qui ont suivi la mise en plus de la réforme. En effet, en 2009 soit 13 ans après l'adoption de la première Directive européenne, les compétiteurs de l'ancien monopole se partagent une part de marché de seulement 4% pour la consommation résidentielle. La compagnie GDF Suez, née de la fusion entre Gaz

de France et Suez en 2008, est incluse parmi les concurrents. De plus, les nouvelles entreprises, nées de la séparation des différents types d'activité, ont du adopter leur propres schémas managériaux impliquant ainsi de profonds changements pour les agents. Les fonctions managériales ont été regroupées en 8 directions opérationnelles venant remplacer les 102 centres départementaux et confirmant la mise en place d'une logique verticale plus que territoriale.

1.4.4 Contributions

Ce Chapitre évalue l'effet de ces changements organisationnels sur la santé des travailleurs concernés. Pour cela, est utilisée la base de données GAZEL, cohorte créée par l'INSERM. Cette base permet d'obtenir des données extrêmement précises sur la santé des individus mais également sur leurs conditions de travail et leurs trajectoires professionnelles. Cette base contient non seulement des données renseignées lors de la passation d'auto-questionnaires mais également des données de nature administrative issues des fichiers des départements médicaux et du personnel de l'entreprise. Le fait de disposer, par exemple, de données sur les arrêts maladie et leurs motifs permet de limiter les biais liés à l'endogénéité des mesures de santé perçue.

Par différence-de-différence, cette étude parvient à mesurer un effet de la réforme sur les conditions de travail et la santé des travailleurs concernés. On constate notamment une augmentation significative du nombre d'arrêts maladie pour raisons psychologiques. L'effet de la réforme est particulièrement marqué sur les arrêts pour dépression nerveuse. Le nombre de troubles musculo-squelettiques déclarés augmentent également parmi les travailleurs des nouvelles entités créées. Par ailleurs, en ce qui concerne l'affectation de la santé psychique, l'effet est particulièrement hétérogène selon le sexe : les femmes sont largement plus affectées que ne le sont les hommes. On mesure une augmentation de plus de deux jours par an du nombre d'arrêts maladie pour raisons psychologiques parmi les femmes.

Si ce Chapitre parvient à surmonter les biais d'endogénéité par l'exploitation du caractère exogène de la réforme du secteur de l'énergie, se pose cependant la

question de la validité externe des résultats présentés. L'échantillon considéré dans ce Chapitre est relativement particulier et faiblement représentatif de l'ensemble des travailleurs pouvant potentiellement être affectés par la mise en place de changements organisationnels. Lorsque la réforme entre en vigueur et que les premiers changements structurels ont lieu, les travailleurs de la cohorte GAZEL sont déjà relativement âgés et présents dans l'entreprise depuis de nombreuses années, ce qui les rend peut-être plus vulnérables aux changements. Par ailleurs, la nature des changements est également particulière. Les contrats de travail, le statut ou encore le salaire des travailleurs concernés restent inchangés. Sont seulement introduites de nouvelles valeurs et de nouvelles pratiques managériales au sein de l'entreprise. Afin de parvenir à interpréter les résultats obtenus dans ce Chapitre, il conviendra d'adopter une approche plus qualitative pour comprendre les mécanismes en jeu et la nature précise des changements qui ont lieu.

A field experiment on the demand for prevention among elderly¹

Sommaire

2.1 Introduction	26
2.2 Experimental design	31
2.2.1 The program	31
2.2.2 The randomizations	32
2.2.3 Sample selection	37
2.3 Results	39
2.3.1 Overview	39
2.3.2 Acting on demand	41
2.3.3 Changing the cost	42
2.3.4 Providing information	45
2.4 Additional Findings on the Decision-making process	48
2.4.1 Non-response and selection bias	49
2.4.2 Summary statistics	56
2.4.3 Decision-making process	58
2.5 Conclusion	67

¹. This chapter is largely based on common work with Simon Beck, Bruno Crépon and Séverine Toussaert.

2.1 Introduction

Which policy is the most effective to increase demand for prevention among the elderly? As a result of advances in medicine and major improvements in living conditions, life expectancy has increased during the last decades (Cervellati and Sunde, 2005). Together with a decline in the fertility rate, this demographic evolution creates an important change in the age structure. It has led to an increase in the relative size of the dependent population and consequently put great pressure on public finances by increasing the amount devoted to social expenditures (Hagemann and Nicoletti, 1989). In France, public spending allocated to the dependent elderly accounted for 1,3% of the total GDP in 2010². The Retirement Insurance agency has developed a new preventive program. Part of this program aims at adapting housing in order to maintain the self-sufficient elderly at home. Despite some evidence of the program's efficiency, the demand for the program remains very low among the elderly. In 2011, only 0,2% of the retired people living in Ile-de-France, the capital region, benefited from preventive measures aimed at adapting housing. Acquiring a better understanding of demand-side barriers that hinder the uptake of prevention among elderly and finding an efficient way of increasing demand are today a main concern for policymakers.

In developed countries, States have a real financial interest in reducing the burden of societal support for the elderly (Heller, 1989). In this context, maintaining self-sufficient elderly at home would appear to be a way to limit costs to the public purse. Most social actors agree that priority should be given to prevention (Harwood, Sayer, and Hirschfeld, 2004). Several pieces of evidence suggest that the adoption of preventive measures could reduce dependence among the elderly by helping people cope with impairments (Cutler, 2001). Falls are a major cause of injury and loss of self-sufficiency among the elderly and account for 70 percent of accidental deaths in persons over 75 (Assessment, 2000). Tinetti et al. (1994) emphasize that around 30% of people over 65 experience a fall each year with psychological

2. According to the French Minister of Solidarity and Social Cohesion, the total amount was 24,7 billions of euros.

trauma (Close, Ellis, Hooper, Glucksman, Jackson, and Swift, 1999), physical injury (Nevitt, Cummings, Kidd, and Black, 1989) or functional deterioration (Dunn, Rudberg, Furner, and Cassel, 1992) as major consequences. This high probability of falling lead to increased levels of dependency, and higher costs associated with falls (Beard et al., 2006) whereas several randomized control trials on the impact of prevention program find positive effects³.

The low level of demand for prevention programs might be explained in a first instance by a lack of information. Providing the elderly with information about the program could be both a way to overcome failures in knowledge (Hsieh and Lin, 1997), and moreover, a way to improve risk perception. Indeed, a large number of studies find that beliefs about risks are often biased, although the signs of the bias may not be obvious. For instance, in a study about smoking and the risk of lung cancer, Viscusi (1990) finds that people tend to underestimate the likelihood of events with strong probability to occur and to overestimate the likelihood of events with low probability to occur. Viscusi and Hakes (2008) confirm these results and generalize them to the perception of mortality risks and life expectancy loss. Providing information might be a way to achieve a better risk perception and consequently a more optimal level of prevention effort. Avery, Kenkel, Lillard, and Mathios (2006) find a causal effect of a Canadian information campaign on tobacco consumption among smokers. Moreover, compliance with prevention may be highly sensitive to the way the information is provided. For example, in their field experiment on food choices, Downs, Loewenstein, and Wisdom (2009) point out that manipulating information is more efficient than providing objective information on calorie content.

However, some empirical studies are more skeptical about the use of information to optimize prevention efforts. For example, Khwaja, Silverman, Sloan, and Wang (2009) show that risky behaviors like smoking can not be explained by a swoked

3. Numerous studies from the medical literature provides evidence of programs having an impact on falls (Jensen, Lundin-Olsson, Nyberg, and Gustafson, 2002; Haines, Bennell, Osborne, and Hill, 2004; Province, Hadley, Hornbrook, Lipsitz, Miller, Mulrow, Ory, Sattin, Tinetti, Wolf, et al., 1995), hospital admissions (Rubenstein, Robbins, Josephson, Schulman, and Osterweil, 1990; Close, Ellis, Hooper, Glucksman, Jackson, and Swift, 1999) and mobility (Mulrow, Gerety, Kanten, Cornell, DeNino, Chiodo, Aguilar, O'Neil, Rosenberg, and Solis, 1994)

perception of risks and a lack of preventive information. Because individuals have limited cognitive skills, providing too much information can have a negative effect on behaviors (Simon, 1955; Norman and Bobrow, 1975; Marois and Ivanoff, 2005). Empirical studies also detect an aversion to information, caused by a fear of facing the fact of disease, which undermines its deterrence effect on preventive behaviors. For instance, Lerman et al. (1996) show that 40% of patients having a high risk of getting breast or ovarian cancer refuse free testing. Individuals tend to delay a consultation or postpone a medical examination in case of breast cancer symptoms (Meechan, Collins, and Petrie, 2002) or melanoma (Richard et al, 2000). Similar results were found in developing countries for HIV. While making people informed about their HIV status is a necessity to reduce the prevalence of HIV, a large percentage of people do not return to pick up their test results (Thornton, 2008).

Price is another major potential determinant of demand for health prevention services. Its impact on take-up is one of the most contentious policy issues and has often been discussed in the economic literature. Many randomized evaluations were conducted in developing countries to determine how price affects purchase decisions for health services. Most of them find effects in line with the standard economic models on human capital investment (Holla and Kremer, 2009). In the theoretical framework developed by Grossman (1972b), prevention, for instance having one's dwelling adapted, can be considered as an investment realized to overcome health capital depreciation. The choice of prevention results from the equalization of the marginal benefits of health capital with the price of the investment. Results, mostly in developed countries, tend to find a very low price sensitivity of demand for medical care (Fuchs, 1972) as well as for insurance (Manning, Newhouse, Duan, Keeler, and Leibowitz, 1987). Conclusions are different for prevention behaviors. In a randomized experiment conducted in Kenya, Cohen and Dupas (2010) show that demand for insecticide-treated bedding, a preventive measure against malaria, is very sensitive to price and drops significantly after a price increase. Kremer and Miguel (2007) find similar results about drugs offering prevention against intestinal worms : the introduction of even a small cost-sharing component reduced take-up

by 80% despite mobilization interventions. Focusing on rubber shoes for children, Meredith, Robinson, Walker, and Wydick (2011) find that 78% of the decision to purchase is explained by variations in price. Moreover, several studies show that incentives may be a way to increase the demand for health products and point out non-linearities in its effect (Holla and Kremer, 2009). Small subsidies may make a big difference in take-up. For example in the randomized experiment in Malawi, small incentives strongly increased the probability of picking up test results (Thornton, 2008). Byrne and Thompson (2001) give a theoretical dimension to this result, showing that the level of prevention effort is suboptimal and that a simple subsidy could be efficient to attain the first best level of prevention. The non-linearity of this effect could also be explained by time-inconsistent preferences and procrastination behaviors (O'Donoghue and Rabin, 1999). Some people, knowing they are present-biased, tend to have a preference for commitment (Duflo, Kremer, and Robinson, 2009) and a demand for control devices (Kan, 2007). Imposing deadlines to benefit from a small subsidy can reduce procrastination behaviors and increase take-up.

In this paper, we contribute to the existing debate on factors influencing demand for prevention by studying the take-up of a housing adaptation program that offers assistance for home adaptations. We use a unique opportunity to test the impact of several manipulations on take-up for this program. We conducted a large scale field experiment and sent over 40,000 flyers to French retired people urging them to call the Retirement Insurance agency in order to benefit from the housing adaptation program. We implement two main categories of treatment. First, following the methodology applied by Cohen and Dupas (2010), we randomly increase the amount of the subsidy in the program and also test the impact of additional reductions conditional on commitment. Secondly, we examine the effect of providing information about risk. Seven flyers were designed to contain randomized framing manipulations. We test, for example, the existence of loss aversion and belief revision mechanisms.

At the same time, we run a survey to collect more data on the decision-making process. This way we obtain additional information on initial intentions to invest in

prevention in the future and on risk perception. We are therefore able to estimate the impact of the different treatments on intention to demand and risk perception as well as on the effective demand. The main issue is to determine whether the determinants are the same as those influencing the effective demand.

We provide evidence that giving more information on risk is the most effective treatment to increase the take-up of the program. In line with [Bertrand, Karlan, Mullainathan, Shafir, and Zinman \(2010\)](#), our results also suggest that a crucial role is played by the framing of the information. A message about risk framed as a personalized letter is the most effective way to induce take-up, whereas the same message framed as statistical information leads to the lowest take-up, even lower than the control flyer. On the other hand, we do not find strong evidence for price sensitivity. Only a 100% subsidy appears to be effective at inducing demand, and in any case this effect is still smaller than the impact of information. This result departs from the findings of other studies. Indeed several randomized experiments conducted in other contexts, mainly in developing countries, show price as the main determinant of investments in prevention ([Meredith, Robinson, Walker, and Wydick, 2011](#); [Cohen and Dupas, 2010](#)).

Using the survey information, we also show that the determinants of intention to demand and risk perception are the same. But, we provide evidence that they are different from the determinants of actual take-up. For example, considering men, we find that a loss versus gain frame affects strongly and positively the intention to demand and risk perception, whereas it affects the effective demand negatively. More generally, the whole response profile is not the same for the intention to demand and risk perception as it is for take-up. This last result highlights the fact that there is a gap between intention and action. The implicit general understanding of the decision-making process as a single process with a unique set of determinants is not validated by our experimental data. They suggest, on the contrary, the existence of a dynamic in the decision-making process, with different determinants playing a role at different steps. One remaining issue is to determine to what extent intentions to demand and risk perception are prior to the true effective demand that will be

realized in the future.

This paper is organized as follows. Section 2 provides background information on the health product we focus on and presents randomizations and the sample. Section 3 presents results on take-up. Section 4 provides additional findings on determinants of the decision-making process while section 5 concludes.

2.2 Experimental design

2.2.1 The program

The health product we focus on in this paper is a new prevention program called Personalized Actions Programs (*PAP*) implemented by the Retirement Insurance agency since 2004. An evaluation of the needs of the elderly person is performed by a caseworker mandated by the Retirement Insurance agency during a home visit. After observing the living environment and interviewing the elderly person, the caseworker recommends support and services all aimed at reducing the risk of dependency. The Retirement Insurance agency supplies financial support for a large range of services : home help, tele-assistance, housing adaptation, bringing of meals or prevention workshops on different subjects.

In this study, we focus on home adaptation. This program offers financial support for minor housing adaptations that help elderly people to perform activities independently and safety at home. It aims at limiting physical environmental barriers, facilitating mobility and reducing the risk of falling (Iwaksson and Isacson, 1996). Grab bars, external handrails, stair-rails, ramps or alterations to steps are examples of the proposed adaptations. We focus on home adaptation for several reasons. First, the presence of home hazards is important in predicting falls at home, specially among the more vigorous retired people (Northridge, Nevitt, Kelsey, and Link, 1995). Despite the effectiveness of home adaptation measures (Heywood, 2001), it is still one of the less-demanded services among those offered by the Personalized Actions Programs (*PAP*). 350,000 retired people benefit from a *PAP* each year but only 15,000 among them accept having their home adapted (around

4%). Caseworkers face huge difficulties in convincing elderly persons to adapt their homes.

To benefit from the program, persons have to contact the Retirement Insurance agency to submit an application. When accepted⁴, the demand is transmitted to one of the mandated service providers. Needs are evaluated by a caseworker visiting the seniors' place of residence. However, the senior herself takes the decision to implement the recommendations and is in charge of the practical aspects. The Retirement Insurance agency offers a means-tested percentage of total outlays as financial support.

2.2.2 The randomizations

In partnership with the Retirement Insurance agency, we sent 14 flyers randomly in three waves (September, October and November 2011). All individuals in the treatment groups (42,079 retired people) received a flyer. Each flyer corresponds to a specific treatment aiming at increasing take-up for the program. The 14 flyers provide different incentives to contact the Retirement Insurance agency. The phone number of the Retirement Insurance agency was *clearly* indicated on each flyer (see flyers in Appendix). Calling this number to ask for the application form is the first step in the demand process. A description of each flyer is provided in Table 2.1.

4. It is a condition of acceptance that an individual has paid his or her regular contributions to the French Social Security system

TABLE 2.1 – Summary of the Flyers’ Content

Title		Categories		Description
Flyer 1	Control	Control	Control	Simple description of the offered services
Flyer 2	Subsidies	Cost	Cost	Presentation of the amount of subsidies according to the level of income
Flyer 3	15% reduction	Cost	Cost	Allowing a 15% extra-subsidy
Flyer 4	35% reduction	Cost	Cost	Allowing a 35% extra-subsidy
Flyer 5	Free	Cost	Cost	Allowing free service
Flyer 6	Short deadline	Cost	Cost	Allowing a 20% extra-subsidy against a commitment in the 20 days after receiving the flyer
Flyer 7	Opportunity costs	Cost	Cost	Reducing psychological costs by simplifying the process
Flyer 8	Statistical information	Information	Information	Providing information with statistics on the risks and consequences associated with a fall
Flyer 9	Testimonial	Information	Information	Providing information by using the testimony of a retired woman
Flyer 10	Letter	Information	Information	Providing information in a personalized letter
Flyer 11	Loss	Information	Information	Providing information by stressing loss associated with a fall
Flyer 12	Gains	Information	Information	Providing information by stressing gains associated with the program
Flyer 13	Underestimation	Information	Information	Showing people with graphics that they tend to underestimate the risk of falling
Flyer 14	Correct perception	Information	Information	Showing people with graphics that they have a correct perception of the risk of falling

Control flyer

We design a first flyer which merely gives only a simple description of all the services offered by the Retirement Insurance agency and briefly presents the prevention program. It does not contain any specific incentive. This flyer will be considered as the control in the experiment. Our basic comparisons will contrast take-up in each treatment groups with take-up in this control group.

Treatment flyers all have a similar format. To the information provided by the control flyer, we add only a specific incentive message. Whereas the control flyer is a simple sheet printed on both sides *recto verso*, treatment flyers have a 4-page format (see flyers in Appendix). We implement two mains categories of treatment. The first group of treatments focuses on altering the cost of the program. The second category of flyers provides information and test manipulations of the frame.

Changing the cost

With the first set of flyers, we aim at finding out how demand for prevention depends on price and if price may be constituting a barrier to home adaptation. We base our analysis on a standard classical model with rational individuals. Consumer make decisions comparing costs with the benefits deriving from the product. This model predicts that the level of demand is correlated with the expected gains relative to the price of the product. In their paper on demand for insurance against rainfall in rural India, Cole et al. (2010) find that price has an impact on demand. Several studies on preventive health products confirm these results on the crucial role played by costs⁵.

The first set of manipulations aims at reducing monetary costs. It makes it possible to measure price elasticity following a methodology close to Cohen and Dupas (2010) or Ashraf, Berry, and Shapiro (2007). A first treatment flyer provides only information on the financial support offered by the Retirement Insurance agency. The amount of the subsidy, depending on income, is presented in the flyer. A simple table indicates the percentage of subvention for each category of income. The amount va-

5. See for instance Holla and Kremer (2009) for a review of results from randomized evaluations.

ries from 27% for a household earning more than 2,246 euros a month to 90% for a household earning less than 1,374 euros. Two different scales are presented, one for persons living alone and one for couples. A concrete case is presented as an example to facilitate understanding. Despite the subsidy offered by the Retirement Insurance agency, the price might still be considered as exceeding the expected benefits associated with the program. The second and the third flyers are exactly the same as the previous one but they offer an extra subsidy of respectively 15 and 35%. A final flyer specifies that the housing adaptation is totally subsidized. For these three flyers, an example presents the amount which would be paid without the subsidy and the amount with the subvention. We will compare the level of demand between groups receiving the flyer without extra subsidies and groups receiving these last three flyers. The main goal is to measure the sensitivity of demand to price. Finally, we test the impact of a short-run subsidy of 20% conditional on a commitment in the 15 days after receiving the flyer. This flyer is devoted to testing procrastination behaviors (O'Donoghue and Rabin, 1999). The assumption is that people are partially time inconsistent and present-biased and tend to postpone their decisions to invest in prevention. A small time-dependent discount could change the behavior of procrastinators (Duflo, Kremer, and Robinson, 2009) and increase their take-up for the program.

Nonmonetary costs have also to be considered. Indeed, the demand process for home adaptation is complex and often obscure in its details (See the description of the program for more details on the different steps of the demand process). We test a manipulation aimed at reducing nonmonetary costs by making the application process clearer with pictograms and a well-described set of simple steps to follow.

Providing information

This second category of treatment aims at providing information. We make the assumption that people are not perfectly informed on the risk and consequences of a fall and do not correctly perceive the benefits of the preventive program. These treatments have two main goals. We first test how powerful providing information is

at increasing take-up for the program. We then follow previous experiments showing that consumer behaviors are very sensitive to the framing of information (Downs, Loewenstein, and Wisdom, 2009; Urbany, 1986; Bertrand, Karlan, Mullainathan, Shafir, and Zinman, 2010). Mainly based on the growing literature in psychology, these papers point out the influence of context on consumers choices. In a randomized experiment conducted on the South African credit market, Bertrand, Karlan, Mullainathan, Shafir, and Zinman (2010) find results inconsistent with the standard economic models and provide evidence that psychological features impact consumer decisions. We manipulate three categories of psychological features.

First, we implement a set of manipulations on risk perception. We randomly change the framing of information. In a first flyer, we provide statistical information on the causes and consequences of a fall and present home adaptation as a solution to reduce risks. Mention is made of the fact that one third of people over 65 falls at least once a year and that the risk could be reduced by 30% with preventive measures. In a second flyer, the information provided is the same, but is given in the form of a testimonial : a retired woman explains the reasons why she contacted the Retirement Insurance agency to benefit from the program. A third treatment provides information in a personalized letter. The assumption is that people may feel more concerned when they receive personalized information instead of a description aimed at the general public. We stress that the content of all three flyers is the same : the additional information on the prevention program is uniformly provided. Consistent with neoclassical theory, we should not observe differences in take-up in these three treatment groups.

A second set of manipulations aims at testing loss aversion following the Asian Disease preference reversal puzzle developed by Tversky and Kahneman (1991). It is based on the assumption that losses and disadvantages have greater impact on decisions than gains and advantages. Two flyers provide the same information but one stresses losses while the second focuses on gains. We expect loss frame to have a bigger impact on take-up.

Finally, we test manipulations based on the literature on belief revision mecha-

nisms. As in Chern, Loehman, and Yen (1995), we consider that beliefs can change over time following a Bayesian process when new information becomes available. Each individual has an *a priori* belief in his probability of falling. In the first flyer, we present graphics aimed at reinforcing this belief. This flyer's message is that people's perceptions about risk are on average correct : perceived and real risks are presented as equal. Contrarily, we send a second flyer which explicitly presents large differences between real and perceived risks. We expect that this flyer, in comparison to the previous one, will lead to belief revisions and have a bigger impact on take-up.

