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Résumé

Cette thèse apporte un éclairage quand à certains aspects de la nature des interactions entre employeurs et employés au sein de l'entreprise, entreprend d'analyser les décisions de chaque agent économique et de mettre en valeur le rôle des ressources humaines. Elle traite différentes problématiques liées à l'environnement de travail dans les entreprises, et est constituée de quatre travaux de microéconométrie appliquée.

Le premier chapitre traite de la dynamique de l'échange d'aide entre les salariés, en particulier les réseaux d'aide informelle, qui est la part d'aide non anticipée par l'entreprise. Il analyse ses déterminants et son effet sur les salaires et l'effort productif des salariés. Les résultats montrent que offrir de l'aide intensifie le niveau d'effort, et en recevoir a un impact positif sur le salaire. Cela met en évidence le rôle de la réciprocité dans l'échange d'aide informelle mais aussi l'existence de comportements de free-riding.

Le deuxième chapitre s'intéresse à l'évaluation des risques psychosociaux chez les salariés, et à l'impact des entretiens individuels d'évaluation sur ceux-ci. Son objectif est de démêler les effets ambigus des entretiens d'évaluation sur les risques psychosociaux des salariés. Les résultats montrent que le niveau de risques psychosociaux diminue lorsque les employés sont soumis à des entretiens d'évaluation. Cet effet est observé dans certaines dimensions de ces risques, qui sont de l'ordre des relations sociales, de l'éthique et de la sécurité économique. De plus ce résultat est confirmé lorsqu'on prend en compte le point de vue de

l'entreprise sur les risques psychosociaux.

Le chapitre trois aborde le thème de l'épargne salariale et a pour objectif de déterminer le rôle de l'aversion au risque des individus dans leur décision de s'engager dans un plan d'épargne salariale. En effet, l'épargne salariale comporte un certain risque pour les salariés. Il est démontré que le premier facteur qui entre en jeu dans dans la décision de souscrire à une épargne salariale est la richesse du ménage. En effet, nous constatons qu'au-delà d'un certain seuil de richesse l'aversion au risque des salariés n'intervient pas dans l'acceptation de la participation financière. Ensuite, et pour les individus dont la richesse se situe dans un niveau intermédiaire, l'attitude face au risque intervient dans la décision d'accepter ou non d'adhérer à une épargne salariale. Plus un individu est averse au risque, moins il est susceptible d'accepter une épargne salariale. Ceci serait favorable à l'entreprise qui engagerait les individus les moins averses au risque.

Enfin, le chapitre quatre considère les pratiques managériales axées sur les ressources humaines dans leurs ensemble, et tente de répondre à la question de savoir si les pratiques managériales tendent à se substituer à la représentation syndicale auprès des salariés. Les résultats montrent que ces pratiques managériales ne sont pas directement impliqué dans l'abandon des syndicats par les salariés. Au contraire, les salariés bénéficiant de certaines de ces pratiques ont tendance à soutenir ou à adhérer à un syndicat.

Mots-clés : aide informelle, risques psychosociaux, entretiens d'évaluation, épargne salariale, pratiques managériales, syndicat professionnel

Abstract

This thesis sheds light on the nature of the interactions between employers and employees within the company, it analyses the decisions of each agent and highlights the role of human resources. It tackles different issues related to the working environment in the firm. It consists of four essays on applied microeconometric.

The first chapter investigates the dynamics of the help exchange between employees, particularly the informal help network, which is the unanticipated part of help by the firm. It analyses its determinants and effects on the wages and the productive effort of employees. The results show that providing help increases the level of effort, and receiving it has a positive impact on wages. This highlights the rôle of reciprocity in the exchange of informal help and suggests the existence of free-riding behaviours.

The second chapter focuses on the evaluation of psychosocial risks among employees, and the impact of performance appraisal interviews on them. It aims at clearing up the ambiguous effects of performance appraisal on psychosocial risks. The results show that the level of psychosocial risk decreases when employees undertake performance appraisal interview. This effect is observed on particular dimensions of psychosocial risks, namely social relations, ethics and economic security. Moreover this result is confirmed when taking into account the point of view of the firm.