2.2.3 Sample selection

We target a geographical area of 225 towns, all located in the Ile-de-France region. 275,512 retired people, identified as possible beneficiaries of the program⁶ were initially targeted. People who already benefit from the program were excluded from the initial sample.

28 strata were defined from 4 individual variables : age (55-64, 65-74 or older than 75), gender (men or women), size of the town (less than 10,000 residents or more than 10,000 residents) and fiscal resources (taxable or not). The full sample was then randomly split into 274 stratified subsamples of around 1,000⁷ individuals each, using the previous strata. For the experiment, each of the 14 flyers was sent to 3,006 (or 3005) individuals by drawing at random three approximately 1,000 individual subsamples from the set of the initial 274 subsamples. In the end, the full sample is composed of 42,079 retired people.

We also use data extracted from the files of the Statistical Department of the Retirement Insurance agency (*DSP*). This information is mainly on professional trajectories and family situations. We have access to information on gender, age, liability to tax status, unemployment, sickness and disablement events.

Table 2.2 reports characteristics for the full sample. Column (1) presents the

6. A reminder : only those, who have paid their contributions to the French Social Security system are eligible

7. In fact the subsample could have either 1,001 or 1,002 individuals

mean of the considered attribute : 26.6% of the retired persons in the sample are aged 55-64 and 80.6% of them are liable to tax. The second column reports the p-value for the test of joint significance of explanatory variables in the regression of the considered attribute on the whole set of flyers. The population is strongly balanced with respect to all the considered attributes.

TABLE 2.2 – Summary of Sample Characteristics

	Mean	Test
Aged 55-64	0.266	1.000
Aged 65-74	0.383	0.981
Couple	0.603	0.892
With Fragilities	0.683	0.193
Women	0.550	1.000
Liable to Tax	0.806	1.000
Live in Big Cities	0.706	1.000

Notes :

1. Sample is all retired persons in the experiment for whom flyers were not returned to CNAV because of wrong address.
2. Column (1) presents the average in the control group (receiving flyer 1).
3. Column (2) presents the p-value of the joint nullity test for the regression of the considered attribute on the whole set of flyers (excluding flyer 1).
4. “With fragilities” is for the population that experienced at least one unemployment spell, one sickness spell or disabled spell prior being retired.

2.3 Results

2.3.1 Overview

The main outcome variable is a dummy equal to 1 if people contacted the Retirement Insurance agency to benefit from the program and 0 otherwise. This variable is a direct measure of the effective demand for the prevention program. Our basic specification amounts to considering the linear regression of the dependent variable on flyers 2 to 14, excluding the control flyer 1 used as the reference on the whole population receiving flyers 1 to 14.

$$E(y|F) = \alpha_0 + \alpha_2 F_2 + \cdots + \alpha_{13} F_{13} \quad (2.1)$$

We also consider linear combinations of flyers to directly obtain the effect of interest on the regression results. Flyer 6 proposes a 20% reduction conditional on a quick commitment. Flyers 3 and 4 propose unconditional reductions of 15 and 35%. Assuming linearity of the reduction effect, the 20% unconditional reduction effect is a weighted mean of the 15% and 35% reduction effects with weights 3/4 and 1/4. We are therefore interested in measuring the change associated with conditionality as : $\tilde{\alpha}_6 = \alpha_6 - 3/4\alpha_3 - 1/4\alpha_4$

We introduce in the regression F_6 , $\tilde{F}_3 = F_3 - 3/4 \times F_6$ and $\tilde{F}_4 = F_4 - 1/4 \times F_6$ and directly read $\tilde{\alpha}_6$ as the coefficient associated with F_6 . α_3 and α_4 correspond to the coefficients of the two other variables.

For the “gain” and “loss” flyers, we are mainly interested in measuring the differential effect $\tilde{\alpha}_{11} = \alpha_{11} - \alpha_{12}$ of the two flyers F_{11} (loss) and F_{12} (gain). We therefore introduce the flyer F_{11} providing $\tilde{\alpha}_{11}$ and $\tilde{F}_{11} = F_{11} + F_{12}$ providing α_{12} .

We proceed in the same way for the flyers related to correct perception. We measure the differential effect between underestimation and correct perception introducing flyer F_{13} and the combination $F_{13} + F_{14}$. The coefficient provides the effect of a correct risk perception compared to the control.

So the regression we consider throughout the paper is :

$$E(y|F) = \alpha_0 + \alpha_2 F_2 + \alpha_3 \tilde{F}_3 + \alpha_4 \tilde{F}_4 + \alpha_5 F_5 + \tilde{\alpha}_6 F_6 + \alpha_7 F_7 + \alpha_8 F_8 + \alpha_9 F_9 + \alpha_{10} F_{10} + \tilde{\alpha}_{11} F_{11} + \alpha_{12} \tilde{F}_{12} + \tilde{\alpha}_{13} F_{13} + \alpha_{14} \tilde{F}_{14} \quad (2.2)$$

Introducing these linear combinations does not impose any restrictions compare to equation (2.1) as we introduce as many independent linear combinations as there are flyers.

Additionally, we are interested in performing tests of several assumptions. We first want to test the “no sensitivity of demand” assumption which merely amounts to jointly test the nullity of all the previous variables. The second is the “no price sensitivity” assumption which amounts to testing $\alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = \alpha_6$. The third one is the “no framing effect” assumption checked by testing $\alpha_8 = \alpha_9 = \alpha_{10}$.

In Figure 2.1, we present the take-up for the 14 groups. Recall that the initial level of demand for the program, in the absence of the experiment, was only 0,2% in 2010 in the region Ile-de-France.

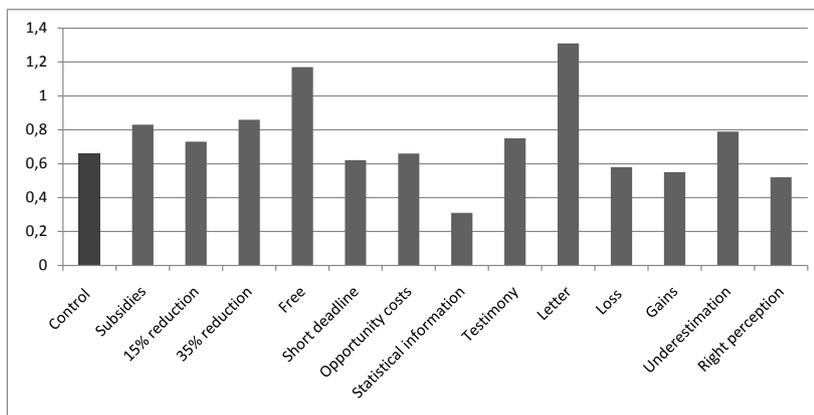


FIGURE 2.1 – Take-up in each group

The average take-up in the control group for the full sample is $p_0 = 0.66\%$ which is quite low. This has some implications for detection power. The variance of the

flyer impact, under the null hypothesis of no effect, is given by $\sigma_0^2 = 2p_0(1 - p_0)/n$ where n is the number of individuals per treatment groups (i.e 3,000). For the full sample, the corresponding standard error is 0.15%. The minimum detectable effect for a test at the 5% level with a power of 80% is $2.83 \times \sigma_0$. In the whole sample, this minimum detectable effect is 0.42%. In the usual comparison with the standard error of the dependent variable $\sqrt{p_0(1 - p_0)} = 8.10\%$, the ratio is just 5.17% which is quite low and thus very good. However, compared with the mean take-up rate $p_0 = 0.66\%$, the ratio is 63%. This means that the flyer has to multiply the demand by 1.63 in order to have a detectable effect with a good probability.

We define several subsamples to analyze heterogeneity in the response to incentives. We first distinguish three categories of age : 55-64, 65-74 and over 75. Age is a crucial factor influencing demand for prevention. We expect demand to follow an inverted U-shape rising and then decreasing. Then, we break the full sample down into two groups based on a dummy indicating if individuals faced unemployment, sickness or disablement during their professional careers. Our supposition is that this subsample are more likely to be interested in prevention measures. We also study differences by gender. Finally, we analyze persons which are taxable separately from those who are not. This last breakdown is relevant for our analysis of the role of price.

For greater simplicity, we present our results by separating cost (Table 2.3) and information (Table 2.4) treatments. We first present results for the full sample and then for the defined subsamples.

2.3.2 Acting on demand

Before looking more closely at the precise effect of the various flyers, we focus on the Fisher test of the joint nullity of all the coefficients in equation 2.2. As can be seen on the line “Global” in Table 2.3, the assumption of the joint nullity of all the variables introduced in the regression is strongly rejected with a p-value below 0.1%. However, as the table also reveals, that is not the case for the whole sub-populations considered. Young retired people, people without fragilities and retired persons not

liable to tax were not responsive to any flyer they were sent. The age category most sensitive to the flyers was the middle range 65-74, although the oldest age category was also responsive.

2.3.3 Changing the cost

Table 2.3 reports the impact of random price changes. Coefficients correspond to the difference in take-up between the control group and the costs treatments groups. How is take-up affected by price? First, we find that providing information on the financial support offered by the Retirement Insurance agency does not have a significant impact on demand. Offering an extra-subsidy of 15 or 35% does not affect take-up in comparison to the control. This result remains valid, whatever the subsample. It contrasts with previous results of randomized evaluations conducted mainly in developing countries which show that even a small incentive may generate sizable movements in take-up (Holla and Kremer, 2009). We do not find such effects in this context.

However, we do find a huge increase in demand when the program is totally free compared to the control. This treatment increases take-up by 0.5 percentage points for the full sample. Separate analysis by subsample reveals the heterogeneity of this effect. The “Free” flyer has an impact on individuals between 65 and 74 years old (Column (3)). In this subsample, this manipulation leads to a 1.2 percentage points increase for an initial level of 0.5 in the control group. Notice also a positive impact of this treatment on individuals with fragilities (Column (5)). People with past unemployment, invalidity or periods of illness during their career are more sensitive to this treatment. One striking feature of our results is that we do find a positive impact on taxable retired people but not on non taxable ones. Notice also that each coefficient for variables in cost for non-taxable people is small or even negative. This tends to show that, besides power issues, non-taxable persons are less responsive to cost manipulations than taxable persons. This is evidently linked with non-taxable people being more responsive to the issues of prevention, as can be seen from the take-up in the control group being three times higher for non-taxable persons than

for taxable ones.

Our findings tend to support the idea that retired people have a willingness-to-pay for prevention equal to 0. This would be consistent with behaviors described by [Kremer and Miguel \(2007\)](#) showing that imposing even a small cost may dramatically reduce take-up. However, we have to be cautious in interpreting these first results. Potential effects are very small. If we consider the effect of a 100% reduction, the effect is a 0.5 increase. Assuming linearity, a reduction of 0.35% should lead to an increase of $0.5 \times 0.35 = 0.175\%$ which is below the Minimum Detectable Effect previously computed (0.42%). Possibly the experiment does not have enough power to detect the small increases implied by limited reductions of 35% or 15%. The sample size does not enable us to draw definite conclusions about the non-linear impact of subsidy on take-up. Indeed, for some subsamples, such as men for example, we find an increase in demand as the amount of the subsidy rises.

Notice also that measuring the net effect of reductions would entail comparing reductions with flyers providing information on the offered subsidies (Flyer 2). It would imply finding even smaller effects. The Fisher test labeled “Reduction” in [Table 2.3](#) provides the test’s p-values for the assumption that flyers “subsidies”, “15% reduction”, “35% reduction” and “free” have the same effect on take-up. As can be seen, this assumption is largely accepted whatever the subsample considered.

Offering a subsidy conditional on a commitment does not lead to movements in take-up. We do not find evidence of a demand for making this commitment among retired people which is what we should have observed with procrastinators.

Finally, the treatment aiming at reducing non-monetary costs has no statistically significant effect on take-up. This result marks a departure from previous findings on the important role of non-monetary factors, mainly explained by the fall of the out-of-pocket money price in developed countries ([Acton, 1975](#)). Costs resulting from the complexity of the demand process do not have a deterrent effect on demand among the elderly.

TABLE 2.3 – Effects of cost treatments

	Dependent variable : Take-Up dummy									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	All	55-64	65-74	More than 75	With fragilities	Without fragilities	Women	Men	Taxable	Non Taxable
Subsidies	0.170 (0.225)	-0.390 (0.388)	0.525 (0.377)	0.205 (0.394)	0.329 (0.271)	-0.161 (0.408)	-0.066 (0.325)	0.458 (0.305)	0.212 (0.213)	-0.000 (0.748)
15% reduction	0.070 (0.218)	-0.252 (0.411)	0.076 (0.320)	0.311 (0.408)	0.277 (0.266)	-0.359 (0.383)	0.061 (0.336)	0.078 (0.254)	0.127 (0.205)	-0.157 (0.732)
35% reduction	0.200 (0.227)	0.159 (0.474)	0.402 (0.359)	0.005 (0.369)	0.386 (0.277)	-0.180 (0.403)	0.180 (0.347)	0.224 (0.274)	0.337 (0.225)	-0.368 (0.703)
Free	0.517** (0.250)	-0.257 (0.410)	1.168*** (0.447)	0.389 (0.415)	0.633** (0.298)	0.267 (0.460)	0.618 (0.383)	0.388 (0.297)	0.636** (0.251)	0.035 (0.756)
Short deadline	0.067 (0.356)	-0.797 (0.682)	0.409 (0.546)	0.346 (0.640)	0.474 (0.420)	-0.774 (0.674)	-0.036 (0.550)	0.191 (0.418)	0.307 (0.335)	-0.917 (1.198)
Opportunity costs	0.000 (0.212)	-0.124 (0.431)	-0.005 (0.310)	0.102 (0.381)	0.221 (0.260)	-0.458 (0.370)	-0.127 (0.319)	0.154 (0.265)	0.128 (0.205)	-0.527 (0.685)
<i>Fisher tests</i>										
Global	0.001	0.579	0.005	0.018	0.000	0.851	0.007	0.000	0.023	0.183
Reduction	0.254	0.168	0.179	0.894	0.675	0.443	0.327	0.644	0.300	0.762
Constant	0.656***	0.778**	0.541**	0.689***	0.556***	0.872***	0.879***	0.383**	0.428***	1.599***
Obs.	40,670	10,684	15,809	14,177	27,211	13,459	22,363	18,307	32,798	7,872

Notes :

1. “All” represents the full sample of persons who were sent the treatment flyers. We exclude individuals in whose case the flyer was returned to the Retirement Insurance agency. We present results for several subsamples described above. See text for more details.
2. The dependent variable is a dummy variable indicating if people contact the Retirement Insurance agency to benefit from the housing adaptation program. The dummy is equal to 1 in this case and 0 otherwise.
3. “Subsidies” is a dummy variable which is equal to 1 if individuals received the flyer “Subsidies” and 0 if they received the “control” flyer. “15% reduction”, “35% reduction”, “Free” and “Opportunity costs” are defined in the same way. “Short deadline” is a linear combination of flyers “15% reduction” and “35% reduction”. See the text for more details on the specification and the content of the flyers.
4. The Fisher test “global” is a test of the equality of coefficients for all the 14 treatment flyers. The Fisher test “Reduction” tests the equality of coefficients for cost treatments only.
5. Each column corresponds to OLS regressions with robust standard errors reported in parenthesis. * means 10%-significant, ** means 5%-significant and *** means 1%-significant.

2.3.4 Providing information

Table 2.4 reports results for information manipulations. Is providing information on risks a more effective policy than reducing costs? How do people react to framing manipulations? Are purchase decisions perfectly rational or driven by psychological factors?

The personalized letter is the most effective frame at positively inducing take-up for the program. In the full sample, the effect is of 0.651 (Column (1)). It almost doubles the take-up in the control group (0.656). The impact is the largest of all the treatments, even larger than the effect of flyer “free”. However, going into more detail, this effect is hardly heterogeneous. It is mainly driven by people in the second category of age (Column (3)), people with fragilities (Column (5)) and people liable to tax (Column (9)).

The effects of the two other flyers that provide the same information but with different frames “statistical information” and “testimony” vary strongly. Indeed the flyer “statistical information” has a significant negative effect on the take-up compared to the control. This last flyer yields the lowest take-up rate in the whole sample. The negative impact is particularly strong for women (Column (7)) and for non-taxable people (Column (10)). For this last subsample, the “statistical information” dummy lead to a decrease of 1.2 percentage points for an initial level of 1.6 in the control group.

These results strengthen the idea that choices can be manipulated by frames without changing the content. Indeed, more generally, the assumption of “no effect of framing” is strongly rejected for almost all subsamples as shown by the Fisher test labeled “framing”. This result is in line with abundant evidence provided by lab experiments which show that choices can be easily manipulated by changing the frame of information.

We also aim at testing two cognitive biases which could influence purchase decisions. We first compare the impact of a loss vs. gain frame. Results are presented in the line “loss vs. gain” which shows the effect of the flyer framed to emphasize loss

compared with the flyer framed to emphasize gains. We find no significant differences between the two frames, except for men. However, contrary to what the loss aversion theory predicts (Tversky and Kahneman, 1991), receiving the loss frame lead to a decrease of 0.5 percentage point among men compared to the gain frame.

The second manipulation is about the belief revision mechanism. We compare take-up in a group receiving a flyer reinforcing people in their beliefs on the probability of falling with a group receiving a flyer showing that people tend to underestimate the same probability. We expect that this flyer will induce a belief revision mechanism and increase the take-up compared with the “correct perception flyer”. Results are presented in the line “underestimation vs. correct perception”. All coefficients are positive but only statistically significant for men and taxable people. Providing information on the underestimation of risks lead to a revision of beliefs and an increase in take-up. This revision of beliefs is not observed in the whole population, where the effect is positive but non-significant. However, it is observed and particularly strong for the subsample of men (0.5 percentage point). Men remains the subsample for which we provide evidence of cognitive bias although the sign of the bias is not always in keeping with theory.

TABLE 2.4 – Effects of information treatments

	Dependent variable : Take-Up dummy									
	(1) All	(2) 55-64	(3) 65-74	(4) more than 75	(5) With fragilities	(6) Without fragilities	(7) Women	(8) Men	(9) Taxable	(10) Non Taxable
Statistical	-0.346*	-0.253	-0.271	-0.496*	-0.348*	-0.362	-0.567**	-0.077	-0.130	-1.241**
	(0.182)	(0.411)	(0.270)	(0.293)	(0.197)	(0.382)	(0.273)	(0.229)	(0.176)	(0.586)
Testimonial	0.098	-0.385	0.077	0.486	0.317	-0.356	-0.069	0.302	0.337	-0.893
	(0.219)	(0.389)	(0.320)	(0.426)	(0.269)	(0.384)	(0.324)	(0.285)	(0.225)	(0.635)
Letter	0.651**	0.016	1.017**	0.717	0.914**	0.091	0.680*	0.614*	0.685***	0.499
	(0.259)	(0.453)	(0.426)	(0.455)	(0.318)	(0.443)	(0.388)	(0.324)	(0.256)	(0.800)
Gain	-0.105	-0.388	-0.189	0.211	-0.084	-0.172	-0.315	0.150	0.083	-0.887
	(0.203)	(0.389)	(0.281)	(0.396)	(0.229)	(0.405)	(0.300)	(0.264)	(0.200)	(0.637)
Loss vs. gain	0.033	0.132	0.009	-0.032	0.137	-0.171	0.436	-0.458**	0.085	-0.184
	(0.197)	(0.344)	(0.251)	(0.415)	(0.235)	(0.354)	(0.312)	(0.215)	(0.217)	(0.467)
Correct perception	-0.138	-0.391	-0.095	0.010	-0.004	-0.430	-0.061	-0.230	-0.043	-0.529
	(0.201)	(0.388)	(0.297)	(0.370)	(0.236)	(0.378)	(0.325)	(0.202)	(0.186)	(0.685)
Underestimation vs. correct perception	0.275	0.280	0.175	0.375	0.264	0.302	0.061	0.534**	0.384*	-0.177
	(0.212)	(0.372)	(0.307)	(0.416)	(0.262)	(0.357)	(0.326)	(0.253)	(0.221)	(0.589)
<i>Fisher test</i>										
Framing	0.000	0.596	0.004	0.000	0.000	0.454	0.000	0.064	0.001	0.027
Constant	0.656***	0.778**	0.541**	0.689***	0.556***	0.872***	0.879***	0.383**	0.428***	1.599***
Obs.	40,670	10,684	15,809	14,177	27,211	13,459	22,363	18,307	32,798	7,872

Notes :

1. “All” represents the full sample that were sent the treatment flyers. We exclude individuals in whose case the flyer was returned to the Retirement Insurance agency. We present results for several subsamples described above. See text for more details.
2. The dependent variable is a dummy variable indicating if people contact the Retirement Insurance agency to benefit from the housing adaptation program. The dummy is equal to 1 in this case and 0 otherwise.
3. “Statistical” is a dummy variable which is equal to 1 if individuals received the flyer “Statistical information” and 0 if they received the “control” flyer. “Testimonial” and “Letter” are defined in the same way.
4. “Gain” is a dummy variable which is equal to 1 if people received the flyer “Gain” and 0 if the received the “control” flyer. “Correct perception” is defined in the same way. “Loss vs. Gain” measures the differential effect between the flyers “Gain” and the flyer “Loss”. “Correct perception vs. underestimation” is defined in the same way. See the text for more details on the specification and the content of the flyers.
5. Each column corresponds to OLS regressions with robust standard errors reported in parenthesis. * means 10%-significant, ** means 5%-significant and *** means 1%-significant.

2.4 Additional Findings on the Decision-making process

In the preceding section, we show that some treatments impact take-up significantly. In order to achieve a more precise description of the decision-making process, we sent a follow-up postal questionnaire to the full sample three weeks after the flyer. The main goal of the questionnaire was to collect additional data in order to measure the different degrees of commitment to the program. The questionnaire began by recalling that a flyer was sent :

A couple of weeks ago, the Retirement Insurance agency sent you a flyer. This flyer aims at informing you about the preventive measures proposed by the Retirement Insurance agency for making your home safer.

One question was about the whole process and asked whether individuals had called the phone number to get information about the program.

A phone number was listed on this flyer, giving you the opportunity to learn more about the programs offered.

Did you call that number ?

We use this information to check consistency between the information in the questionnaire and the observed demand behavior. We indeed expect the response to the treatment profile of the true demand behavior to be correlated to the response to treatment profile to this question.

The information of interest to us is about intentions regarding current or future demand, which is provided by the answer to the question :

This flyer explained that the Retirement Insurance agency makes it possible for you to receive a caseworker at your home to identify your needs and offer you solutions for improvement of the safety of you home.