Chapter Three addresses the issue of financial participation and seeks to

determine the role of workers' risk aversion on their decision to engage in a financial participation plan, such as profit sharing or employee stock ownership plan, since profit sharing involves a certain risk for employees. We find that the first factor that intervenes in the decision to subscribe to financial participation plan is the household wealth. Indeed, we find that beyond a certain threshold of wealth, workers' risk aversion does not interfere in the decision to accept financial participation. For individuals whose wealth is at an intermediate level, the attitude towards risk play a role in the decision to accept or not a financial participation plan. The more risk-averse an individual is, the less likely he is to accept financial participation. This would be beneficial to the firm that would hire the least risk averse individuals.

Finally, chapter Four considers human resources management practices as a whole, and tries to answer the question of whether human resource management practices are driving workers away from unionism. The results show that human resources management practices are not directly involved in the abandonment of unions by employees, but rather the opposite phenomenon is observed. Employees who benefit from some of these practices tend to be more involved with a trade union.

Keywords: informal help, psychosocial risks, performance appraisal, financial participation, management practices, trade unions

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General Introduction

The role of human resources has changed significantly over the last six decades. In traditional economic principles and theories, the value of human capital in the production process was analysed from the perspective of an input to the production process as a cost of production (Becker, 1994; Coleman, 1988; McEvily et al., 2014). However, contemporary economics realizes the significance of human capital from the psychological and behavioural point of view, noting how these factors affect the production process, and in so doing, the general economic output. For organizational leadership, understanding the importance of human factors in the economy allows for proper planning, management, and coordination towards effective and sustainable production. As such, in a bid to understand this fundamental role, it serves to analyse and determine the interactions between human capital and the organizational elements. In this way, the influence of the interactions on the success of the firm is determinable, which helps in the creation of models and policies through which the human capital can be employed.

Understanding the nature and the structure of human resources eliminates the negative perceptions towards exploitation of human labour in the production process. In traditional economics, reference to human capital insinuated exploitation. Becker (1994) annotates that traditional studies sought to associate the economic and social aspects of labour and as a result pointed to the negative inferences of the term human capital. However, the fact that human resources is a significant proportion of the production process, and its performance

is based on investments to it, makes the term more reasonable in contemporary practice. Despite the reference to human resources in the economic context, the influence of social concepts on human resources emplaces challenges which organizational management needs to understand in order to more effectively manage the resource. Among the most significant social influences, as noted by Becker (1994), include; education and training, and family upbringing. Education affects the level of expertise of human capital. Knowledge is the single most significant factor that determines the output of human capital.

With regards to familial influences, the upbringing of individuals determines their mannerisms, cultures, values, and decision-making effectiveness. These behavioural aspects of the individual cumulatively determine the overall output of the organization and of the economy. The familial upbringing determines the social behaviours of the individual which similarly affect the economic structure of the society. Becker (1994) notes that effective upbringing results in better economic outcomes due to the fact that the behavioural annotations of the children would affect the robustness of education and production. The development of future generations towards sustainable production is as a result of the social upbringing. The interplay between human capital and the society is that, while society determines the effectiveness of its human capital, human capital determines the economic growth of the society. Becker (1994) differentiated between causation and correlation in noting that the increase in the level of education is both correlated and causally related to economic growth. The inference of this deduction is that the nature of human resources, as influenced by investment in it determines the level of the economy. Hajpál (1983) notes that through human input in the production, distribution, and consumption of goods, the human factor affects and determines the direction of economic growth. Being centrally placed in the life cycle of goods and service productions, it is evident that the management of human factors would ultimately affect the socio-economic outlook of the society.

The objective of macroeconomists in the development of growth framework models is to determine the influences of different economic factors to growth of the economy. This enables policy-makers to design policies that emphasize on the development and motivation of those factors that significantly influence economic growth. Barro (2001), analysed the relationship between education and economic growth. In this paper, the author noted significant influence on economic development by the quality of education. The quantity and quality of education in an economic society determines the level of growth by influencing factors such as productivity of the work force, and adoption of scientific and technological processes of production (Sunde & Vischer, 2015). In expanding on this argument, Lucas Jr. (2015) proposed the application of the theory of social learning in the determination of the growth of the economy as a way to explain increased economic growth in well-educated societies. Through interactionism, the author notes that individuals interacting with other well-educated individuals increase their skills and knowledge towards economic development of the society and hence higher influence of education in economic growth.