– *Are you willing to be visited by this caseworker ?*

In the coming months ?

- Within three months ?*
- Later ?*
- Never ?*

and information on risk perception which is provided by the answer to the question :

This flyer explained that the Retirement Insurance agency makes it possible for you to receive a caseworker at your home to identify your needs and offer you solutions for improvement of the safety of you home.

– Does your dwelling present potential risks of falling ?

- Yes a lot*
- Yes a little*
- Not really*
- Not at all*

2.4.1 Non-response and selection bias

The questionnaire was deliberately kept very short to maximize the response rate and it was sent twice to the full sample. Because of potential impacts of flyers on response behavior, we randomly selected a sub-sample among the non-respondents and ran the same survey by phone.

However there are some important issues associated with using the answers in the questionnaire. The first one is about the effect of the flyers on the response behavior. The second one is about the population answering the questionnaire : how strongly different from the whole population is it in its take-up response to the different flyers ? The last issue is about the quality of the response in the questionnaire : is the information in the questionnaire reliable ?

We first check that response behaviors are not correlated with treatments (i. e. the received flyer). Three different dummy variables are considered and, for each of them, we perform the regression on the whole set of flyers. Results are presented in Table 2.6. The first dummy variable is defined on the full sample, except for people

for whom the flyer was returned to the Retirement Insurance agency because of a wrong address. The variable is equal to 1 if people sent back the postal questionnaire and 0 otherwise. As can be seen in Column (1), there are differences between the response rate of each flyer although the test of the joint nullity of identity of response rate cannot reject the assumption at the 10% level. The second dummy variable considers only the sample composed of people randomly chosen among non-respondents to answer the phone survey, and is equal to 1 if people accept to respond and 0 otherwise. The assumption that the response rate is the same among the individuals surveyed by phone is largely accepted (Column (2)). As a result, the assumption of same response rate on the weighted sample of individuals either answering the postal survey or randomly chosen to be surveyed by phone is largely accepted (Column (3)). However, we note a significant positive impact of the treatment “Free” on response behaviors. It has a response rate 6 points higher than the response rate for the control flyer. This dictates great caution in interpreting the effect of this treatment on outcomes from the survey.

We also face partial non-response. People could decide to sent back the questionnaire or respond to the survey by phone but only answer some of the asked questions. We check that this partial non-response is not correlated with treatments. We define dummy variables which are equal to 1 if the response is missing and 0 otherwise for the two main questions of the questionnaire we are interested in. We consider weighted regression of these dummy variables on our 14 treatments and test the joint nullity of all coefficients as for Column (3). Columns (4) and (5) present the results and show that the assumption is largely accepted.

Lastly, we conduct final checks on our take-up variable in order to assess the selectivity of take-up associated with being a respondent. We present, in Columns (6) and (7), the regression of the take-up variable in the whole sample and the weighted regression on the respondent sample. There are no strong differences in take-up behaviors of the respondents compared with the full sample. Main findings remain the same : a strong positive impact of the letter and a positive effect of the “Free” flyer. It is important to note however that the estimated effect on the

respondent is somewhat stronger for this last flyer in the respondent sample than in the full sample (0.923 compared to 0.517). This sheds light on the potential selection effect related to the 6.6 point higher survey response rate for this flyer. Not surprisingly, if there is a bias, this bias is likely to be an upward bias.

Respondents are however a specific population. Table 2.5 presents estimation results of the response variables on the main available demographic characteristics. Women, younger elderly, retired persons liable to tax and people living in a couple have a higher probability of response. However, people who knew at least one period of sickness or disablement during their professional career tended to respond less to the survey.

TABLE 2.5 – Selection bias

Characteristics	Response to the survey
Women	0.014*** (0.005)
Age	-0.002*** (0.000)
Couple	0.011** (0.005)
Urban	-0.005 (0.005)
Taxable	0.094*** (0.006)
Unemployment	-0.006 (0.005)
Sickness	-0.029*** (0.005)
Disablement	-0.029*** (0.010)
Constant	0.394*** (0.023)
Obs.	42,079
R-squared	0.009

Notes :

1. Each column corresponds to OLS regressions with robust standard errors reported in parenthesis. * means 10%-significant, ** means 5%-significant and *** means 1%-significant.
2. The dependent variable is a dummy variable indicating if people answer the postal or the phone questionnaire. The dummy is equal to 1 in this case and 0 otherwise.
3. “Unemployment” is a dummy variable which is equal to 1 if individuals knew at least one unemployment period during their professional career and 0 otherwise. Variables “Sickness” and “Disablement” are defined in the same way.

We address lastly the issue of the reliability of information in the questionnaire. To do this, we consider the response to the question in the questionnaire about the fact that people either call or do not call the number given in the flyer they received. Our hope is that the sensitivity of this variable to the various flyers is the same as the sensitivity of the take-up directly measured by phone calls to the Retirement Insurance agency : there is nothing related to the flyers in the differences in the information from the survey about the reported demand behavior and take-up directly measured by phone calls to the Retirement Insurance agency. Let y_s be the demand behavior reported in the survey and y the take-up. These variables are not identical but what is of interest to us is to know whether these differences are related to treatments.

We wish to test if $P(y_s = 1|F, y) = P(y_s = 1|y)$. This assumption implies that, in the two profile, the response of the variables y and y_s to the flyers are identical up to additive and multiplicative constants. This can be tested by a standard IV over-identification test using the set of flyers as instruments for y in the artificial meaningless model $y_s = \alpha + \beta y + \nu$. Indeed we have :

$$P(y_s = 1|F) = P(y_s = 1|F, y = 1)P(y = 1|F) + P(y_s = 1|F, y = 0)P(y = 0|F)$$

Thus :

$$P(y_s = 1|F) = P(y_s = 1|F, y = 0) + (P(y_s = 1|F, y = 1) - P(y_s = 1|F, y = 0))P(y = 1|F)$$

One implication of the restriction $P(y_s = 1|F, y) = P(y_s = 1|y)$ is therefore :

$$P(y_s = 1|F) = p_0 + (p_1 - p_0)P(y = 1|F)$$

This means that the two responses y_s and y to the flyers are proportional. This in turn implies :

$$E(y_s - p_0 - (p_1 - p_0)y|F) = 0$$

Formally, it means that F is a valid set of instrumental variables for equation :

$$y_s = \alpha + \beta y + \nu$$

Column (8) of Table 2.6 presents the results of the regression of demand behaviors reported in the survey on flyers. Column (7) presents the regression on the take-up variable which would be the first stage in the previous IV procedure. We are interested in the comparison between the two sets of coefficients. As can be seen from the Table 2.6, standard errors in Column (8) are quite large. One point of consistency concerns the “Free” flyer. The other flyer usually strongly significant, “Letter” has a large coefficient in the regression of the questionnaire variable but it is not statistically significant. Some flyers appear to have a significant effect on response reported in the survey. This is the case for the “Opportunity cost” flyer for example and the “Underestimation” flyer. Column (9) presents estimation results of the GMM-IV regression of the survey take-up variable on the take-up, producing a coefficient of 0.818 with a p-value for the over-identification test of 0.16. Therefore, although there are some differences in the two response profiles, they on the whole provide a consistent picture of the sensitivity of demand to the various flyers.

TABLE 2.6 – Response behaviors

	(1) Postal survey	(2) Phone survey	(3) Global response	(4) Question 7	(5) Question 8	(6) Take-up dummy	(7) Take-up on respondents	(8) Take-up in questionnaire	(9) Take-up in questionnaire
Cost treatments									
Subsidies	1.911 (1.225)	-2.571 (3.479)	-0.446 (2.847)	-0.982 (2.763)	-0.572 (2.783)	0.170 (0.225)	0.409 (0.317)	1.051 (0.824)	
15% reduction	2.854** (1.231)	1.192 (3.570)	2.658 (2.876)	1.776 (2.792)	2.314 (2.813)	0.070 (0.218)	-0.030 (0.261)	2.507** (1.263)	
35% reduction	2.266* (1.225)	-0.700 (3.521)	1.067 (2.859)	-0.680 (2.762)	0.110 (2.787)	0.200 (0.227)	0.049 (0.272)	1.669** (0.851)	
Free	3.933*** (1.235)	3.391 (3.738)	6.627** (2.940)	5.791** (2.859)	6.361** (2.879)	0.517** (0.250)	0.923* (0.548)	1.342* (0.805)	
Short deadline	1.681 (1.225)	-3.245 (3.552)	0.646 (2.895)	-0.873 (2.790)	0.217 (2.823)	-0.035 (0.209)	0.033 (0.276)	0.871 (0.563)	
Opportunity costs	2.209* (1.228)	-0.777 (3.670)	3.474 (2.941)	2.090 (2.845)	2.981 (2.872)	-0.000 (0.212)	0.585 (0.568)	3.241** (1.358)	
Information treatments									
Statistical	2.324* (1.227)	0.924 (3.556)	2.147 (2.872)	2.107 (2.798)	2.159 (2.813)	-0.346* (0.182)	-0.217 (0.237)	1.317 (0.817)	
Testimonial	1.113 (1.220)	-2.820 (3.526)	0.038 (2.879)	-0.579 (2.790)	-2.244 (2.810)	0.098 (0.219)	0.599 (0.574)	1.448 (0.891)	
Letter	0.959 (1.220)	-1.942 (3.530)	0.173 (2.879)	-1.334 (2.784)	-0.540 (2.810)	0.651** (0.259)	0.777** (0.358)	1.413 (0.862)	
Loss	3.204*** (1.230)	-3.004 (3.527)	1.057 (2.868)	0.502 (2.779)	0.521 (2.795)	-0.073 (0.206)	-0.062 (0.261)	0.228 (0.492)	
Gain	2.576** (1.228)	-2.880 (3.509)	0.384 (2.862)	-0.029 (2.776)	0.700 (2.801)	-0.105 (0.203)	-0.060 (0.261)	0.466 (0.511)	
Underestimation	0.991 (1.221)	1.048 (3.608)	2.392 (2.910)	0.158 (2.802)	0.435 (2.823)	0.137 (0.223)	0.196 (0.292)	1.756** (0.839)	
Correct perception	3.245*** (1.232)	-5.169 (3.464)	-0.548 (2.847)	-1.785 (2.746)	-0.743 (2.777)	-0.138 (0.201)	-0.395* (0.214)	0.091 (0.483)	
Constant	31.101*** (0.860)	26.349*** (2.486)	47.313*** (2.030)	43.763*** (1.977)	44.521*** (1.987)	0.656*** (0.150)	0.534*** (0.190)	1.251*** (0.336)	0.013*** (0.003)
Take-up on respondents									0.818***
Obs.	40,670	4,096	17,595	17,595	17,595	40,670	14,530	12,923	12,923
<i>Fisher tests</i>									
Joint Nullity	0.106	0.657	0.590	0.493	0.568	0.002	0.002	0.057	
Joint Identity	0.347	0.603	0.548	0.416	0.505				
Overidentification									0.160

Notes : See next page

Notes :

1. "Postal survey", "Phone survey" and "Global response" are dummy variables indicating if people responded to the survey (See the text for more details on their construction).
2. "Question 7" is a dummy variable which is equal to 1 if people respond to this question in the survey and 0 otherwise. "Question 8" is defined in the same way.
3. "Take-up dummy" is our main outcome variable and indicates if people call the Retirement Insurance agency to benefit from the program. "Take-up on respondents" is defined on the same way but considers only the population of respondents to the survey. "Take-up in questionnaire" is a dummy variable which indicates if people declare in the survey that they called the Retirement Insurance agency.
4. "Subsidies" is a dummy variable which is equal to 1 if people received the flyer "Subsidies" and 0 if they receive the control flyer. All treatment variables are defined in the same way.
5. "Take-up" is a variable which indicates the level of correlation between the three take-up variables defined above.
6. "Joint nullity" is a Fisher test which tests the equality of all coefficients. "Joint identity" is a Fisher test which tests the equality of all coefficients, excepting the control group.
7. Each column corresponds to OLS regressions with robust standard errors reported in parenthesis. * means 10%-significant, ** means 5%-significant and *** means 1%-significant.

2.4.2 Summary statistics

Tables 2.7 and 2.8 present correlations between risk perception and the take-up variable as well as correlations between future demand and the take-up variable. Column (1) shows the distribution of outcome variables in the 4 modalities. The reported distribution is quite representative of the low demand for housing adaptation. Only 3% of retired people declare their dwelling to be highly risky. Most people declare their dwelling to be “rather low risk” (55.94%) or “not at all risky” (40.16%). As can be expected, retired persons who did take up are strongly represented among individuals feeling their dwelling was very risky (8.33% for highly risky vs 0.32% for not risky at all). We observe a similar pattern for the demand variable : very few retired people declare they would like to receive a caseworker at home to evaluate their needs in the next three months (2.04%) and most of them declare they would like to receive such a visit sometime after three months (42.52%) or never (39.66%). This is well in line with the key demand problem for preventive investment and the observed behavior : 2.94% of retired saying they would like the visit within three months did indeed take up which is large compared with the very small (although not zero) proportion of these who took up and said they would prefer never to receive the visit (0.45%).

In order to capture a larger population than just those who took up, and catch those more broadly sensitive to the program, we constructed two dummy variables excluding only the last modality. The “Risk” variable is therefore 1 but 0 for individuals saying their housing is not risky at all, and the “Demand” variable is 1 but 0 for individuals saying they preferred never to receive the visit of a caseworker. Notice that this demand variable can therefore be considered as an intention of demand in the present or the future. It includes all types of individuals with an anticipation of demand : those who indeed will invest, but also the procrastinators, these saying they will invest in the future but will always postpone the decision.

TABLE 2.7 – Risk perception

Risk perception		
Do you feel your housing is risky ?		
	(1)	(2)
	Risk perception	Take-up conditional to risk perception
Yes a lot	3.00	8.33
Rather yes	1.79	3.91
Rather not	55.94	0.45
Not at all	40.16	0.32
Obs.	13,434	

Notes :

1. The sample considered is composed of people who responded to the question in the survey.
2. Column (1) presents the distribution of the variable in the 4 modalities. Coefficients correspond to percentage. For example, 40.16% of respondents answer that they do not at all feel their dwelling to be risky.
3. Column (2) presents the probability to call the Retirement Insurance agency after receiving the flyer conditional on answers to the question “Do you feel your dwelling is risky ?”.

TABLE 2.8 – Anticipated demand

Anticipated demand		
Would you like to have an evaluation at home ?		
	(1)	(2)
	Anticipated demand	Take-up conditional to anticipated demand
Yes, in one month	2.04	2.94
Yes, in three months	15.76	1.21
Yes, later	42.52	0.71
Never	39.69	0.45
Obs.	12,935	

Notes :

1. The sample considered is composed of people who responded to the question in the survey.
2. Column (1) presents the distribution of the variable in the 4 modalities. Coefficients correspond to percentage. For example, 39.69% of respondents answer that they do not want to benefit from an evaluation.
3. Column (2) presents the probability to call the Retirement Insurance agency after receiving the flyer conditional on answers to the question “Would you like to have an evaluation at home ?”.

2.4.3 Decision-making process

The specification used is the same as the previous one used for the take-up dummy. For greater simplicity and understanding, we present results in four tables by separating costs manipulations (Tables 2.9 and 2.10) from information manipulations (Tables 2.11 and 2.12). We present results for both outcome variables in the same table. We select only some subsamples and focus on men, retired people between 65 and 74 years old, people who are not taxable, people with and without fragilities. Subsamples selected were those on which we find the strongest impacts on take-up. For more simplicity, we first present results for men, retired people between 65 and 74 years old (Tables 2.11 and 2.9) and for the remaining subsamples after (Tables 2.12 and 2.10).

First, we note that the assumption of “no-flyer effect” is frequently rejected (See line “Global” in Tables 2.9 and 2.10). It is true for the whole sample but also for most sub-populations. In some cases, we do find effects of the flyers on risk perception and intention of demand but not on the take-up variable. This is the case for example for the population “Without fragilities”. One broad conclusion is that the manipulations introduced in the flyers also act on the risk perception and intention of demand and that the responsiveness seems larger.

A crucial remark is that the determinants for risk perception and intention of demand are different from those for take-up. The 100% subsidy for example does not affect risk perception and intention of demand whereas it was shown to be one of the main determinants of take-up⁸. Similarly, the flyer “Letter” has no effect either on risk perception or intention of demand.

Other flyers however affect risk perception or intention of demand. For example, one interesting finding is that both the treatment offering a conditional 20% reduction and the treatment about correct risk perception positively affect risk perception. A separate analysis by sample points out that the impact is mainly driven

8. As discussed previously, the 100% subsidy flyer is also associated with a response rate to the survey 6 points higher than other flyers. We have to use any result about this flyer for the survey variables with caution. However, as noted before, when looking at the purchase decision, the effect of the 100% subsidy is stronger for respondents than for the full sample. Therefore, if there is a selection bias due to specific response behaviors, it is likely to be an upward bias.

by men and non-taxable people. The flyer about correct risk perception mentions that 30% of retired people think they might fall at home and indeed 30% indeed have serious chances of falling. What the fact that this flyer affects the reported risk perception reveals is that indeed a proportion of retired persons do indeed have the feeling they might fall. They just recognize themselves in those with the correct perception. The fact that risk perception is also affected by the conditional reduction, which is at first glance quite surprising and meaningless could be related to a demand for commitment by sophisticated agents, that is, aware of their tendency to always postpone investments.

The intention of demand for an evaluation at home is less affected by cost manipulations than risk perception. We find a positive impact of reduction in non-monetary costs only on men (Column (4) in Table 2.9). Explaining clearly steps of the demand process lead to an increase of more than 12 percentage points in the probability to declare being interested in receiving a caseworker at home for an initial level of 60% in the control group. We do not find an impact of the same treatment on take-up.

TABLE 2.9 – Effects of costs treatments (1)

Dependent variables : Risk perception and Future Demand for the program						
	(1)	(2)	(3)	(4)	(5)	(6)
	All		Men		65-74	
	Risk	Future Demand	Risk	Future Demand	Risk	Future Demand
Subsidies	6.234*	-2.153	7.983	-0.694	8.958	-1.272
	(3.411)	(3.345)	(4.556)	(5.104)	(5.072)	(5.432)
15% reduction	-0.284	-4.053	-0.619	-6.535	4.712	-2.287
	(3.444)	(3.322)	(5.162)	(5.054)	(5.457)	(5.255)
35% reduction	4.077	4.942	2.389	6.067	0.482	0.737
	(3.437)	(3.231)	(5.121)	(4.875)	(5.568)	(5.234)
Free	2.694	-0.261	0.504	3.083	7.321	1.807
	(3.434)	(3.297)	(5.081)	(4.916)	(5.457)	(5.195)
Short deadline	11.008*	0.400	17.027**	2.996	13.695	-1.582
	(5.793)	(5.568)	(8.575)	(8.416)	(9.279)	(8.917)
Opportunity costs	4.725	5.269	6.663	12.022**	5.130	5.311
	(3.432)	(3.276)	(5.086)	(4.754)	(5.394)	(5.015)
<i>Fisher tests</i>						
Global	0.002	0.019	0.000	0.000	0.070	0.351
Reduction	0.023	0.043	0.721	0.408	0.400	0.940
Constant	57.534***	62.568***	55.575***	59.871***	57.039***	64.260***
	(2.488)	(2.371)	(3.721)	(3.630)	(3.998)	(3.789)
Obs.	14,530	14,530	6,531	6,531	5,641	5,641

Notes :

1. “All” represents the entire sample that were sent the treatment flyers. We exclude individuals for whom the flyer was returned to the Retirement Insurance agency. We present results for several subsamples described above. See text for more details.
2. Results are presented for the two dependent variables : “Risk perception” and “Interest”.
3. “Subsidies” is a dummy variable which is equal to 1 if individuals received the flyer “Subsidies” and 0 if they received the “control” flyer. “15% reduction”, “35% reduction”, “Free” and “Psychological costs” are defined in the same way. “Short deadline” is a linear combination of flyers “15% reduction” and “35% reduction”. See the text for more details on the flyers’ content.
4. Each column corresponds to OLS regressions with robust standard errors reported in parenthesis. * means 10%-significant, ** means 5%-significant and *** means 1%-significant.

TABLE 2.10 – Effects of costs treatments (2)

	Dependent variables : Risk perception and Future Demand for the program					
	(1)	(2)	(3)	(4)	(5)	(6)
	Non taxable		With fragilities		Without fragilities	
	Risk	Future Demand	Risk	Future Demand	Risk	Future Demand
Subsidies	13.455*	0.943	3.013	-8.276**	13.278**	11.162*
	(8.093)	(8.211)	(4.181)	(4.008)	(5.859)	(5.824)
15% reduction	10.236	-6.851	-4.471	-4.883	7.614	-0.577*
	(7.868)	(7.966)	(4.213)	(3.947)	(5.917)	(5.777)
35% reduction	17.437**	10.443	3.395	3.626	5.685	8.500
	(8.161)	(7.537)	(4.215)	(3.799)	(5.911)	(5.726)
Free	5.204	-8.900	-0.163	-5.171	8.525	10.378*
	(7.899)	(8.127)	(4.205)	(3.957)	(5.922)	(5.749)
Short deadline	30.768**	0.932	5.373	-5.459	22.222	14.534
	(13.026)	(13.037)	(7.086)	(6.574)	(10.003)	(9.815)
Opportunity costs	11.690	-5.815	5.884	1.432	2.966	13.906**
	(8.264)	(8.381)	(4.154)	(3.857)	(6.013)	(5.874)
<i>Fisher tests</i>						
Global	0.002	0.177	0.042	0.055	0.062	0.028
Reduction	0.481	0.098	0.041	0.030	0.677	0.189
Constant	40.200***	62.018***	58.866***	67.453***	54.646***	51.976***
	(5.330)	(5.407)	(3.027)	(2.750)	(4.343)	(4.251)
Obs.	2,175	2,175	9,587	9,587	4,943	4,943

Notes :

1. “All” represents the entire sample that were sent the treatment flyers. We exclude individuals for whom the flyer was returned to the Retirement Insurance agency. We present results for several subsamples described above. See text for more details.
2. Results are presented for the two dependent variables : “Risk perception” and “Interest”.
3. “Subsidies” is a dummy variable which is equal to 1 if individuals received the flyer “Subsidies” and 0 if they received the “control” flyer. “15% reduction”, “35% reduction”, “Free” and “Psychological costs” are defined in the same way. “Short deadline” is a linear combination of flyers “15% reduction” and “35% reduction”. See the text for more details on the flyers’ content.
4. Each column corresponds to OLS regressions with robust standard errors reported in parenthesis. * means 10%-significant, ** means 5%-significant and *** means 1%-significant.

For information manipulations, we note that framing matters for the majority of subsamples although effect is clearer for risk perception than for future demand. Among the various frames, the “Testimonial” has the biggest impact, especially on risk perception. It also makes a clear change compared with take-up for which this flyer never had any significant impact. For the full sample, it leads to an increase of 8.6 percentage points. For non-taxable retired people (Column (1) in Table 2.12), the impact is of almost 30 percentage points for a base level of 40% in the control group. Providing information framed as a testimonial influences positively pre-stages of demand. On non taxable people, we do always find a positive impact of the personalized letter. Notice also the new and positive effect of the treatment providing information on the consequences of falling (loss framed) or positive consequences of not falling (gain framed). This is another type of information provided and it affects the risk perception with the same order of magnitude as the information about risks of falling.

One interesting result is that emphasizing losses increases the probability to declare being interested in a home visit in the future. This result is consistent with theoretical findings on loss aversion by [Tversky and Kahneman \(1991\)](#) predicting that loss frames have a bigger impact on decision-making than comparable gain frames. Here also, there is a big change compared to results on take-up. Indeed, for take-up, no significant difference between the loss and the gain frames was found. Our results suggest that loss frames are not effective at increasing take-up but could however influence pre-stages of the demand process. Moreover, for men, we noted a negative impact of the loss frame for take-up but a positive impact of the same treatment on future demand. This means that loss aversion decreases the level of effective demand by discouraging people to call the Retirement Insurance agency now whereas it increases the probability they declare to be interested in the future.

TABLE 2.11 – Effects of information treatments (1)

	Dependent variables : Risk perception and Future Demand for the program					
	(1)	(2)	(3)	(4)	(5)	(6)
	All		Men		65-74	
	Risk	Future Demand	Risk	Future Demand	Risk	Future Demand
Statistical	0.052 (3.457)	-4.180 (3.317)	0.917 (5.121)	-4.131 (4.995)	-0.040 (5.518)	-8.406 (5.320)
Testimonial	8.690** (3.453)	0.782 (3.315)	10.612** (5.140)	0.038 (5.015)	6.637 (5.589)	1.480 (5.233)
Letter	5.327 (3.469)	2.256 (3.274)	10.295** (5.176)	6.616 (4.934)	6.346 (5.505)	0.669 (5.208)
Gain	7.604** (3.390)	-1.401 (3.318)	6.328 (5.145)	-0.491 (5.042)	11.595** (5.269)	-3.514 (5.289)
Loss vs. gain	1.113 (3.236)	6.143* (3.153)	8.435* (4.488)	11.547** (4.622)	4.788 (4.788)	10.433** (4.865)
Correct perception	9.843*** (3.375)	2.546 (3.253)	12.541** (5.033)	2.991 (4.960)	7.737 (5.500)	1.194 (5.214)
Underestimation vs. correct perception	-0.574 (3.293)	1.444 (3.186)	-1.985 (4.963)	4.924 (4.810)	1.886 (5.334)	0.728 (5.102)
<i>Fisher tests</i>						
Framing	0.037	0.117	0.088	0.076	0.377	0.109
Constant	57.534*** (2.488)	62.568*** (2.371)	55.575*** (3.721)	59.871*** (3.630)	57.039*** (3.998)	64.260*** (3.789)
Obs.	14,530	14,530	6,531	6,531	5,641	5,641

Notes :

1. “All” represents the entire sample that were sent the treatment flyers. We exclude individuals for whom the flyer was returned to the Retirement Insurance agency. We present results for several subsamples described above. See text for more details.
2. Results are presented for two dependent variables : “Risk perception” and “Interest”.
3. “Statistical” is a dummy variable which is equal to 1 if individuals received the flyer “Statistical information” and 0 if they received the “control” flyer. “Testimony” and “letter” are defined in the same way. “Correct perception or underestimation” is a dummy variable which is equal to 1 if people received the flyers “Correct perception” or “Underestimation” and 0 if they received the “control” flyer. “Loss or gain” is defined in the same way. “Loss” is a dummy variable which is equal to 1 if individuals received the flyer “loss” and 0 if they received the flyer “gain”. “Underestimation” is defined in the same way. See the text for more details on the content of the flyers.
4. Each column corresponds to OLS regressions with robust standard errors reported in parenthesis. * means 10%-significant, ** means 5%-significant and *** means 1%-significant.

TABLE 2.12 – Effects of information treatments (2)

Dependent variables : Risk perception and Future Demand for the program						
	(1)	(2)	(3)	(4)	(5)	(6)
	Non taxable		With fragilities		Without fragilities	
	Risk	Future Demand	Risk	Future Demand	Risk	Future Demand
Statistical	6.422 (8.036)	-6.988 (8.171)	-1.933 (4.252)	-8.422** (3.993)	4.220 (5.922)	5.155 (5.753)
Testimonial	29.349*** (7.351)	9.482 (7.076)	7.320* (4.207)	-2.701 (3.921)	11.662* (6.030)	8.310 (5.894)
Letter	20.184** (7.944)	5.892 (7.696)	3.632 (4.274)	-0.566 (3.883)	8.878 (5.930)	9.092 (5.748)
Gain	12.696 (8.393)	-4.583 (8.405)	6.105 (4.151)	-6.271 (3.983)	10.862* (5.839)	9.158 (5.748)
Loss vs. gain	4.294 (8.844)	2.656 (8.637)	1.191 (3.993)	6.955* (3.862)	0.921 (5.504)	4.525 (5.425)
Correct perception	30.200*** (7.559)	4.356 (7.874)	7.191* (4.146)	-1.626 (3.872)	15.574*** (5.748)	11.600 (5.747)
Underestimation vs. correct perception	-7.235 (8.209)	-10.481 (8.477)	-2.238 (4.100)	-1.718 (3.951)	2.700 (5.394)	8.003 (5.322)
<i>Fisher tests</i>						
Framing	0.014	0.092	0.084	0.129	0.429	0.752
Constant	40.200*** (5.330)	62.018*** (5.407)	58.866*** (3.027)	67.453*** (2.750)	54.646*** (4.343)	51.976*** (4.251)
Obs.	2,175	2,175	9,587	9,587	4,943	4,943

Notes :

1. “All” represents the entire sample that were sent the treatment flyers. We exclude individuals for whom the flyer was returned to the Retirement Insurance agency. We present results for several subsamples described above. See text for more details.
2. Results are presented for two dependent variables : “Risk perception” and “Interest”.
3. “Statistical” is a dummy variable which is equal to 1 if individuals received the flyer “Statistical information” and 0 if they received the “control” flyer. “Testimony” and “letter” are defined in the same way. “Correct perception or underestimation” is a dummy variable which is equal to 1 if people received the flyers “Correct perception” or “Underestimation” and 0 if they received the “control” flyer. “Loss or gain” is defined in the same way. “Loss” is a dummy variable which is equal to 1 if individuals received the flyer “Loss” and 0 if they received the flyer “Gain”. “Underestimation” is defined in the same way. See the text for more details on the content of the flyers.
4. Each column corresponds to OLS regressions with robust standard errors reported in parenthesis. * means 10%-significant, ** means 5%-significant and *** means 1%-significant.

Previous results (Tables 2.9, 2.10, 2.11 and 2.12) tend to show that determinants are not the same for take-up as for outcomes from the survey. Consistency between outcome variables can be tested further. We can indeed test easily assumptions that responses to flyers are proportional between risk and take-up, between future demand and take-up and, finally, between future demand and risk. We use the same methodology as the one used to test consistency between responses to the survey and take-up variable (See Table 2.6). We use a GMM-IV regression with the flyers as instruments and look at over-identification test.

First, we are interested in testing whether the determinants of future demand and take-up are the same :

$$E(\textit{Takeup} - \alpha - \beta(\textit{Futuredemand})|\textit{flyers}) = 0$$

Also we are interested in testing whether risk perception and take-up respond to the same incentives (i.e. flyers) :

$$E(\textit{Takeup} - \alpha - \beta(\textit{Risk})|\textit{flyers}) = 0$$

Finally, we test whether the future demand and risk perception respond to the same incentives :

$$E(\textit{Futuredemand} - \alpha - \beta(\textit{Risk})|\textit{flyers}) = 0$$

Results are presented in Table 2.13. It clearly shows that take-up and future demand do not respond to the same incentives. The over-identification test is strongly rejected and the relationship between the purchase decision and the future demand implied by the restriction is very weak. We observe the same result for risk perception and take-up. However, when looking at consistency between future demand and risk perception, we see that the two response profiles are consistent. The over-identification assumption is accepted and the implied relationship between the two outcomes makes sense. Risk perception and future demand respond to the same

incentives. They are not the same as the incentives to which the effective demand responds.

TABLE 2.13 – Interpretation

	(1) Take-up	(2) Take-up	(3) Anticipated demand
Risk perception	-0.013 (0.013)	-	0.467*** (0.161)
Anticipated demand	-	0.002 (0.016)	-
Intercept	0.013 (0.008)	0.003 (0.010)	0.342*** (0.102)
Overidentification test	0.003	0.002	0.071

Notes :

1. Column (1) presents the IV-GMM regression of the take-up variable on the risk perception variable using Flyers 2 to 14 as instruments.
2. Line “Over-identification test” provides us with the p-value of the GMM over-identification test performed on the second step estimator. The tested assumption is that the flyer response profiles of the reduced form are the same up to additive and multiplicative constants.

2.5 Conclusion

By conducting a large field experiment, we first show that it is possible to induce take-up for prevention programs. We provide empirical evidence that providing information is more powerful at increasing demand than reducing costs. This result is not in line with the previous literature on determinants of health investment, mainly in developing countries, which show that the take-up of prevention products is largely determined by price (Meredith, Robinson, Walker, and Wydick, 2011; Holla and Kremer, 2009). If providing information on risks seems to be the most fruitful policy avenue to increase prevention efforts among the elderly persons, we also find that behaviors are very sensitive to information frames. Manipulating information frames leads to sizeable movements in take-up. By providing information on risks through a national campaign and by choosing an appropriate frame, the government may be able to raise demand without increasing the offered financial support.

However, some sub-populations are not affected whatever the incentives are. In particular, we do not find any significant impact of treatments on the younger retired people. This result confirms the feeling of social actors who agree that, most of the time, people tend to postpone decisions and adapt their housing when it is too late, after experiencing a fall.

We also provide additional findings by analyzing the impact of the same treatments on two other outcomes which could be considered as pre-stages of the investment decision. We do not find the same determinants for risk perception and future demand as for take-up. Indeed, we find a positive impact of a short-run subsidy on risk perception. Moreover, the testimonial appears to be the most effective frame at influencing risk perception whereas the personalized letter has a large effect on the purchase decision. We also find a positive impact of the loss frame compared to the gain frame, meaning that loss aversion affects future demand.

Our results suggest that determinants are not the same for the effective demand and the future demand. Combining different incentives could be an effective strategy

to attain an optimal level of prevention effort. Our findings call for a closer look at the dynamic and intertemporal dimension of the decision-making process.

Appendix

Flyers “Control” (1), “Free” (5), “Testimonial” (9) and “Letter” (10) are presented as examples in the next pages.



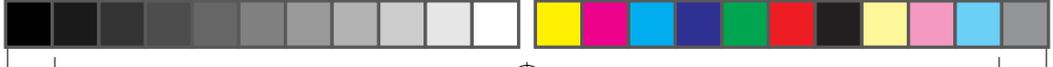
Pensioners

Enjoying your daily life, services to help you



SECURITÉ SOCIALE

**l'Assurance
Retraite**



Social actions from Pensioner's Insurance

Pensioner's insurance does not just manage careers and pay out pensions. It also works in the field of social action to accompany pensioners.

Its missions comprise two dimensions:

● The objective evaluation of the needs of a pensioner

During an appointment at the home of a pensioner, a professional carrying out a mission by Pensioner's Insurance will evaluate this need and give advice and recommendations. If needed, he will be able to recommend services that will assist the pensioner in remaining at his home.

● A whole range of services dedicated to "aging well"

Pensioner's Insurance proposes a complete range of services for pensioners, covering the most important dimensions of personal well-being, social life, upkeep and adaptation of accommodations.



Did you know?

Pensioner's Insurance help you pay for many types of assistance such as the installation of seat or bed risers and support bars, remote assistance, meals brought to your home, refurbishing your home, delivering food, assistance in cleaning your house, someone to go with you on your trips and prevention workshops.



09 71 10 75 10

From Monday to Friday from 9:00 to 12:00 and from 13:00 to 17:00, our advisers will be happy to answer any questions you may have

You may be eligible for all Ile-de-France Pension Insurance social action services:

- if you do not receive the APA, PSD, ACTP, PCH or the MTP;
- if you are not staying in a retirement home or another establishment.



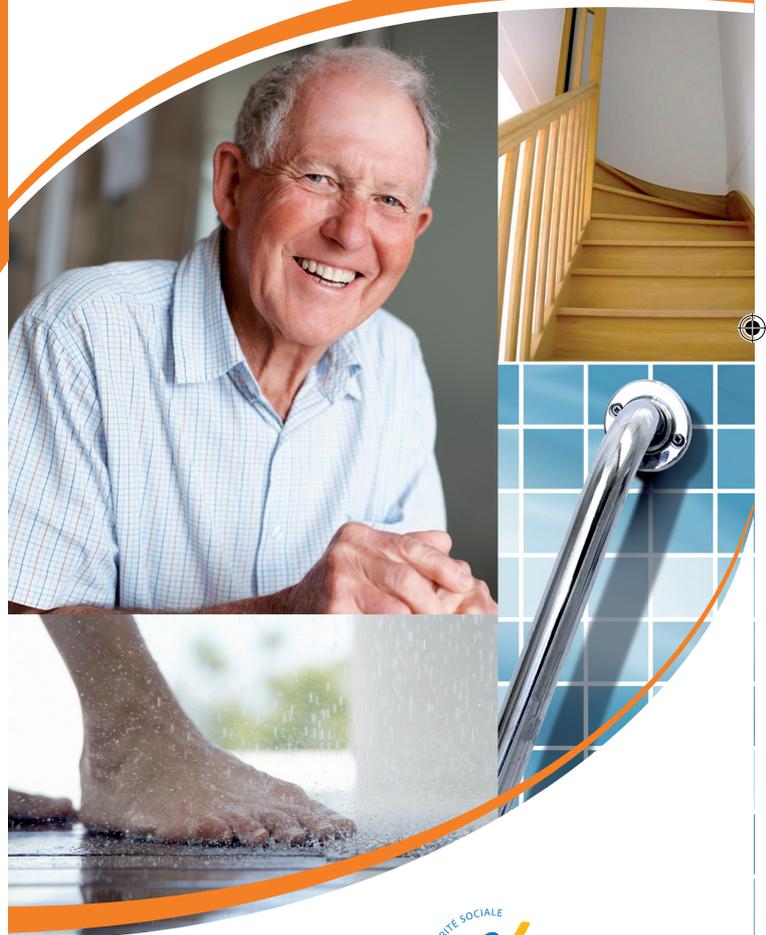
Pensioners

Adapt your home for a better life

09 71 10 75 10

From Monday to Friday from 9:00 to 12:00 and from 13:00 to 17:00, our advisers will be happy to answer any questions you may have.

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This offer is only good for a length of six months after having received the leaflet.

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- **A whole range of services dedicated to "aging well"**

Pensioner's Insurance proposes a complete range of services for pensioners, covering the most important dimensions of personal well-being, social life, up-keep and adaptation of accommodations.

Did you know ?

Pensioner's Insurance helps you pay for many types of assistance such as the installation of seat or bed risers and support bars, remote assistance, meals brought to your home, refurbishing your home, delivering food, assistance in cleaning your house, someone to go with you on your trips and prevention workshops.

1: If your file is not accepted, you will receive a letter saying that you do not qualify.

Assistance in adapting housing

Exceptionally, Pensioner's Insurance can **finance all costs** linked to adapting your home.

- **How can I take advantage of financial assistance?**

Call **09 71 10 75 10** to receive the financial assistance file. If your file meets qualifications¹, an assessor will make an appointment to visit your home. He will make a list of needs and will draw up a personalised action plan. Pensioner's Insurance, if you meet the conditions, will finance all costs linked to adapting your home (diagnostics and technical assistance).

Example

Mrs Martin wants to install two support bars for a total of €200 which will be completely financed by Pensioner's Insurance.

100 % of expenses paid



Pensioners

« **When you fall,**
at my age,
it's no longer funny »

09 71 10 75 10

From Monday to Friday from 9:00 to 12:00 and
from 13:00 to 17:00, our advisers will be happy
to answer any questions you may have.

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You may be eligible for all Ile-de-France Pension Insurance social action services:
• if you do not receive the APA, PSD, ACTR, PCH or the MTP;
• if you are not staying in a retirement home or another establishment.



Social actions from Pensioner's Insurance

Pensioner's insurance does not just manage careers and pay out pensions. It also works in the field of social action to accompany pensioners.

Its missions comprise two dimensions:

● The objective evaluation of the needs of a pensioner

During an appointment at the home of a pensioner, a professional carrying out a mission by Pensioner's Insurance will evaluate this need and give advice and recommendations. If needed, he will be able to recommend services that will assist the pensioner in remaining at his home.

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Did you know?

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"When you fall, at my age, it's no longer funny"



Christian Bourbon, who has retired, tells us about the reasons why she contacted Pensioner's Insurance.

"Until very recently, I didn't think it was necessary for me to modify anything in my bathroom.

But just a few weeks ago I slipped and luckily I was able to prevent myself from falling by grabbing the vanity nearby. I became aware that my environment, even though I am used to it, could present a danger for me. I could have had a very serious accident.

I then contacted Pensioner's Insurance and they were able to propose several different solutions to my problems. In particular, we decided that a bit of planning was going to be necessary.

Since then, I installed a support bar to help me. And I must say that it really is useful. I can move around more freely and now I'm not afraid of falling anymore."

Dear Sir and Madam,

A poorly adjusted carpet, shelves that are too high, moss on your steps, a slippery bathtub: as you get older, moving around in poorly adapted accommodations can truly be risky. One moment of inattention and you could easily slip. And consequences of this could be heavy.

Ile-de-France Pension Insurance is sending you this letter today to present you its personalised action plans. Recently implemented, they consist of studying with you any eventual needs to improve your accommodations and enhance your daily comfort.

Take a few minutes to ask yourself the right questions:

Are my accommodations still adapted to my physical condition? The risk of falling is easier to prevent than to cure. Take a look around you: do you need a support bar in your shower; have the stairs become too dangerous?

Do my accommodations present potential risks of falling? People fall because of many different reasons. The floor coating, different levels, kitchen and bathroom appliances, windows, lighting, stairs, balconies and patios must be checked for potential risks.

Would it be a good idea to refurbish my accommodations? Moving around easily and a safe access to all rooms in your home play an important role in your autonomy, the quality of your life and your happiness.

If you think that your accommodations should be better adapted, please contact the following phone number: **01 55 45 79 79 from Monday to Friday from 9:00 to 12:00 and from 13:00 to 17:00; our advisers will be happy to answer any questions you may have.**

Ile-de-France Pension Insurance has put in place solutions to make your approach easier and help finance the rehabilitation of your accommodations.

Ile-de-France Social Action Management

An evaluation of a Community-based Information Campaign on Health Demand in Mali¹

Sommaire

3.1	Introduction	77
3.2	Background	81
3.2.1	The Malian health system	81
3.2.2	The program	82
3.3	Data	87
3.4	Identification Strategy	90
3.5	Results	95
3.6	Conclusion	99

3.1 Introduction

“A woman dies from complications in childbirth every minute - about 529,000 each year - the vast majority of them in developing countries”

UNICEF

1. This chapter is largely based on common work with Pauline Givord.

In this paper, we evaluate the impact of an information campaign promoting assisted childbirth which was carried out in Mali between 2002 and 2004. We have access to a unique administrative Malian dataset that provides precise yearly information on the activities of all Malian primary health care structures over the period 2002-2007. According to our estimates, the campaign results in an increase of at least 17% in the assisted childbirth rate and 25% in the prenatal care rate in subsequent years. These estimates are obtained by using a difference-in-difference method : because of financial constraints, the campaign was conducted on a three-waves basis in different geographical districts. Additionally, this campaign was linked to a vaccination campaign against Maternal and Neonatal Tetanus (MNT). The campaign was time-scheduled to give priority to districts with higher prevalences of MNT. As suggested by empirical evidence, the districts were picked for the different waves of the campaign independently of any specific change in assisted childbirth or prenatal care rates before the campaign. The difference-in-difference estimate compares the evolution of the assisted childbirth and prenatal care rates in districts that benefit first from the program before and after the campaign with districts that have not benefited from the campaign yet.

These results have important consequences for health policy. Mali is one of the worst countries in terms of maternal and child health. The Malian infant and maternal mortality rates are among the highest in the world (respectively 191 per 1,000 and 464 per 100,000 births).² This situation is partly due to a very low uptake of skilled health services. Despite substantial investments in health service delivery,³ demand-side barriers remain. Only 18% of the population goes to primary health care structures when they need care (Thome, 2002). While the World Health Organization strongly advocates "skilled care at every birth", only 49% of births are attended by skilled health professionals in Mali (Audibert and De Roodenbeck, 2004).

Finding a way of overcoming demand-side barriers to the delivery of health care

2. According to the last survey on Health in Mali (*EDSM IV* in 2006).

3. According to the Malian National Health Accounts, the spending related to the Malian Health sector raised from 109 to 165 billions of euros for from 1999 to 2004.

services has become both a necessity for policy makers as well as a main concern for development economists (Waitzkin, 2003).

Apart from obvious financial constraints, this low uptake of health services has several explanations. The lack of information and trust on the part of the local population, regarding both health risks and the potential benefits of accessing a health care system, is one of them. Our results are in line with Ensor and Cooper (2004), who points out that information campaigns conducted in African countries, mainly in Nigeria, Sierra Leone and Ghana, lead to an increase in attendance at deliveries. These interventions mostly aim at making women aware that they have the option of an attended delivery in a primary health care center. Focus group discussions on infant and maternal mortality are also organized. On a related topic, Dupas (2009a) also supplies evidence that providing information can be a way of changing care seeking behaviors (in this case, sexual behavior among teenagers, with the aim of reducing HIV related risk). Moreover, empirical evidence shows that reinforcing community participation and adopting a train-the-trainer approach can positively influence the outcomes of health-promotion projects (Campbell, 1999). Working closely with communities can help to make an information campaign more credible and culturally appropriate (Galbraith, Ricardo, Stanton, Black, Feigelman, and Kaljee, 1996). The necessity to take into account local practices and preferences instead of applying "generalized models" is stressed by Chopra and Ford (2005). For instance, Bjorkman and Svensson (2009), in a randomized field experiment on primary health care services in Uganda, show that involving communities in the monitoring of providers leads to greater efforts from the medical staff, higher utilization of the services, and better health outcomes. Similarly, Manandhar, Osrin, Shrestha, Mesko, Morrison, Tumbahangphe, Tamang, Thapa, Shrestha, Thapa, et al. (2004) find that participatory intervention with women's groups about perinatal problems reduces neonatal mortality by as much as 30%. In a study conducted across six African Countries, Stephenson, Baschieri, Clements, Hennink, and Madise (2006) show that the choice of place of delivery is influenced by community factors.