The nature of interrelations between the personnel and the management of a firm enters into the core organisational design of the firm. An efficient organisational design is determined by a suitable differentiated and subdivision of departmental units in the firm and the cohesion between the differentiated units. It reflects the firm efforts to respond to changes and allow flexibility. And it is reinforced by good management practices. It highly depends on the hierarchical structure of the firm and its goals, whether its focused on the outcome or on the production process (Paul et al., 2011).

Work organisation allows the firm to adapt to the change in its environment and to achieve productivity, development and innovation. It also determines how firms control and motivate their labour forces and how to improve their work environment (Osterman, 1994). This can be done by stimulating interaction

among agents and delegating responsibility for problem solving. Changes in the work environment are today often carried out through cooperation between management and employees (Björk, 1975). For instance firms organised through high levels of discretion is given to the employee in solving complex problems tend to be more active in terms of innovations (Arundel et al., 2007).

In order to achieve a better organisation of work the firm relies on various models labelled "high-performance practices". High-performance practices refers to a range of human resources management practices designed to substantially improve the performance of organisations. They combine two sets of practices; the development of alternative work practices and the development of high commitment of workers to the organisation and to their work. The practices include teamwork organisation, quality circles, training of workers, compensation through financial participation, flexible employment (Osterman, 1994; Healy & Martin, 2008).

Having determined the relationship between the social and economic aspects of labour and its influence on economic development, it becomes apparent that in managing human factors, emphasis should be given to the formal and informal structure exchanges in the production process. This interplay, a modernized concept of human resources management, presents, as offered by McEvily et al. (2014), theoretical dualisms. The dualisms seek to determine ways in which informal structures can be utilized in the promotion of formal structures, and how formal structures are influenced by the informal networks. This direction, echoing the proposition by Becker (1994) emphasizes on how human capital, influenced by the society, can influence production effectiveness through its behavioural aspects. From this perspective, education and training influences the formal elements, while family and society influences the informal element. The management of human capital, approached from the formal/informal perspective would eventually result in higher production effectiveness. Therefore, policy

should seek to structure the two elements in a way that enhances the effectiveness of the relationship.

The human factor progression is observable and determinable from two distinct positions; formal and informal. The formal education connotes academic and cognitive progression, while the informal education encompasses a generalization of skills through which individuals can become productive members of the society. Government policies seek to promote the formal education aspect of human capital development, more so in the United States (Heckman, 2000). However, in the European Union, a holistic approach allows for the inclusion of social skills development along with formal cognitive skills (Vaitkevičius et al., 2015). The focus on different government and social institutions in the promotion of economic development through educational policies is based on the perception of the society's leaders towards production and economic growth. For instance, the US, which is more capitalist than a number of the EU member states, would approach human capital development from a formal-skills perspective.

Regardless, the effectiveness of the different approaches can only be analysed from a social perspective given the peculiarities of the developmental approach to knowledge and skills acquisition (Vaitkevičius et al., 2015). While the diversities of different societies point to the absence of a "one-size-fits-all" approach to educational policy development, the social impact of human capital on the productivity of the workforce portends higher effectiveness of the holistic approach to educational development. According to Vaitkevicius et al., the three aspects that contribute to successful educational development in Europe include; social progression, innovation development and potential for human capital development. Focus on the three aspects in the development of evaluation indices allows countries to achieve effective and socially equitable growth. As such, the organization of education development is structured around formal training, social skills, innovation development, and psychosocial development skills. In incorporating these aspects of growth into human capital development, the soci-

ety would markedly realize the economic growth objectives in a sustainable way which allows for social equitability.