As regards the information campaign evaluated in this paper, communities were

closely involved : in each village, community leaders were informed beforehand about the utility of the campaign in order to obtain their support. Messages about the necessity of skilled attendance at delivery were provided by volunteer villagers directly chosen by communities. The information campaign was carried out in tandem with a national vaccination campaign against Maternal and Neonatal Tetanus (MNT), which might also have helped to increase people's knowledge of and comfort with health care structures and confidence in the capacity of such structures to improve health status.

This paper is organized as follows. Section 2 provides background information on the Malian health system and on the campaign against MNT. Section 3 presents the database we used. Section 4 presents the identification strategy, while section 5 shows the main results. Our conclusions are stated in section 6.

3.2 Background

3.2.1 The Malian health system

The Malian national health care system is pyramid-shaped and involves three different levels (see for further clarification Figure 3.1). The first level includes public and private national or regional hospitals. Referral Health Centers (*CSREF*) are present in each district and correspond to the second level. We count 59 districts around the country. In our paper, we focus on the third level of the Malian health care pyramid, which corresponds to local health areas. This level includes all Community Health Centers (*CSCOM*).

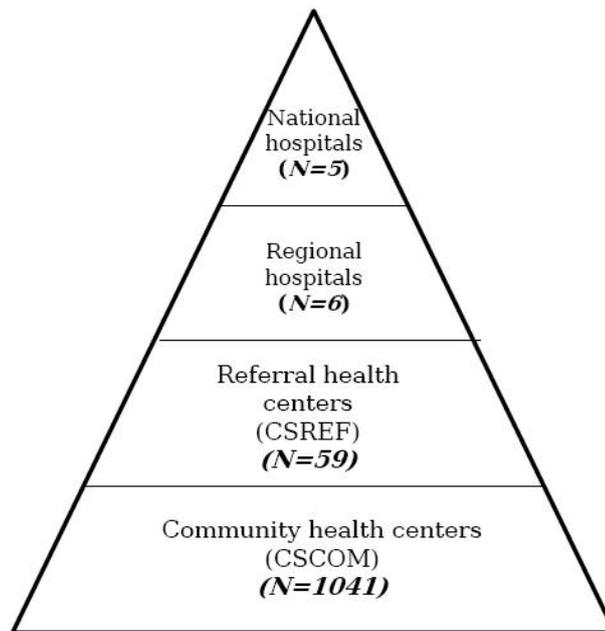


FIGURE 3.1 – Organization of the Malian Health System.

The creation of *CSCOM* in Sub-Saharan Africa is closely linked to the concept of primary health care which emerged during the 1978 Alma Alta International Conference (Ridde, 2004). Ten years later, the Bamako Initiative adopted by African Health Ministers aimed to widen access to primary health care by defining effective implementation strategies and by overcoming the lack of resources. The Bamako

Initiative is based on the idea that elected village committees have to be engaged in health-facility management and control of financial and human resources. The orientations adopted by sub-Saharan Health Ministers correspond to a far-reaching political process that aims to change the nature of the relationship between the staff providing health care and users. The creation of health committees directly representing the villagers' communities ensures the accountability of public health services. Sub-Saharan countries which implemented some form of scaling up achieve positive results. They succeed in increasing the use of health structures among the poorest women and children and lead to significant reductions in maternal and child mortality (UNICEF, 1999).

In Mali, the first primary health care centers were created in the 1980s in response to the Malian State's difficulties in satisfying the basic health needs of its population. These primary health care structures were considered by the Malian government as an efficient strategy to extend health coverage to rural areas. The Malian State, through an official political declaration in 1990, recognized the central role played by *CSCOM* in the improvement of the conditions of access to primary health care. Each *CSCOM* includes a clinic, a maternity hospital and a drugstore. They are managed by a local association of users called *ASACO*. These health Committees are linked to the State through the signature of a convention. *CSCOM* are charged with providing primary health care services in their designated areas. Although the State is partially involved in the financing of the construction of each *CSCOM* provides an initial endowment, *CSCOM* have private status and must rely on their own resources. Each *ASACO* is responsible for the financial accounts of its health center and must support the salaries of the staff. We count around 1,000 *CSCOM*, depending on year considered (see the Table 3.7 in the appendix for details).

3.2.2 The program

Although Maternal and Neonatal Tetanus (hereafter MNT) has been eliminated in the great majority of countries, today it still remains endemic in 40 of the world's poorest countries, included Mali. Tetanus occurs when a bacterium, *Clostridium*

tetani, succeeds in entering the body through an open puncture and produces a poison that strikes rapidly and attacks the central nervous system. Tetanus can kill newborns within a few days of birth. The disease generally causes facial paralysis and newborns affected are no longer able to breastfeed. Maternal and Neonatal Tetanus accounts for a large part of the high child mortality rates in developing countries. For instance, Kapoor, Srivastava, Misra, Sharma, Thakur, Srivastava, and Singh (1996) show that Tetanus caused 36% of newborn deaths in Indian urban slums in 1996.

The International Organizations, in particular WHO and UNICEF, have made it their aim to reduce considerably the number of Tetanus cases around the world with the MNT Elimination Initiative. Maternal and Neonatal Tetanus could be easily prevented by immunizing mothers with vaccine. If the mother is protected from the disease, the newborn will not be affected in the first weeks of his life. In developing countries, immunization of all women of reproductive age is considered the best strategy (Black, Huber, and Curlin, 1980).

The Malian Health Ministry, with the help of NGOs and the international institutions, implemented a three-year campaign between 2002 and 2004. The global campaign had two parts. First, the vaccination campaign aimed at reducing the overall prevalence of Maternal and Neonatal Tetanus. The tetanus toxoid immunization policy followed closely the recommendations of the WHO. 2,330,000 women of childbearing age were targeted by the campaign. Second, the Malian Health Ministry took the opportunity of a national program to organize an information campaign at the same time. Each vaccination team was reinforced local volunteer worker charged with providing information. This second part of the campaign had two main goals : increasing the level of knowledge about MNT and promoting assisted childbirth. While the immunization of women against MNT contributes to cutting the number of newborns deaths, stimulating the demand for maternal care given by skill attendants in health care structures is the only effective way to reduce the high maternal and neonatal mortality rates.

In order to reach as many women as possible, mobile teams were deployed in

rural areas. Some villages are often hardly reachable and women rarely possess convenient means of transportation. As the marginal benefit of vaccination cannot be directly perceived, the opportunity cost increases with distance (Buor, 2003). Mobile teams able to reach the most remote areas assured a greater efficiency than vaccination in a center.

The campaign was scheduled over a three-year period because all of the health districts could not be vaccinated at the same time. In 2002, the UNICEF and the WHO, in collaboration with the Malian Health Ministry, established a classification of health districts in order to determine an order of priority. The decision rule adopts three criteria : the level of MNT risk, the current vaccination rate against Tetanus and an aggregated indicator of the feasibility, durability and visibility of the action. In the pilot phase in 2002, the campaign was carried out in just six districts presenting the highest Tetanus risk levels (see Figure 3.2 for the geographical allocation of the health districts). In 2003, the second wave targeted twenty districts : thirteen identified as presenting a very high level of risk and seven from among those with "only" a high level of risk. The Bamako region (comprising six districts) was not targeted by the national campaign, as the vaccination rate against Tetanus was already very high there. For the twenty-seven remaining districts, the campaign began late in 2004 and finished in 2005.

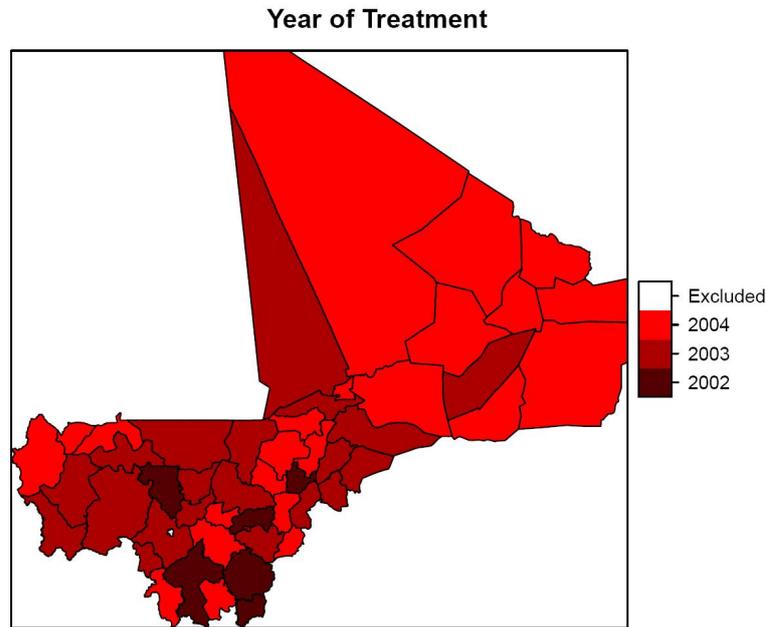


FIGURE 3.2 – Schedule of the Vaccination campaign against MNT.

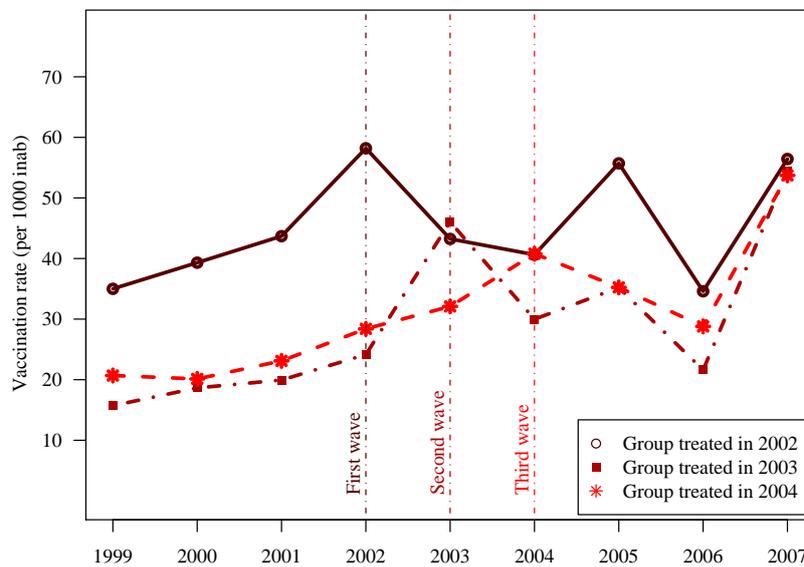


FIGURE 3.3 – Vaccination rates against MNT, 1999-2007.

Figure 3.3 graphs the trend of the average vaccination rates against MNT according to the year of treatment in the districts, relative to its catchment population

(per 1000 inhabitants).⁴

Figure 3.3 provides evidence that the campaign took place as described. We observe a significant increase in the vaccination rate in 2002 (resp. 2003) for the districts of the first wave (resp. second wave). The average vaccination rate for the first-wave districts jumps from 45 per 1000 inhabitants in 2001 (before the campaign) to 58 per 1000 inhabitants in 2002 (the year of the campaign). For the second wave, the figure nearly doubles before and after the vaccination rate (from 24 in 2002 to 46 in 2003 per 1000 inhabitants). The figure shows that vaccination rates already vary from one district to another, independent of the campaign. It was previously higher in the first-wave districts. Moreover, the vaccination rate was nearly twice as high in the Bamako region as in other districts over the period. The impact of the vaccination campaign is less noticeable in the districts of the third wave (the gap is “only” 8 points per 1000 inhabitants from 2003 to 2004), as the vaccination rate was already increasing in these districts. Another reason is that since the number of districts in the third wave is higher, the campaign took more time to reach all of the targeted population. An impact evaluation of the campaign conducted by the WHO concluded that the number of reported cases of neonatal tetanus has fallen from 73 cases in 2000 to 20 cases after the campaign.⁵

Following recommendations made by international organizations (Portela and Santarelli, 2003; Gryboski, Yinger, Dios, Worley, and Fikree, 2006), the Malian government tried to involve local communities as much as possible in the organization of the campaign. In each village, community leaders were informed beforehand and closely associated with the campaign. In its report on community-based interventions, the World Health Organization stresses that the role of men and local decision makers has to be considered in the design of community programs for maternal and child health. In fact, involving opinion leaders was a way to ensure a positive image of the campaign among the population and to make it more culturally appropriate. The local women’s associations were also mobilized. Information

4. Detailed figures at this level on the targeted population (women in childbearing age) are not available.

5. According to the WHO, Mali registers about 650 000 births a year.

during the vaccination sessions was provided by a voluntary worker directly chosen by his or her community. Meetings and focus group discussions about Tetanus and assisted childbirth were organized in each village, in order to clarify and illustrate the global message delivered by the media and to improve understanding of the issues of Tetanus immunization and the role of skilled care throughout pregnancy, childbirth and the postpartum periods.

3.3 Data

We use the CROCEP database for our estimates.⁶ This base was developed as a steering tool by the Malian health authorities to evaluate a health development program. It constitutes the sole exhaustive source about the activities of the primary health care structures. Data are collected annually since 2001 in each of the eight Malian regions and in the Bamako district. The CROCEP base consists mainly of information on the activities of health structures at different levels.

Data are organized in 14 parts that provide geographical and demographic information about each district and its involved local areas, material and human resources, financial aspects and different kinds of activities realized in the structure.⁷ We use panel data at a disaggregated level, i.e. the primary health care centers *CSCOM* over the period 2002-2007. For a previous period (1999-2001), data are available at the district level only, not at the level of primary health care centers.

Until 2005, data were collected between the 1 July and 30 June of the next year (as a rule, we will denote by year t the period beginning in July of the year $t - 1$ and ending in June of year t). The reference period changed in 2005. In addition to the original one, we have data collected over a period corresponding to the calendar year. We have no observation for the year 2006, while we have two measures for the year 2005 (the first corresponds to an overlapping measure over 2004 and 2005, the

6. Orientation, Coordination and Evaluation Regional Committee of PRODESS (Five-year Program of Social and Health Development)

7. Information are sometimes missing : Community Health Centers (*CSCOM*) are not always functional at the time of the data collection, or *CSCOM* can refuse to give information about their activities.

second to the calendar year 2005). Data collected in 2007 also correspond to the calendar year. We will check the robustness of our results to this change in reference period (see Section 5).

The catchment population of the 1,041 primary health centers is large : 10,000 persons on average (Table 3.1). Notwithstanding, the personnel are scarce. The presence of a GP in centers is rare, except in the Bamako district. However, most of the centers had the benefit of more than one “health worker”, qualified nurses, midwives, nurses or more frequently matrons (i.e. woman trained to assist childbirths). This shortage of health care workforce is fairly uniform across districts, except for the Bamako district. As in many sub-Saharan African countries, the density of health care workers is highest in urban centers where hospitals tend to be located and where incomes are highest. The level of activity of these primary health care centers is very low. We adjust all figures by the targeted population of the centers because no precise data on the local proportion of pregnant women are available. The average number of consultations of persons seeking care is around 130 per 1,000 persons. The number of prenatal consultations is 17 per 1,000 persons.

The births attended by skilled health workers are also rare compared to the targeted population. With an estimated average of 5% of pregnant women, our data suggest that in some districts only one out of five pregnant women gave birth in these primary health centers in 2002.⁸ Since they do not include childbirths in private health centers, in the other public structures such as *CSREF* for example, in regional hospitals, or assisted childbirth at home, these figures are lower than those observed on macro data.

8. For instance in the centers of the third waves, we observe 9 childbirths attended by assisted childbirth for 1,000 persons, a sample that includes on average 50 pregnant women.

TABLE 3.1 – Basic description of the different groups (in year 2002)

	All	Group 2002	Group 2003	Group 2004	Bamako District
N. of primary health centers	1,041	149	462	371	59
Targeting population per centers	10,275	10,165	10,285	8,747	20,085
<i>Staff in primary health centers (average number by center)</i>					
N. of manager	0.55	0.72	0.43	0.57	0.86
N. of GP	0.14	0.11	0.08	0.07	1.02
N. of any “health worker” (except GP)	1.69	2.03	1.44	1.40	4.43
N. of qualified nurses	0.26	0.24	0.25	0.21	0.69
N. of midwives	0.14	0.02	0.06	0.03	1.67
N. of nurses	0.39	0.52	0.31	0.38	0.69
N. of matrons	0.95	1.25	0.90	0.80	1.38
<i>Primary health centers activity / pop (*1000)</i>					
N. of curative consultations	129	147	100	143	222
N. of prenatal consultations	17	26	13	16	27
N. of assisted childbirth	12	18	9	10	29

Notes :

1. “All” represents the full sample of the 1,041 primary health centers. “Group 2002” corresponds to health centers where the campaign took place in 2002 (i.e. the first wave). “Group 2003” and “Group 2004” are defined in the same way for the second and the third waves. “Bamako district” correspond to primary health centers located in the Bamako district.
2. The targeting population per centers correspond to the total population in the area divided by the number of primary health center.
3. “Number of curative consultations” is the average number of curative consultations which took place in the center per 1,000 persons. “Number of prenatal consultations” and “Number of assisted childbirth” are defined in the same way.

We observe strong variations between different districts in terms of activity. An evaluation of the information campaign cannot rely on a simple comparison of levels of activity of the centers after the campaign. However, while there was an expectation that the activity rate would be lower in the districts with the highest tetanus risk (as this risk can be due for instance to insufficient health care demand), we observe on the contrary a higher activity rate in the health districts of the first wave. This does not alter our identification strategy, as it relies on the less stringent assumption that these differences would be stable over time, in the absence of the program.

3.4 Identification Strategy

We evaluate the impact of the campaign on the activity of primary health care structures using a difference-in-difference estimator (for a description of this method, see for instance [Imbens and Wooldridge, 2009](#)). Identification is obtained by using the three different waves of the vaccination campaign against the Maternal and Neonatal Tetanus (MNT) which took place in Mali between 2002 and 2004. The standard difference-in-differences design can be summarized as follow. Let Y_{it} denotes the activity of a primary health care structure i at time t , and T_{it} the fact of having benefited from the campaign, i.e. the treatment. The primary health care structure i belongs to one of the three groups G_i , defined by the waves of the vaccination campaign.

The observed data are the triple (Y_i, G_i, T_i) . Using the potential outcome notation usual in the treatment effect literature, let Y^0 denote the outcome for primary health care structure i if this structure does not receive the treatment, and let Y_1 be the outcome for the same center if it does receive the treatment. Thus, if T_{it} is an indicator for the treatment for the center i at date t , the realized (observed) outcome for center i is

$$Y_{it} = T_{it}Y_{1t} + (1 - T_{it})Y_{0t} \quad (3.1)$$

Let us assume the following specification for the potential outcome without treatment :

$$Y_{0it} = e_i + e_t + X_{it} + u_{it} \quad (3.2)$$

The first coefficient, e_i , represents an individual fixed-effect. The second coefficient, e_t , represents the time-period effect. The third term X_{it} stands for observable characteristics of the structure (for instance staff). The fourth term, u_{it} , stands for unobservable characteristics of the individual. This term is assumed to be independent of the group indicator and to have the same distribution over time, i.e.,

$$u_{it} \perp T_{it} | e_t, e_i, X_i \quad (3.3)$$

and is normalized to have mean zero.

This decomposition means that if structures are different in terms of potential outcome, these differences are stable over time. Thus, the evolution of outcome in the untreated group is a correct counterfactual of the evolution of outcome in the treated group if it had not been treated.

On the assumption that the treatment effect is constant across individuals,⁹ we have this model for the realized (observed) outcome :

$$Y_{it} = T_{it}\delta + e_i + e_t + X_{it} + u_{it} \quad (3.4)$$

Under assumption 3.3, simple OLS gives a consistent estimate of the causal impact of the treatment T on the outcome Y . As least square standard errors could be biased in the presence of correlations within groups (Bertrand, Duflo, and Mullainathan, 2004), we use clustered standard-errors.

In order to measure the impact of the campaign on primary health care demand, our identification strategy is based on the fact that the campaign did not take place at the same time in all Malian health districts. We use this source of variation to create groups, according to the year (2002, 2003 or 2004).¹⁰ The validity of assumption 3.3 depends on the outcome of interest. In particular, caution is needed in using our design to evaluate the effectiveness of the campaign when it comes to reducing the prevalence of Tetanus. Health districts were not randomly assigned to treatment, but selected in view of the level of Tetanus risk in the region. The evolution of the Tetanus rate would probably not have been the same in each group without the vaccination campaign.

It is much less probable that the evolution of prenatal care and assisted child-birth rates would have been different within groups if the campaign had not taken

9. One can relax this assumption and state that the effect of the intervention might differ across individuals. Then estimation of (3.4) gives the average effect of the intervention on the treatment group.

10. We do not use the districts of the Bamako area. This area is indeed very specific and the evolution of health demand do not present similar evolution for the outcomes of interest (See Figure ?? in Appendix).

place. While it is impossible to determine what these counterfactual evolutions would have been, we can however check whether trends observed before the campaign were similar between groups. Before 2002, data are not available at the level of primary health care centers. We do, however, have aggregated data at the district level. Over the period 1999-2002, both assisted childbirth and prenatal care rates are upward trending for all groups (Tables 3.2 and 3.3). They range widely from one group to another, but these differences appear to be stable over time before the introduction of the campaign. By contrast, the magnitude of the change observed after the campaign is impressive. For instance, the difference between the average rate of assisted childbirths in the districts of the first wave and the average rate of assisted childbirths in the districts of the second wave (the fourth column of the Table 3.2) from 1999 to 2001 (meaning before the beginning of the campaign) do not vary by much more than 10%, around 5.5 percentage points. In 2002, these differences jump by more than 50% compared to previous years (from 5.5 to 8 percentage points) and are even higher in 2003. This suggests that the full impact of the information campaign information campaign is delayed by one year. This delay is more marked for districts of the second and third waves, as the campaign was spread over a longer period of time. The average rate of assisted childbirths is slightly higher in the third wave and the difference is stable from 1999 to 2003. In 2004, the rates increase faster in the districts of the second wave (which have benefited from the information campaign the year before) than in those of the third wave. The following year, as the latter have also benefited from the campaign, the gap goes back to its initial level.

TABLE 3.2 – Assisted childbirth rate by group, 1999-2007

	<i>Rate (in %)</i>			<i>Difference (in percentage points)</i>		
	Group 2002	Group 2003	Group 2004	2002 - 2003	2002 - 2004	2003 - 2004
	(1)	(2)	(3)	(1)-(2)	(1)-(3)	(2)-(3)
1999	12.9 (5.8)	7.4 (5.0)	9.2 (8.6)	5.5 (2.5)	3.7 (3.0)	-1.8 (2.3)
2000	15.1 (6.0)	9.3 (5.4)	10.9 (7.2)	5.9 (2.8)	4.2 (3.0)	-1.6 (2.0)
2001	15.9 (8.1)	10.2 (6.5)	12.1 (6.9)	5.6 (3.5)	3.8 (3.5)	-1.8 (2.1)
2002	18.8 (9.1)	10.3 (5.4)	11.8 (6.4)	8.4 (3.7)	7.0 (3.7)	-1.5 (1.8)
2003	23.6 (12.2)	11.7 (5.8)	13.4 (7.1)	11.9 (4.9)	10.2 (4.9)	-1.7 (1.9)
2004	21.6 (5.5)	13.1 (6.7)	12.9 (7.2)	8.2 (2.6)	8.7 (2.6)	0.5 (2.1)
2005	22.9 (10.9)	13.8 (6.8)	15.4 (6.8)	9.1 (4.5)	7.5 (4.4)	-1.6 (2.0)
2006	24.1 (7.9)	15.0 (7.2)	17.4 (8.4)	9.1 (4.0)	6.7 (2.3)	-2.4 (2.3)
2007	28.2 (5.8)	18.4 (5.7)	18.9 (8.6)	9.8 (2.7)	9.3 (2.1)	-0.5 (2.1)

Notes :

1. Average rates of assisted childbirth in percentages are presented by group for each year between 1999 and 2007. Standard errors are reported in parenthesis.
2. “Group 2002” corresponds to health centers where the campaign took place in 2002 (i.e. the first wave). “Group 2003” and “Group 2004” are defined in the same way.
3. “2002 - 2003” corresponds to the difference between Group 2002 and Group 2003.

The figures are qualitatively the same for the prenatal consultation rate. We observe however that in 1999 the average rate observed in the districts of the second wave was higher. The gap narrows slightly in the subsequent year. This relative change is smaller than the one observed after the beginning of the campaign in 2002. By contrast, trends are much more similar on average in districts of the second and third waves (See the last column of the Table 3.3).

TABLE 3.3 – Prenatal consultation rate by group, 1999-2007

	<i>Rate (in %)</i>			<i>Difference (in percentage points)</i>		
	Group 2002	Group 2003	Group 2004	2002 - 2003	2002 - 2004	2003 - 2004
	(1)	(2)	(3)	(1)-(2)	(1)-(3)	(2)-(3)
1999	25.4 (9.3)	13.6 (8.8)	19.3 (11.1)	11.7 (4.2)	6.0 (4.4)	-5.7 (3.2)
2000	24.8 (7.1)	15.7 (7.9)	21.3 (9.9)	6.5 (3.3)	3.5 (3.5)	-5.6 (3.3)
2001	26.4 (10.9)	18.2 (7.9)	24.2 (9.9)	8.2 (4.6)	2.3 (4.7)	-6.0 (2.3)
2002	37.6 (8.1)	18.8 (7.8)	24.0 (8.6)	18.8 (3.6)	13.7 (3.6)	-5.2 (2.4)
2003	41.0 (10.4)	23.0 (9.9)	28.0 (10.7)	18.0 (3.8)	13.0 (4.6)	-5.0 (3.1)
2004	40.6 (8.3)	27.1 (11.4)	29.4 (13.1)	13.5 (4.1)	13.1 (4.1)	-0.4 (3.5)
2005	45.0 (6.9)	29.3 (11.4)	33.1 (11.2)	15.7 (3.7)	11.9 (3.5)	-3.8 (3.4)
2006	38.9 (9.6)	33.4 (9.6)	31.8 (11.9)	5.5 (4.9)	7.1 (5.0)	1.5 (3.3)
2007	49.7 (14.5)	38.4 (7.6)	38.5 (10.9)	11.3 (6.3)	11.2 (6.4)	-0.1 (2.7)

Notes :

1. Average rates of prenatal consultation in percentages are presented by group for each year between 1999 and 2007. Standard errors are reported in parenthesis.
2. “Group 2002” corresponds to health centers where the campaign took place in 2002 (i.e. the first wave). “Group 2003” and “Group 2004” are defined in the same way.
3. “2002 - 2003” corresponds to the difference between Group 2002 and Group 2003.

This similar evolution in the period before the campaign reinforces the validity of our identification assumption. The evolution of our outcome of interest in a not yet treated group provides a credible estimator of the counterfactual outcome evolution in the treated group. The relative change according to group before and after the campaign can very likely be attributed to it. We will estimate the extent of this effect in the next section.

3.5 Results

Our results show a strong positive impact of the campaign on prenatal care and assisted childbirth rates. After the introduction of the program, we observe an increase of 31% in the prenatal care rate and 26% in the assisted childbirth rate (Table 3.4). These results are obtained by the fixed-effect specification provided in equation 3.2. In the model, the impact is measured from the year after the information campaign to take into account the fact that the campaign was spread over time (especially for the second and third waves). We compute cluster-robust standard errors by using the cluster-correlated Huber-White covariance matrix method.

TABLE 3.4 – Impact of the MNT campaign on health demand indicators (Fixed-Effect specification)

	Prenatal Care	Assisted Childbirths
Treatment	0.314*** (0.043)	0.258*** (0.049)
Year=[2003]	0.147*** (0.035)	0.118*** (0.038)
Year=[2004]	0.265*** (0.049)	0.202*** (0.053)
Year=[2005]	0.288*** (0.063)	0.162** (0.080)
Year=[2006]	0.224*** (0.069)	0.116 (0.080)
Year=[2007]	0.414*** (0.058)	0.435*** (0.070)
N. of GP	0.073* (0.040)	0.128** (0.052)
N. of qualified nurses	0.110*** (0.028)	0.064* (0.034)
N. of midwives	0.077 (0.072)	0.184** (0.080)
N. of nurses	0.042* (0.025)	0.102*** (0.033)
N. of matrons	0.007 (0.022)	0.084*** (0.026)
N. of managers	0.181*** (0.043)	0.265*** (0.059)
Intercept	-4.227*** (0.051)	-4.927*** (0.062)
R-squared	0.18	0.13
N of Obs.	4146	4185

Notes :

1. Dependant variables are the rates of prenatal care and assisted childbirth.
2. “Treatment” provides the impact of the campaign on outcomes.
3. We control by the number of health workers for each categories.
4. Each column corresponds to results obtained by the Fixed-Effect specification with robust clustered standard errors reported in parenthesis. * means 10%-significant, ** means 5%-significant and *** means 1%-significant.

Several robustness checks have been performed (Table 3.5). First, we use the fact that we dispose of three groups treated at different periods. Data available at the district level on the period before the vaccination campaign show that the rates of prenatal care and assisted childbirth evolve at a similar pace in the districts where it was carried out in 2003 compared to those where it was carried out in 2004, but differ slightly from the pace observed in the districts where it was carried out in 2002. When we exclude the latter districts, and thus compare districts from the 2003 and 2004 groups, we still obtain the result that the campaign did increase the prenatal care rate by 25% and the assisted childbirth rate by 17%. Other estimations using the treated groups one by one obtained similar results. We also use the Bamako districts, which have never been treated, as an additional control group. Whatever specification is taken, the estimated impact of the MNT campaign on assisted childbirth and the prenatal care ratio is positive and significant. We also restrict the estimation to the sub-period 2002-2005 (as the reference time period changed after 2005), or restrict the sample to the primary health centers present at the beginning of the campaign (as some health centers were created since then, see Table 3.7 in the appendix). Once again, the results appear positive and significant.

TABLE 3.5 – Robustness tests

	Prenatal Care	Assisted Childbirths
<i>Main results</i>	0.314*** (0.043)	0.258*** (0.049)
<i>Alternative control group</i>		
Group 2003 vs Group 2004	0.249*** (0.061)	0.174** (0.068)
Group 2002 vs Group 2003	0.333*** (0.060)	0.142** (0.059)
Group 2002 vs Group 2004	0.444*** (0.054)	0.446*** (0.065)
With Bamako District	0.411*** (0.043)	0.306*** (0.046)
<i>Before 2006</i>	0.254*** (0.048)	0.212*** (0.054)
<i>Balanced sample</i>	0.349*** (0.047)	0.291*** (0.054)

Notes :

1. Dependant variables are the rates of prenatal care and assisted childbirth.
2. “Treatment” provides the impact of the campaign on outcomes.
3. We control by the number of health workers for each categories.
4. “Before 2006” corresponds to results for the sub-period 2002-2005. “Balanced sample” corresponds to the sample of primary health centers present since the beginning of the campaign.
5. Each column corresponds results obtained by the Fixed-Effect specification with robust clustered standard errors reported in parenthesis. * means 10%-significant, ** means 5%-significant and *** means 1%-significant.

In order to measure potential mitigation effect over time, we use an alternative specification with a linear time trend :

$$Y_{it} = T_{it}\delta + T_{it} * (t - t_i)\delta_t + e_g + e_t + X_{it} + u_{it} \quad (3.5)$$

where t_i is the first year of the campaign for the district corresponding to the primary health center i . Results are presented in Table 3.5. We observe that the impact of the campaign on prenatal consultations rapidly decreases, while the impact on assisted childbirths is maintained over time. As emphasized by Buor (2003), the low level of demand for preventive and more especially pre- and postnatal care in African developing countries can be explained by a high opportunity cost (due to the distance to the health center for instance). Besides, the marginal benefits

associated with prenatal consultations are smaller and/or not directly perceived in comparison to those of assisted childbirth.

TABLE 3.6 – Temporal impact of the MNT campaign on health demand indicators (Fixed-Effect specification)

	Prenatal Care	Assisted Childbirths
Treatment	0.401*** (0.045)	0.274*** (0.053)
Treatment*time	-0.110*** (0.021)	-0.020 (0.027)
R-squared	0.07	0.19
N of Obs.	4408	4415

Notes :

1. Dependant variables are the rates of prenatal care and assisted childbirth.
2. The controls are the same as in equation (3.4).
3. “Treatment” provides the impact of the campaign on outcomes while “Treatment*time” corresponds to the results for the linear time trend.
4. Each column corresponds results obtained by the Fixed-Effect specification with robust clustered standard errors reported in parenthesis. * means 10%-significant, ** means 5%-significant and *** means 1%-significant.

3.6 Conclusion

In this paper, we evaluate the impact of a community-based national campaign on the care-seeking behavior of women in the areas of prenatal care and assisted childbirth.

We show that the information campaign added to the Tetanus immunization increases the level of demand for maternal care. The fact of being in an area benefiting from the program against MNT results in an estimated increase of 24% of the number of assisted childbirths, as a ratio to the global population in the area. The level of this variable was 0.012 in 2002 (see Table 3.1) : as the estimated level of pregnant women is on average 5%, the campaign results in an increase of 7 percentage points, from an initial level of 28%.

The similarity in the evolutions of the prenatal consultation and assisted childbirth rates prior to the introduction of the program would seem to prove the validity of our identification strategy. Moreover, our results are robust whatever the specification or control group we use and similar to those found by [Gennaro, Thyangatbyanga, Kersbbaumer, and Thompson \(2001\)](#). In a randomized experiment conducted in Malawi, they find that the provision of information on ante- and post-natal delivery care to women increases the use of services for delivery from 29% to 59%.

The findings reported in this paper have important implications. Increasing the uptake of primary health services in developing countries is considered an effective way to reduce the current high maternal and child mortality rates. Our results suggest that a community-based campaign involving the villagers and their opinion leaders as much as possible can be an efficient strategy for increasing the demand for skilled health care. Our results are in line with the previous medical literature in the development area and confirm the relevance of the orientations being taken by the international institutions.

Because of the extent of the effects produced by the campaign, our results call for a close look at the potential channels. Administrative data are clearly not well suited to this analysis. As the stakes are high and the potential impact suggested

by our results are substantial, we argue that it would be cost-effective to conduct field experiments in order to establish whether such a community-based intervention could be an effective strategy to change women's care-seeking behaviors and lead to a long-term improvement of child and maternal health in developing countries.

Appendix

TABLE 3.7 – Number of CSCOM by group

	Group 2002	Group 2003	Group 2004	Total
2002	149	475	371	995
2003	137	494	374	1,005
2004	151	464	391	1,006
2005	163	481	396	1,040
2006	158	515	404	1,077
2007	108	493	420	1,021

Sources : CROCEP database.

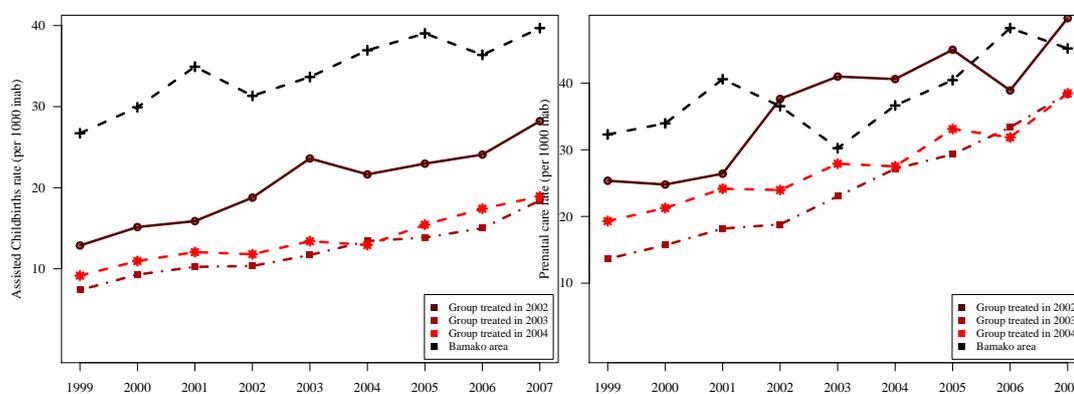


FIGURE 3.4 – Evolution of the assisted childbirths (left) and prenatal care (right) ratios in groups of the TCN campaign, 1999-2007

Organizational Change and Workers' Health : Lessons from the 2000 Reform in the French Energy Utilities ¹

Sommaire

4.1	Introduction	104
4.2	Institutional background	108
4.3	Data and descriptive statistics	112
4.3.1	The GAZEL database	112
4.3.2	Descriptive Statistics	112
4.4	Empirical approach	118
4.4.1	Identification strategy	118
4.4.2	Econometric model	122
4.5	Results	124
4.5.1	Impact on working conditions	124
4.5.2	Impact on health	124
4.6	Robustness checks	130
4.7	Conclusion	134

1. This chapter is largely based on common work with Roland Rathelot.

4.1 Introduction

Do organizational changes in firms have an impact on working conditions, and how do they affect workers' health status? As a result of technological progress, firms have to permanently update their organizational structure (Brynjolfsson and Hitt, 2000; Bresnahan, Brynjolfsson, and Hitt, 1999). If changes in working organization were to deteriorate workers' health, for instance by leading to an increasing number of illness or sick leave, this would constitute a negative externality supported by other actors than the firms. Measuring the magnitude of such effects is crucial for policy makers in order to be able to understand the cost in terms of social welfare of organizational cost. To our knowledge, this paper provides the first evaluation of the effects of organizational changes on workers' health status. We take advantage of the massive reform of the energy sector that started in France in 2000 and we use a unique individual panel dataset in which job description, working conditions and health are accurately reported.

The economic literature about intra-firm organizational changes has mostly focused on the impact on labor market developments (Bauer and Bender, 2004), on the demand for skilled labor (Caroli and Van Reenen, 2001) or on economic performance and productivity (Black and Lynch, 2001). Why would organizational change affect workers' health? The introduction of new forms of work organization has led to an increasing level of responsibility but also to a growing intensification of work pressure which could affect worker's health. The relationship between stressful working conditions and the possible development of pathologies was mainly analyzed with two theoretical frameworks aiming at measuring stress : the effort-reward imbalance model developed initially and tested by Siegrist (1996) and the demand-control-support model of Karasek (1979). In their study conducted in Belgium, Godin and Kittel (2004) underline the role of macroeconomic conditions which could, through an increase of psychosocial stress and instability, have negative effects on worker's health. Using the context of the 1997 financial crises in South Korea, Kim, Muntaner, Khang, Paek, and Cho (2006) show that the development of adverse working conditions caused by the introduction of labor market flexibility lead to an increase

of mental disorders among women. Several studies use sickness health as a proxy for health to evaluate the impact of the working environment. In her model based on the Shapiro and Stiglitz efficiency wage model, Ose (2005) finds a relationship between absence behavior and working conditions.

Understanding the relationship between changes in working conditions and workers' health is not without facing complex methodological problems (Gollac and Volkoff, 2006). First come the issues relating to endogeneity.² Work is correlated with many variables which impact also health such as education (Ross and Wu, 1995), income (Van Doorslaer, Wagstaff, Bleichrodt, Calonge, Gerdtham, Gerfin, Geurts, Gross, Häkkinen, Leu, et al., 1997; Mackenbach, Martikainen, Looman, Dalstra, Kunst, Lahelma, et al., 2005), economic status and lifestyle (Contoyannis and Jones, 2004). To account for individual observed and unobserved heterogeneity, one needs to rely on detailed individual, preferably longitudinal, data. Organizational changes can rarely be thought as exogenous, as they are often pulled by external factors (intensive competition, macroeconomic shocks...). A related literature uses plant closures as a quasi-experimental design in order to evaluate their impact on health outcomes. For example, in their paper, Hamilton, Broman, Hoffman, and Renner (1990) use the exogenous variation provided by the large-scale 1987 General Motors plant shutdowns. Kuhn, Lalive, and Zweimüller (2009) studies the impact of job loss after plant closing on public expenditures for health care.

Another difficulty of this kind of analysis is to correctly measure health. Because health is multidimensional (Fuchs, 2004) and because health data are ethically difficult to collect, most studies use subjective proxies as health, which are often endogenous and measured with error. In their literature review on the measurement of health, Strauss and Thomas (1998) underline that self-evaluations of health, which are the most used indicator, suffers from weaknesses. Respondents, who have traditionally to rate their health on a scale, do not necessarily have the same definition of what means "good health". Their responses reflect their perception of health status

2. See the related strand of literature measuring the impact of job displacement on health, attempting to account for the endogeneity of the displacement process. For instance, Browning, Moller Dano, and Heinesen (2006) find no effect of displacement on stress-related health outcomes.

which is correlated with values, beliefs and socioeconomic outcomes. These subjective self-assessments of mental and physical health status lead to a biased measure of the relationship between health and work (Dwyer and Mitchell, 1999; Butler, Burkhauser, Mitchell, and Pincus, 1987). Moreover, Chirikos and Nestel (1984) underline a phenomenon referred as “justification hypothesis” when workers tend to report bad health as a justification for an early retirement.

In this paper, we use the important changes in the European legislation on energy utilities as a source of exogenous variation in the organization of the state-owned electricity and gas utilities *EDF-GDF*. Since 2000, the organization of this firm has been deeply modified following the transposition of the European legislation that aimed at increasing competition in the energy market. The reform induced exogenous and asymmetric changes in working conditions in the firm : distribution services were externalized in other companies (*ErDF*, *GrDF*, *RTE* and *GRT*) while the production services remained in *EDF* and *GDF*. This exogenous shock provides a credible identification strategy to measure the effect of organization changes on working conditions and worker’s health status. We use difference-in-differences to identify the impact of the organizational change, comparing the department in charge of the distribution of gas and electricity versus the other departments of the firm, before and after 2000. We rely on an unique dataset, the GAZEL Cohort Study (INSERM, Paris), which contains precise information on several relevant dimensions. Workers’ job histories come from the personnel management dataset. Health status can be precisely measured by pathologies, the number of days in sick leaves and their medical motives. Working conditions are measured by a dedicated survey merged with the other data.

We find that the organizational changes brought about a significant deterioration of working conditions and workers’ health. Two aspects are especially worth of interest. The impact of organizational changes on health seems to be concentrated on the psychological dimension. Moreover, women are more affected than men by organizational changes.

The remainder of the paper is organized as follows. Section 2 provides back-

ground information on the reform and its consequences. Section 3 presents our data and provides some descriptive statistics. The empirical approach, identification strategy and estimation are discussed in section 4. Section 5 shows the main results, while robustness checks are presented in section 6. The final section concludes.

4.2 Institutional background

In the months following the end of the Second World War, the French government has supported the creation of a public vertically integrated monopoly in charge of operating the generation and the distribution of energy : *Électricité de France - Gaz de France (EDF-GDF)* (Serrallés, 2006). The company has remained mostly unchanged until the late nineties. Adopted in 1986, the Single European Act aimed at setting up an unified European Market, the electricity and gas sectors of members states of the European Union experienced major changes. As a consequence, two directives, adopted in 1996 and 2003, established common rules for a competitive electricity market. They were implemented in the French law from 2000 to 2004.³ Competition was gradually enforced. In 1999, entrants were allowed to contract with all industrial firms consuming more than 100 GWh/year. The threshold was decreased to 16 GWh/year in 2000, then to 7 GWh/year in 2003. All customers but residential ones could be served from 2004. Finally, the sector was totally open to competition in 2007.

If these reforms were aimed at increasing competition in the energy sector, the historical utility companies still hold most of the market. In its 2009 annual report, EDF reported that its main competitors held a 4% market share for the residential consumption and 13% for the non-residential one. The GDF Suez company, formed by the merger of the public company Gaz de France and the private society Suez in 2008, is included among competitors. The other mentioned competitors are ENDESA/SNET, Atel, HEW Energies, Poweo and Direct Energie. Direct Energie is one of the biggest competitors and has constituted a portfolio of only 500,000 clients since its creation in 2003. A government agency was created by the gouvernement in 2008 in order to increase competition in the energy market. Because the market share of competitors was so low, a set of measures was taken to establish a real competitive market. Our study mostly focuses on the 2000-2005 period, before

3. A first Directive (96/92/CE) was adopted the 19 December 1996 by the European Parliament and the Council; it was revoked by a second one (2003/54/CE) adopted the 26 June 2003. The Directives on the electricity market were transposed in the three legal acts in France : laws 2000-108 (10th of February 2001), 2003-108 (3th of January 2003) and 2004-804 (9th of August 2004).

competition became a real threat for EDF and GDF.

The reform implied that distributors are not bounded anymore with one unique supplier belonging to the same firm. Distributors have to be able to contract with all generators and to guarantee a non-discriminatory access to its network (Eising, 2002). The implementation of this principle was not possible without a deep restructuring of the electricity and gas monopoly firm. To ensure a fair competition, distribution activities were strictly separated from the vertically integrated company and operated by a legally separate entity. Independent management, accounting or decision-making process between the distributor and generators were implemented. This process is known as “unbundling” (Eising, 2002). If the distribution stage stays regulated, generators are now in competition (Kaserman and Mayo, 1991).

In the short run, the reform had deep consequences in the organization of *EDF-GDF*. First, the distribution departments, in charge of transporting electricity and gas from plants to customers, were separated from the other departments, to create new firms. In 2000, two firms were created to manage the transportation network from plants to local distribution networks : *RTE (Réseau de Transport d'Électricité)* for electricity and *GRT (Gaz Réseau Transport)* for gas. In 2004, two other firms were created, one in charge of ensuring electricity distribution activities (*EDF Réseau Distribution*) and the other responsible of the gas distribution network (*GDF Réseau Distribution*). In addition, a common service for the two new distributors was created (*EDF-GDF Distribution*). In 2008, the name of the two new entities was changed by *ErDF and GrDF*.

The decision-making process was radically changed in the distribution department (in their way to become the new entities). Starting from 102 centers spread over French territory, the management of the distribution services were gathered in 8 operational directions. While before the reform, most decisions (investment...) were made locally, the new management system drastically increase the physical distance between operators and managers. The new firm adopt a vertical logic instead of the former regional one. Anecdotal evidence also suggests that this transformation induced a significant share of workers to either accept to relocate or to change job, if

they chose to stay in the same location. Indeed, Table 4.1 reports the difference-in-differences (between the distribution and the other departments, before and after 2000, see *infra* for details) estimates of the organizational change on the individual probability to experience a profession change, a forced job change, or a voluntary job change. The results show that the organizational change had a positive impact on changing job, whether in a voluntary or a forced way, for women and changing profession on everyone.

TABLE 4.1 – Effect on job displacements

	(1) All	(2) Men	(3) Women
Profession change	0.017*** (0.004)	0.014** (0.006)	0.023*** (0.007)
Forced job change	0.004 (0.003)	-0.004 (0.004)	0.013** (0.005)
Voluntary job change	0.011*** (0.002)	0.004 (0.002)	0.022*** (0.004)

Notes :

1. “All” represents the sample of workers of the Distribution Department. We exclude retired people from the treated and the control groups. We present results separately for men (Column (2)) and women (Column (3)).
2. “Profession change” is a dummy variable which is equal to 1 if workers experience a profession change and 0 otherwise. “Forced job change” and “Voluntary job change” are defined in the same way.
3. Coefficients are obtained by the estimation of a 2SLS model. Standard errors are reported in parentheses. * means 10%-significant, ** means 5%-significant and *** means 1%-significant.

If the organization of the distribution department was transformed in the years following the reform, the other departments of EDF-GDF, mainly the department in charge of energy production, were not subject to immediate changes. Their administrative status changed, from a nationally-owned company to a private company. Later in the decade, in July 2008, GDF Suez SA was created by the merger of GDF and the private company Suez.

In the remainder of the paper, we consider that the reform of the French utilities lead to deep changes in the working conditions, environment and organization of individuals working in the distribution department, while the workers of the other

departments were relatively spared. Obviously, this is an approximation of the reality ; our difference-in-difference estimate is thus a lower bound of the impact of the organizational change.

4.3 Data and descriptive statistics

4.3.1 The GAZEL database

In this study, we use the GAZEL database. These data are collected by a research unit at *INSERM* (French National Institute for Health and Medical Research), in association with the utility firm *EDF-GDF*. The main goal was to develop a longitudinal dataset mainly oriented towards epidemiological research and health-related issues (Goldberg, Leclerc, Bonenfant, Chastang, Schmaus, Kaniewski, and Zins, 2007).

The dataset was created in 1989 and was initially composed by 20,624 voluntary workers who accepted to participate in the long-term health study. People are followed up each year by responding to a postal questionnaire, from 1989 to 2010. They contain information on personal characteristics, perceived working conditions and perceived health. The dataset was then merged with several files collected by the Occupational Health and Human Ressources departments of *EDF-GDF*. This second category of data provides information on working conditions, sick leave and pathologies.

The assets of this dataset are plenty. Beside being longitudinal, health status is measured by many variables : number and type of pathology, number of days spent in sick-leave associated with its medical motive, consumption of alcohol and tobacco. The dataset also contains classical perceived self-reported health status. Working conditions are also measured very precisely. Data extracted from the files of the firm describes accurately the working environment of each participants. Finally, each worker's career can be precisely tracked, including job title, department, compensation, etc., from the hiring year (or 1989) to the retiring, or exit, year (or 2010).

4.3.2 Descriptive Statistics

Descriptives statistics of the sample of 1997 are presented in the Table 4.2. Year 1997 is chosen as reference : this date is three years before the beginning of

the reform, ruling out anticipation effects. Column (1) shows the proportion of our variable for the distribution department and column (2) for the other departments. Socio-demographic, education, income (measured in 1989), as well the number of days of sick leave and the number of pathologies, by type, are reported in the Table 4.2.

TABLE 4.2 – Summary Statistics

Variables	(1) Distribution department	(2) Other departments
<i>Socio-demographic</i>		
Women	0.32	0.28
Married	0.82	0.82
Age	50.95	51.15
<i>Education</i>		
University, Higher education	0.09	0.20
Tech. : Bac+2 (BTS/DUT)	0.05	0.09
Bac : General	0.08	0.08
Bac-2 : Vocational (BEP)	0.23	0.22
Bac-2 : Vocational (CAP)	0.31	0.22
Lower Sec. Educ. Deg. (BEPC)	0.17	0.11
No diploma	0.05	0.04
Other	0.02	0.03
<i>Household income (in Francs, 1989)</i>		
Least than 5000	0.00	0.00
From 5000 to 6500	0.01	0.00
From 6500 to 7500	0.03	0.02
From 7500 to 9000	0.09	0.06
From 9000 to 10500	0.11	0.08
From 10500 to 13000	0.20	0.17
From 13000 to 17000	0.30	0.25
From 17000 to 25000	0.21	0.29
More than 25000	0.05	0.13
<i>Sick leave (1997)</i>		
Nb of sick leave	12.93	9.91
<i>Pathologies (1997)</i>		
Cardiovascular	0.48	0.46
Articular	1.15	1.06
Psychological	0.41	0.39
Digestive	0.27	0.26
Respiratory	0.26	0.27

Notes :

1. We present summary statistics by separating the Distribution department from the other departments. We use data from the GAZEL dataset (INSERM).
2. Socio-demographic characteristics, education and income are measured in 1989 whereas sick leave and pathologies are measured in 1997 before the introduction of the reform.
3. Reported in table are means.

The individuals of the sample are relatively old in both groups at the date of the reform ; their average age is 51 in 1997. This feature should be taken into account in the interpretation of the results. About 70% are male, most are married. The two groups mostly differ in terms of education and income. Workers of the distribution department are less education, holding less often a higher-education degree. Their income is also notably lower, which is likely to be correlated by the lower education. In terms of health outcomes, the number of pathologies is quite similar across groups, the main pathologies being articular, cardiovascular and psychological ones. Workers in the distribution department spend 3 more days in sick leave than the ones from the other departments (13 versus 10).

Figure 4.1 displays the evolution of the number of workers in both groups in our dataset. It shows the important attrition across time : some individuals may decide to stop taking part in the survey, but most attritions are due exit from the firm (and quasi exclusively from retiring). In 1997, there were still more than 15,000 individuals. In 2000, they year in which the organizational change starts to be enforced, less than 10,000 individuals are still employed. In 2005, the sample contains less than 4,000. For these reasons, we will stop interpreting the results after 2005.

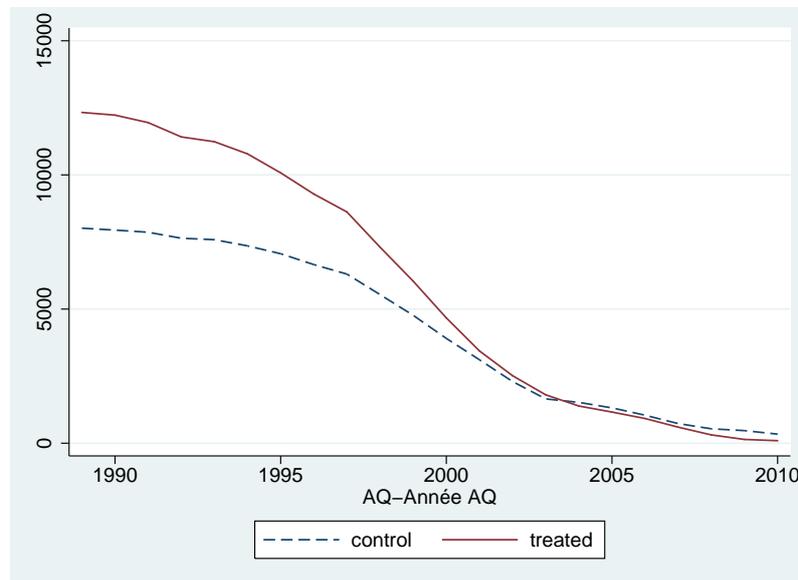


FIGURE 4.1 – Evolution of the number of workers in the distribution and production departments
Sources : GAZEL database (INSERM).

We now give a first glance at the evolution of the outcomes across groups. Figure 4.2 presents the share of people reporting at least 4 in a scale from 1 to 8 for what concerned their job satisfaction for both groups. We can see a discontinuity in the years following the implementation of the reform. The level of job satisfaction decreases in the treated group. Figure 4.3 presents the share of people who report at least 4 for what concerned their general health status in a scale from 1 to 8, 1 corresponding to “very good” and 8 “very bad”.

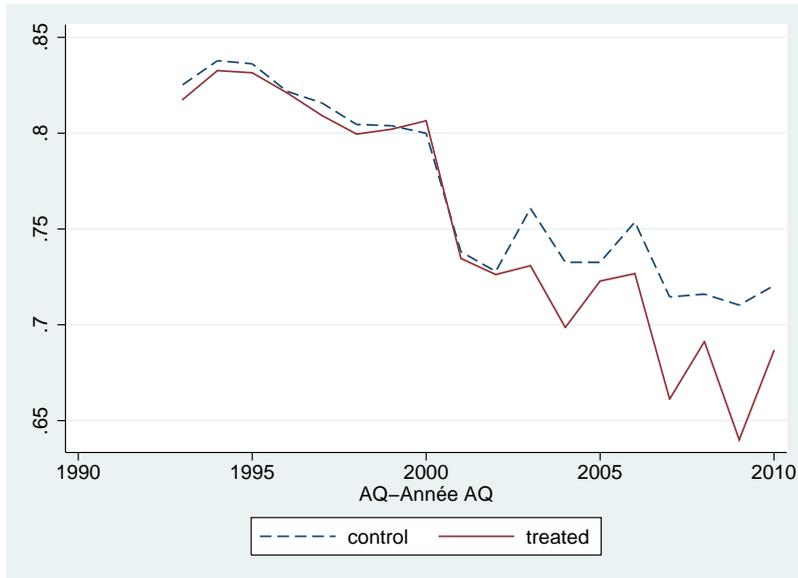


FIGURE 4.2 – Evolution of the job satisfaction
Sources : GAZEL database (INSERM).

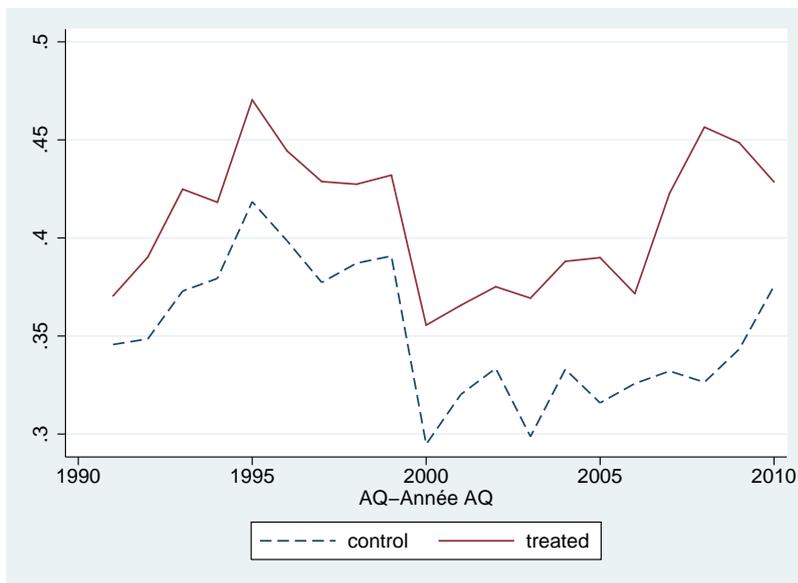


FIGURE 4.3 – Evolution of the perceived health status
Sources : GAZEL database (INSERM).

In Figures 4.4 and 4.5, we present respectively the evolution of the total number of pathologies and the number of psychological pathologies. We observe a significant

increase in the years following the reform for workers of the distribution department.

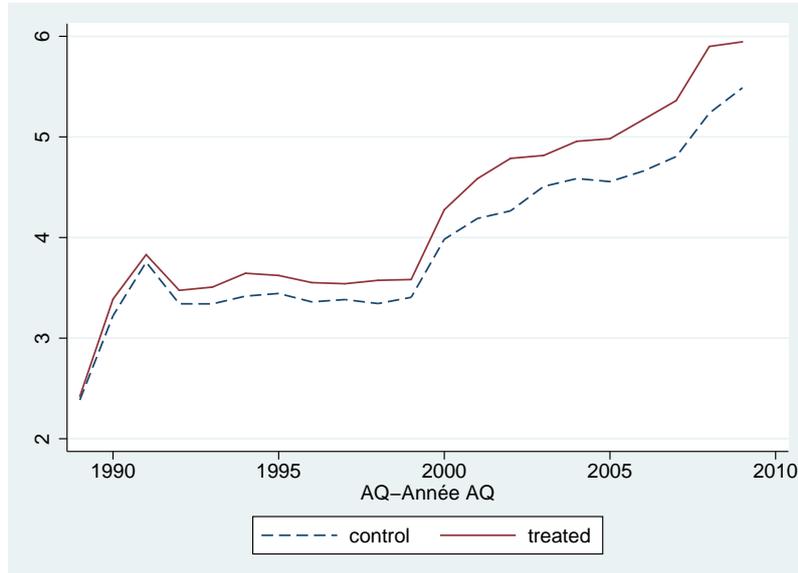


FIGURE 4.4 – Evolution of the number of pathologies
Sources : GAZEL database (INSERM).

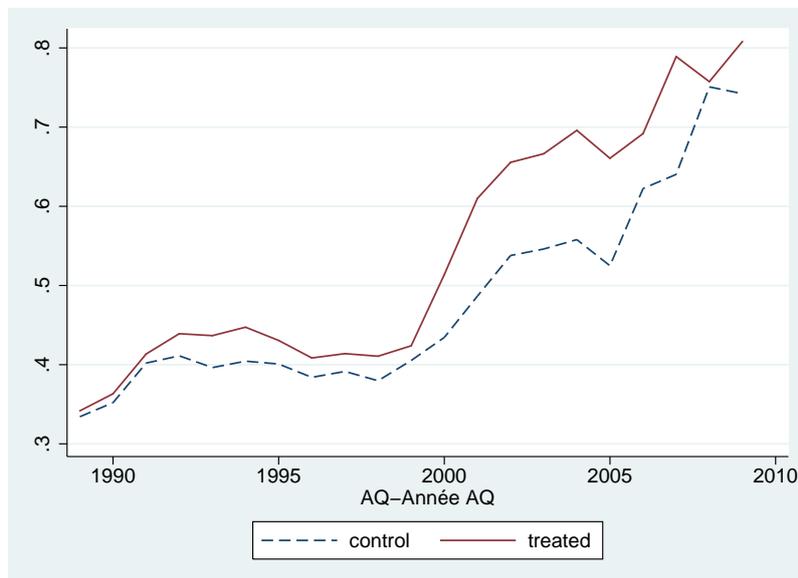


FIGURE 4.5 – Evolution of the number of psychological pathologies
Sources : GAZEL database (INSERM).

4.4 Empirical approach

4.4.1 Identification strategy

We take advantage of the reform to identify a causal effect of a substantial change in the organization of the firm on objective measures of working conditions and workers' health.

The idea is to compare the outcome within firm between the departments that have been externalized from EDF-GDF, namely the departments in charge of distribution services, and those who stayed within EDF-GDF, namely the departments in charges of production, transportation, administration or equipment.

To start with, assume that there are two periods $t \in \{0, 1\}$. At time $t = 0$, individuals belong to group $g \in \{A, B\}$. At time $t = 1$, individuals may belong to group $g \in \{A, B, R\}$. Individuals may therefore stay in their groups, switch, or retire (group R). The treatment is assumed to be assigned to individuals belonging to group A at time 1. However, because people may move endogenously between 0 and 1, there is a need to formalize the analysis before stating the identifying assumptions.

Consistently with the notations by [Rubin \(1974\)](#), $\Delta Y_g(s)$ denotes the time-difference, between period 0 and 1, of the potential outcomes for an individual who belongs to group g at time 0, if the treatment is $s \in \{0, 1\}$ in period 1.

Denote $DiD = \mathbb{E}[\Delta Y_A - \Delta Y_B]$ the quantity identified by the difference-in-differences estimator, if group are defined and fixed to what they are at period 1. DiD can be decomposed into three terms.⁴

$$\begin{aligned} DiD &= \mathbb{E}[\Delta Y_A(0) - \Delta Y_B(0)] \\ &\quad + p_{AA}ATT_{AA} - p_{BA}ATT_{BA} \\ &\quad + p_{AR}ATT_{AR}^R - p_{BR}ATT_{BR}^R \end{aligned}$$

with $p_{g_1g_2}$, with $g_1 \in \{A, B\}$ and $g_2 \in \{A, B, R\}$, the probability to move to g_2 in

4. This decomposition is inspired from the one derived by [de Chaisemartin \(2012\)](#).

period 1 conditional on being in g_1 in period 0, ATT_{g_1A} the average treatment effect on people belonging to g_1 in period 0 and A in period 1, $ATT_{g_1R}^R$ the effect of retiring conditional on being in g_1 in period 0 and retiring in period 1. The quantities of interest, in this paper, are ATT_{g_1A} .

If we assume that :

1. $\mathbb{E}[\Delta Y_A(0)] = \mathbb{E}[\Delta Y_B(0)]$
2. Average treatment effects on the treated are homogenous : $ATT_{AA} = ATT_{BA} = ATT$,
3. Probabilities to retire are identical across groups and unaffected by the treatment $p_{AR} = p_{BR}$,
4. Effects of retiring are identical whatever the group you come from $ATT_{AR} = ATT_{BR}$,

then

$$ATT = \frac{DiD}{p_{AA} - p_{BA}}$$

Assumption 1 is the standard difference-in-differences assumption applied in the panel case. It states that the evolution of the outcome of people belonging, in period 0, in A and B , would have the same in the absence of treatment. While it is strictly speaking impossible to check whether this assumption holds, the graphical elements we provide suggest that outcomes were indeed evolving in a strikingly parallel way before treatment.

Assumption 2 is not possible to check. If one believes that individuals self-select themselves into treatment, it is possible that movers may less suffer from the treatment than stayers. Because the probability of movers is small, this difference is likely to be also small. In the Robustness section, we show that relaxing this assumption results in giving up point identification. Bounds can still be computed and be quite informative given the small size of p_{BA} .

Assumption 3 is easier to check. Figure 4.6 and Table 4.3 show that the behavior of retiring is not affected by the group the individual belongs to.

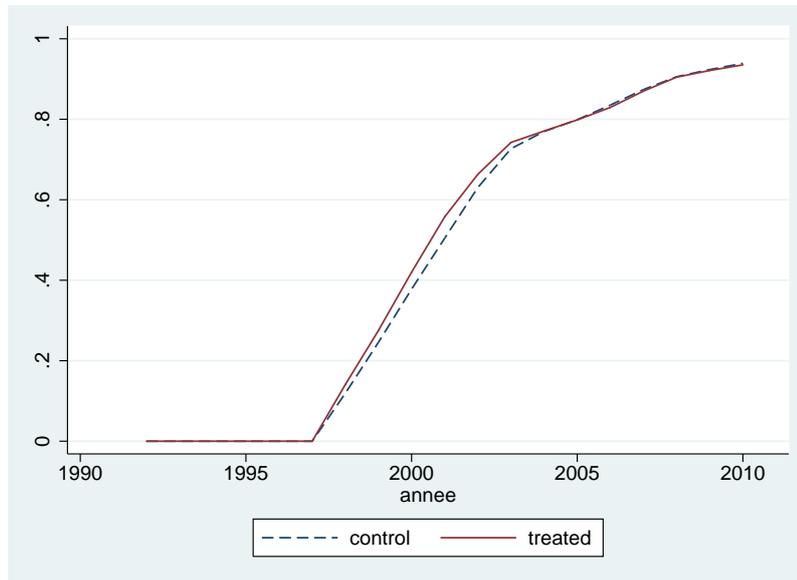


FIGURE 4.6 – Evolution of the probability of retirement in both groups
Sources : GAZEL database (INSERM).

TABLE 4.3 – Impact of the reform on retirement decision

	(1)	(2)
Treatment	-0.050*** (0.011)	0.005 (0.011)
Margins effect	-0.232 (0.052)	0.021 (0.052)

Notes :

1. We consider the entire sample. The dependant variable corresponds to the number of years between 1997 and the retirement year.
2. Coefficients are obtained by the estimation of a negative binomial regression model. We report the impact of treatment and margins effects. Standard errors are reported in parentheses. * means 10%-significant, ** means 5%-significant and *** means 1%-significant.
3. Column (1) corresponds to a specification without controls. In Column (2), we control by age, sexe, education, familial situation, number of children and by the department measured in 1997.

Last, it is also possible to check Assumption 4 because we have data on retirees in this dataset. Table 4.4 presents the impact of retirement on pathologies by comparing treated and control groups. These results confirm that health while retired does not heavily depend on the group to which one belonged before retiring.

TABLE 4.4 – Impact of retirement on pathologies

	(1) All	(2) Men	(3) Women
<i>By categories of pathologies</i>			
Genito-urinary	-0.014 (0.010)	-0.007 (0.010)	-0.094*** (0.035)
Respiratory	0.007 (0.009)	0.014 (0.010)	-0.025 (0.023)
Cancer	0.003 (0.003)	0.002 (0.003)	0.009 (0.006)
Eye trouble	-0.004 (0.005)	-0.002 (0.006)	-0.011 (0.016)
Skin	0.011* (0.006)	0.010 (0.007)	0.019 (0.014)
Psychological	0.004 (0.011)	0.004 (0.011)	-0.009 (0.034)
Endocrinal	0.000 (0.013)	0.006 (0.014)	-0.009 (0.032)
Digestive	0.018 (0.014)	0.033** (0.015)	-0.067 (0.042)
Cardiovascular	-0.014 (0.016)	-0.012 (0.017)	-0.028 (0.047)
Articular	-0.040 (0.028)	-0.041 (0.029)	-0.056 (0.079)

Notes :

1. “All” represents the sample of workers of the Distribution department. We present results separately for men (Column (2)) and women (Column (3)).
2. Dependant variables are the number of pathologies by categories. For example, “Genito-urinary” corresponds to the number of genito-urinary pathologies declared by workers.
3. Coefficients are obtained by the estimation of a 2SLS model. Standard errors are reported in parentheses. * means 10%-significant, ** means 5%-significant and *** means 1%-significant.

4.4.2 Econometric model

The preceding analysis provides conditions under a Wald estimator of the average treatment effect on the treated can be derived from a set of identifying assumptions. When more than two period are considered and covariates are added in the analysis, the estimator translates into an IV estimator, where belonging to the treated group at the dates in which the treatment takes place is instrumented by belonging to the treatment before it takes place interacted with the dates in which the treatment takes place.

The treatment is defined as belonging to the distribution department, denoted as d , after 2000 :

$$T_{it} = \mathbf{1}\{g_{it} = d, t \geq 2000\} \quad (4.1)$$

where g_{it} is the department to which individual i belongs in year t .

The outcome Y_{it} of individual in year t is assumed to depend on individual characteristics X , time t , department g , as well as the treatment variable.

$$Y_{it} = X_{it}\beta + \delta_{g_{it}} + \delta_t + \alpha T_{it} + \varepsilon_{it} \quad (4.2)$$

As assignment to treatment can potentially be correlated with unobserved characteristics of the individual, one can consider the reduced-form version.

$$Y_{it} = X_{it}\beta + \delta_{g_{is}} + \delta_t + \alpha_Z Z_{it} + \varepsilon_{it} \quad (4.3)$$

where s is a date prior to the treatment at which there were possible self-selection into the treatment. In the main analysis, we take $s = 1997$, in order to prevent anticipation effects to contaminate the results. In the robustness section, we study the robustness of the results to the choice of this date. We choose 1999 and find the same results.

$$Z_{it} = \mathbb{1}\{g_{is} = d, t \geq 2000\} \quad (4.4)$$

Under the identifying assumptions stated above, Z is orthogonal to the error term. An OLS regression thus consistently estimates α_Z . Instrumenting T by Z leads to the estimation of α , the causal impact of the treatment on the treated.

4.5 Results

4.5.1 Impact on working conditions

We first look at the impact of the reform on various working-conditions indicators (Table 4.5). We present results for our sample and for men and women separately. There is a significant impact on all indicators but stand-by duty on the overall sample. The organizational change led to a deterioration of the working conditions in many dimensions : sound intensity and insalubrity of the workplace, increased distance between workplace and home, more hours constraints (stand-by duty and three-shift work).

TABLE 4.5 – Working conditions

	(1) All	(2) Men	(3) Women
Sound Intensity	0.133*** (0.042)	0.079 (0.053)	0.185*** (0.060)
Insalubrity	0.056*** (0.011)	0.070*** (0.015)	0.014 (0.013)
Stand-by duty	0.047 (0.037)	0.058 (0.056)	0.037*** (0.012)
Three-shift work	0.025*** (0.010)	0.031** (0.014)	0.002 (0.003)
Distance to work	3.762*** (0.780)	2.669*** (0.955)	5.200*** (1.297)

Notes :

1. “All” represents the sample of workers of the Distribution department. We present results separately for men (Column (2)) and women (Column (3)).
2. “Sound intensity” is a dummy variable which is equal to 1 if workers are exposed to sound intensity and 0 otherwise. Others dependant variables are defined in the same way.
3. Coefficients are obtained by the estimation of a 2SLS model. Standard errors are reported in parentheses. * means 10%-significant, ** means 5%-significant and *** means 1%-significant.

4.5.2 Impact on health

Table 4.6 presents first the impact of the treatment on the average number of days spent in sick leave. We note a positive and significant impact of the reform. We also focus of the motives of sick leave by studying the impact for each categories

of diseases and for the most reported motives (more than 2,000 days). We observe no significant impact of the treatment on the average number of sick leave reported for the global sample and for women. Yet, the impact appears to be negative for men.

Going into more detail, we find a positive impact of the reform on sick leave for psychological diseases. Our analysis by gender shows that this effect is mainly driven by women. Women are two days more absent in the treated group than in the control group. This effect is confirmed by the analysis of the most reported motives of sick leave. We observe a significant and positive impact of the reform on the number of days in sick leave for depression, entirely due to women.

TABLE 4.6 – Sick leave

	(1) All	(2) Men	(3) Women
Days in sick leave	-0.240 (0.904)	-1.912** (0.933)	1.011 (1.677)
<i>By categories of diseases</i>			
Bacterial and virus diseases	0.003 (0.069)	0.012 (0.040)	-0.039 (0.148)
Circulatory diseases	-0.339 (0.245)	-0.559 (0.402)	0.050 (0.246)
Digestive diseases	-0.071 (0.118)	-0.140 (0.123)	-0.046 (0.197)
Genital diseases	0.022 (0.062)	0.104 (0.065)	-0.110 (0.130)
Articular diseases	-0.605* (0.346)	-0.214 (0.335)	-1.211* (0.683)
Skin diseases	-0.052* (0.031)	-0.040* (0.024)	-0.082 (0.068)
Psychological diseases	1.196** (0.481)	0.221 (0.422)	2.089** (0.951)
Blood diseases	-0.003 (0.009)	0.016 (0.013)	-0.035* (0.021)
Respiratory diseases	-0.135 (0.125)	-0.146 (0.117)	-0.214 (0.252)
Traumatology	-0.184 (0.261)	-0.415 (0.328)	0.160 (0.435)
Urinary diseases	-0.026 (0.082)	-0.107 (0.095)	0.053 (0.149)
<i>For the most reported motives</i>			
Flu	-0.042 (0.037)	-0.044 (0.036)	-0.060 (0.076)
Rachis complaint	-0.056 (0.100)	0.042 (0.095)	-0.216 (0.206)
Upper airway complaints	0.065 (0.061)	0.028 (0.057)	0.081 (0.122)
Sciatica	-0.133 (0.147)	-0.009 (0.183)	-0.201 (0.258)
Intestinal complaints	0.059 (0.068)	0.046 (0.062)	0.060 (0.118)
Domestic accident	0.034 (0.140)	-0.177 (0.165)	0.358 (0.246)
Depression	0.877*** (0.258)	0.361 (0.247)	1.287*** (0.472)

Notes :

1. "All" represents the sample of workers of the Distribution department. We present results separately for men (Column (2)) and women (Column (3)).
2. Dependant variables are the total number of days in sick leave, by categories of diseases and for the most reported motives. For example, "Bacterial and virus diseases" corresponds to the number of days in sick leave reported for bacterial or virus diseases.
3. Coefficients are obtained by the estimation of a 2SLS model. Standard errors are reported in parentheses. * means 10%-significant, ** means 5%-significant and *** means 1%-significant.

The impact of the organizational change on the number of pathologies is reported in Table 4.7. We show the impact on the total number of pathologies as well as results decomposed by type, for the most reported pathologies. We observe a positive and significant impact of the reform on psychological, cardiovascular and articular diseases. For these two last categories, the impact is mostly due to women. We find an effect on categories of pathologies which are related to working conditions, as hinted by [Coutrot and Wolff \(2005\)](#). We go more into detail by analyzing the impact of the treatment on the most reported pathologies. We observe a positive and significant impact for anxiety and stress, nervous breakdown, lower back pain, articular and muscular pain and arthrosis and rheumatism.

TABLE 4.7 – Pathologies

	Sample	Men	Women
<i>By categories of pathologies</i>			
Genito-urinary	0.007 (0.018)	-0.021 (0.015)	0.020 (0.035)
Respiratory	-0.043*** (0.015)	-0.045** (0.018)	-0.036 (0.026)
Cancer	0.003 (0.003)	-0.003 (0.003)	0.010** (0.005)
Eye trouble	0.005 (0.008)	0.009 (0.008)	-0.007 (0.014)
Skin	0.005 (0.011)	-0.001 (0.013)	0.014 (0.018)
Psychological	0.049** (0.022)	0.012 (0.022)	0.023 (0.039)
Endocrinal	0.009 (0.016)	0.005 (0.019)	0.011 (0.027)
Digestive	0.020 (0.024)	0.014 (0.026)	0.002 (0.043)
Cardiovascular	0.050** (0.024)	-0.007 (0.027)	0.099** (0.041)
Articular	0.088** (0.042)	0.011 (0.044)	0.165** (0.075)
<i>For the most reported pathologies</i>			
Anxiety, stress	0.043*** (0.012)	0.008 (0.012)	0.036 (0.022)
Nervous breakdown	0.007* (0.004)	-0.005 (0.004)	0.014* (0.008)
Lower back pain	0.048*** (0.014)	0.049*** (0.017)	0.048** (0.023)
Middle back pain	0.002 (0.009)	0.000 (0.009)	0.007 (0.016)
Articular or muscular pain	0.036*** (0.013)	0.039*** (0.015)	0.022 (0.022)
Sleeping troubles	0.023* (0.013)	0.020 (0.014)	-0.000 (0.022)
Arthrosis, rheumatism	0.034*** (0.012)	0.004 (0.012)	0.052** (0.021)
Eczema	0.007 (0.008)	-0.005 (0.009)	0.016 (0.014)
Migraine	0.000 (0.012)	0.005 (0.012)	-0.005 (0.021)

Notes :

1. "All" represents the sample of workers of the Distribution department. We present results separately for men (Column (2)) and women (Column (3)).
2. Dependant variables are the number of pathologies reported by categories of pathologies and for the most reported pathologies. For example, "Genito-urinary" corresponds to the number of genito-urinary pathologies declared by workers.
3. Coefficients are obtained by the estimation of a 2SLS model. Standard errors are reported in parentheses. * means 10%-significant, ** means 5%-significant and *** means 1%-significant.

Table 4.8 presents the impact on perceived health status. The positive impact of the treatment of the indicator means that treated individuals are more likely to report being in bad health condition. Although we are less confident in this self-evaluated measure of health, this last result is in line with the previous ones.

TABLE 4.8 – Perceived health

	(1) All	(2) Men	(3) Women
General health	0.045 (0.035)	-0.041 (0.041)	0.102* (0.058)
Mental health	0.095* (0.050)	0.017 (0.058)	0.073 (0.083)
Physical health	0.078* (0.046)	-0.005 (0.054)	0.140* (0.076)

Notes :

1. “All” represents the sample of workers of the Distribution department. We present results separately for men (Column (2)) and women (Column (3)).
2. “General health” corresponds to a score given by workers to rate their general health status in a scale from 1 to 8, 1 corresponding to “very good” and 8 “very bad”. “Mental health” and “Physical health” are defined in the same way.
3. Coefficients are obtained by the estimation of a 2SLS model. Standard errors are reported in parentheses. * means 10%-significant, ** means 5%-significant and *** means 1%-significant.

The previous findings show that the impact of organizational change on health can be sizeable. Besides, organizational changes mostly affect women. How can this gender difference be explained? According to [Paringer \(1983\)](#), women perceive and treat illness earlier than men. This is consistent with the fact that women tend to invest more in their health capital, leading to high life expectancy ([Grossman, 1972a](#)). Other studies show that women are sicker, report more conditions and have higher rates of use of health facilities than men ([Wilensky and Cafferata, 1983](#)).

Finally, we measure the impact of the reform on the number of days of hospitalization (See Table 4.11 in Appendix). We do not find any impact of the treatment.

4.6 Robustness checks

In this section, two placebo reforms are proposed to back the reliance of our results. We build two false reforms : the first one keeping the same department as treated but changing the treated time window, the second changing the treated group.

First, we conduct a placebo test in which we evaluate the impact of a fictive reform that would take place in 1994. We choose 1994 to overcome potential anticipation effects. We select only the pre-treatment period (1989-1997). Because some pathologies were detected only since 1994, we could not present results for all of them.

Results on pathologies are reported in Table 4.9. Except for sleeping troubles, we find no impact of the fictive reform on our main outcomes of interest.

TABLE 4.9 – Impact of a fictive reform

	Sample	Men	Women
<i>By categories of pathologies</i>			
Genito-urinary	-0.007 (0.006)	-0.004 (0.005)	-0.012 (0.017)
Respiratory	0.000 (0.007)	-0.003 (0.008)	0.007 (0.014)
Cancer	-0.001 (0.001)	-0.001 (0.001)	-0.002 (0.003)
Eye trouble	0.005 (0.003)	0.005 (0.003)	0.001 (0.006)
Skin	0.006 (0.005)	0.006 (0.006)	0.007 (0.011)
Psychological	0.005 (0.008)	0.012 (0.009)	-0.013 (0.019)
Endocrinal	-0.001 (0.006)	0.004 (0.008)	-0.014 (0.010)
Digestive	0.001 (0.008)	-0.001 (0.009)	-0.001 (0.016)
Cardiovascular	-0.001 (0.009)	-0.008 (0.011)	0.020 (0.019)
Articular	0.016 (0.015)	0.010 (0.016)	0.028 (0.032)
<i>For the most reported pathologies</i>			
Middle back pain	0.005 (0.005)	0.006 (0.005)	0.001 (0.011)
Sleeping troubles	0.010* (0.006)	0.012* (0.007)	0.005 (0.013)
Eczema	0.002 (0.004)	0.003 (0.004)	-0.000 (0.008)
Migraine	0.000 (0.006)	-0.000 (0.006)	0.001 (0.012)

Notes :

1. “All” represents the sample of workers of the Distribution department. We present results separately for men (Column (2)) and women (Column (3)).
2. Dependant variables are the number of pathologies reported by categories of pathologies and for the most reported pathologies. For example, “Genito-urinary” corresponds to the number of genito-urinary pathologies declared by workers.
3. Coefficients are obtained by the estimation of a 2SLS model. Standard errors are reported in parentheses. * means 10%-significant, ** means 5%-significant and *** means 1%-significant.

Secondly, we evaluate the impact of a reform which would take place for another group. We choose to apply a fictive reform for worker’s in the equipment department. We exclude the treated group from the regression. Results are presented in 4.10. We find no significant impact of the reform excepted a negative one on genito-urinary diseases for men and on sleeping troubles.

TABLE 4.10 – Impact on a fictive group

	Sample	Men	Women
<i>By categories of pathologies</i>			
Genito-urinary	-0.076 (0.051)	-0.060** (0.030)	-0.080 (0.100)
Respiratory	0.003 (0.041)	0.003 (0.045)	0.010 (0.069)
Cancer	0.006 (0.009)	0.009 (0.015)	0.004 (0.011)
Eye trouble	-0.024 (0.016)	-0.007 (0.021)	-0.040* (0.022)
Skin	0.038 (0.031)	0.032 (0.040)	0.051 (0.050)
Psychological	-0.076 (0.051)	-0.066 (0.055)	-0.069 (0.089)
Endocrinal	0.034 (0.042)	0.068 (0.054)	-0.008 (0.068)
Digestive	-0.054 (0.065)	-0.080 (0.056)	-0.029 (0.122)
Cardiovascular	0.003 (0.062)	-0.010 (0.068)	0.039 (0.105)
Articular	0.006 (0.107)	0.102 (0.119)	-0.060 (0.180)
<i>For the most reported pathologies</i>			
Anxiety, stress	-0.015 (0.032)	-0.021 (0.029)	-0.006 (0.059)
Nerveuse breakdown	-0.001 (0.011)	0.012 (0.018)	-0.016 (0.013)
Lower back pain	-0.002 (0.037)	0.036 (0.049)	-0.040 (0.056)
Middle back pain	-0.000 (0.022)	0.037 (0.026)	-0.038 (0.038)
Articular or muscular pain	-0.054* (0.031)	-0.059* (0.034)	-0.046 (0.053)
Sleeping troubles	-0.074** (0.030)	-0.071** (0.029)	-0.068 (0.054)
Arthrosis, rheumatism	-0.007 (0.030)	-0.036 (0.028)	0.034 (0.055)
Eczema	0.017 (0.022)	0.014 (0.026)	0.024 (0.036)
Migraine	-0.030 (0.027)	0.009 (0.034)	-0.044 (0.041)

Notes :

1. “All” represents the sample of workers of the Distribution department. We present results separately for men (Column (2)) and women (Column (3)).
2. Dependant variables are the number of pathologies reported by categories of pathologies and for the most reported pathologies. For example, “Genito-urinary” corresponds to the number of genito-urinary pathologies declared by workers.
3. Coefficients are obtained by the estimation of a 2SLS model. Standard errors are reported in parentheses. * means 10%-significant, ** means 5%-significant and *** means 1%-significant.

The results of these placebo tests tend to support our identification assumptions and the robustness of our previous results.

4.7 Conclusion

In this paper, we provide evidence that the reform of the French energy utilities sector affected the working environment as well as workers' health outcomes. It led to a deterioration in working conditions by increasing, in particular, the level of sound intensity, insalubrity and the distance to work. Workers' health status was also affected by the organization change. In particular, we provide evidence of an increase of psychological disorders among women. They are two days more absent for psychological motives and the number of absence for depression increases. We find also a positive impact on pathologies related to work. The number of cardiovascular, articular and psychological pathologies significantly increases in the treated group after the reform. If women are more affected by the organizational change than, men tend to report more lower back pain and articular and muscular pain among men.

Taking advantage of a reliable dataset and a credibly exogenous reform, the internal validity of our results seems to be granted. However, one could raise question about the external validity of our findings. There is no evidence that our sample is representative of workers who are likely to suffer from organizational changes : most were old at the time of the reform and have been working in the firm for several decades. One could argue that these workers are more vulnerable to organizational changes.

We have evidenced that organizational changes generate substantial damages to workers' health. The mechanisms of the identified impact should be further investigated.

Appendix

TABLE 4.11 – Impact on hospitalizations

	All	Men	Women
Number of days	-0.163 (0.104)	-0.197 (0.136)	-0.175 (0.173)
<i>By motives</i>			
Depression	0.046 (0.066)	0.044 (0.054)	0.076 (0.117)
Cancer	-0.138* (0.080)	-0.101 (0.113)	-0.079 (0.108)
Cerebrovascular accident	-0.096* (0.057)	-0.112* (0.066)	-0.094 (0.096)
Myocardial infraction	0.121 (0.077)	0.113 (0.096)	0.040 (0.097)

Notes :

1. “All” represents the sample of workers of the Distribution department. We present results separately for men (Column (2)) and women (Column (3)).
2. Dependant variables are the total number of days of hospitalization (“Number of days”) and number of days reported by motives. For example, “Cancer” corresponds to the number of days of hospitalization for cancer.
3. Coefficients are obtained by the estimation of a 2SLS model. Standard errors are reported in parentheses. * means 10%-significant, ** means 5%-significant and *** means 1%-significant.

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Trois essais empiriques en économie de la santé

Résumé : Cette thèse a pour objectif principal de parvenir à mieux comprendre les facteurs influençant l'état de santé des individus en s'intéressant aux déterminants de la demande de santé mais aussi aux possibles sources d'altération de cette dernière. Elle est composée de trois chapitres. Le Chapitre 2 vise à acquérir une meilleure compréhension des déterminants de la demande de prévention chez les personnes retraitées. Si l'offre proposée par la Caisse Nationale d'Assurance Vieillesse (CNAV) s'est largement diversifiée au cours des dernières années, la demande pour ces prestations reste très faible. Par la mise en place d'une évaluation randomisée dont chacun des traitements vise à activer un levier potentiel de la demande, il s'agit de déterminer la nature des freins à l'adoption de mesures préventives. Nous montrons que donner de l'information sur les risques s'avèrent être une politique efficace. Le Chapitre 3 a pour objectif d'évaluer l'impact d'une campagne d'information sur le recours aux soins de santé primaires au Mali. Ne pouvant avoir lieu dans tous les districts sanitaires au même moment pour des raisons logistiques, la campagne a été conduite en trois vagues. Nous exploitons ces variations temporelles exogènes pour évaluer l'effet de cette campagne sur la demande de soins. Nous montrons que donner de l'information a conduit à une large augmentation du recours aux consultations prénatales et aux accouchements assistés. Le Chapitre 4 montre que l'environnement de travail peut également avoir de lourdes conséquences sur l'état de santé, notamment psychologique, des individus. Les difficultés d'identification liées aux problèmes d'endogénéité sont surmontées par l'exploitation du caractère exogène des directives européennes visant à réformer le secteur énergétique français. En utilisant des données de panel sur les salariés d'EDF-GDF, nous montrons que les changements organisationnels entraînés par la réforme ont provoqué une importante détérioration de la santé des travailleurs concernés.

Mots clés :

Demande de santé, non-recours, changements organisationnels, évaluation randomisée, différence-de-différence, expérience naturelle

Three Essays in Empirical Health Economics

Abstract : This dissertation aims at better understanding the determinants of individual health status. It focuses both on determinants of health investments and external factors impacting directly the health status. The dissertation is divided into three chapters. Chapter 2 focuses on determinants of the demand for prevention among elderly. During last years, the Retirement Insurance has increased prevention supply, in particular for housing adaptation but the take-up for the program still remains very low. We implement a large field experiment with several incentives in order to determine the nature of demand-side barriers for prevention. We provide evidence that providing information is the main fruitful policy avenue. Chapter 3 evaluates the impact of an information campaign on health demand in Mali. The campaign did not take place in all Malian health districts at the same time and was therefore realized in three waves. We exploit these temporal exogenous variations in order to evaluate the impact of the campaign on health demand. We find that providing information has a strong impact on assisted childbirth and prenatal care rates. Chapter 4 points out that the working environment could lead to large consequences on the health status, in particular on the psychological dimension. We overcome methodological problems linked to endogeneity issues by exploiting the exogenous change of the European legislation that aimed at increasing competition in the energy market. We use unique panel data on workers and provide evidence that organizational changes caused a deterioration of the workers' health outcomes.

Keywords :

Health demand, non take-up, organizational changes, randomized experiment, difference in difference, naturel experiment