Human resource management seeks to identify, recruit and retain talent in the organization in order to achieve the firm's objectives. These objectives include; development of competitive advantages (Glykas, 2011; Delery & Gupta, 2016), achieve sustainable organizational growth (Absalyamova et al., 2015), and increase stakeholder value (Ferrary, 2009). In interacting with the different elements in the operating environment of the organization, the human resource function faces new challenges in the contemporary economy (Drucker, 2012). These challenges encompass how the human capital is measured and how it is developed with reference to current available practices. Current scholarship emphasizes on the determination of effectiveness of human management practices by analyzing how those practices strategically fit to the overall objective of the organization. In addition, there is increasing focus on the social aspects of human capital and how those social aspects influence human resource management, with respect to employee welfare (Edgar & Geare, 2005; Maki, 1994; Milfelner et al., 2015). The socialization of human capital points to a new approach of human resource management where the social developmental goals of the employee take center-stage in human resource management practices. In this way, it is the role of the human resources function to promote the welfare of the employees and the society.

From a review of different scholarship on human resource practices, it is evident that the established practice determines the method of outcome measurement. In addition, the focus of the human resources function determines the practice employed by the organization towards management of human capital. This interplay results in differing approaches to the measurement of the effectiveness of human resource management. For instance, Edgar & Geare (2005) offer a hard and soft model of human resource management. The hard model focuses entirely on organizational performance, while the soft model incorporates

the social aspects of the employee in measuring performance of the practice. Based on the different models, it becomes possible to determine the objective of the organization and the society and ensure that such objectives are achievable within reasonable practice. As such, different societies would employ different practices in human resource management and human capital developments. Evidently, the perception of the society towards its human resources dictates the employment of human resource management practices, which in turn influences the development and the investment focus of human capital. In understanding the outcomes of the different approaches, it becomes possible to determine best practices towards achievement of social economic development objectives.

The Role of Government Agencies and International Organisations

Given the relationship between policy and human resources effectiveness, the role of governmental agencies and world organization is the development of policies which would enhance the productivity of human capital. The policies seek to increase human factor efficiency, promote sustainable practices in its management, and determine effective evaluation measures (See, Advisory Committee on Health and Safety at Work, PRIMA-EF). These institutional processes allows for the structuring of the society in a way that promotes economic development and personal growth of the members of the society. With the main purpose of the government being policy development towards the needs of the society, the focus of the government should be to develop educational policies that would allow individuals to achieve economic successes; develop effective work environments that would promote effectiveness of individual contribution, and develop measures through which such successful policy implementation is evaluated. Through these processes, the human factor can be monitored, along with the economic needs of the society for future alignment of objectives and strategies.

An example of the world organizations is the World Economic Forum. The

organization, a consortium of state representatives, industrial leaders, and scholars, is an independent international body that was established with the objective of improving the state of the world economy. The organization produces yearly human capital reports, which seek to highlight the condition of human capital, industrial trends, emerging practices, and determinations of the value of human capital. For instance, in the 2016 report, the organization reported on the changes being faced in the global economy in terms of production, consumption, transportation, and technology (World Economic Forum, 2016). In conducting research surveys, and determining metrics of analysis, the organization is able to offer insight into the current state of affairs of the economy, the needs of the global society in terms of disparities between economic objectives and human capital availability, and give recommendations on bridging of the gaps. By implementing the details of the report, policy makers are able to ensure that global economic development is achieved.

In its 2016 report, the World Economic Forum noted a growing trend towards the fourth industrial revolution, identifying the needs that countries face in order to effectively participate in the revolution. The report argued for a change in the focus of education towards a more technology and sustainability focused approach which would prepare the human capital for the coming changes. By, "...quantifying how 130 countries are developing and deploying their human capital..." (p. v) the report is able to give an overview of how policy makers can structure their human capital changes and policies towards similar changes. It also develops an index, the human capital index, that ranks the 130 countries, using a 0-100 scale, on how well they are developing and deploying their talent. The index aims at assessing the outcome of investments in human capital and offer insight into countries' talent base (figure 1). In essence, the report presents case studies of different successful implementation of effective human capital management, in order to form advisory information on how government agencies can keep up with the future needs of the society. The report then allows policy

makers to make concise decisions towards education reforms, work environment reforms, and economic policy reforms.

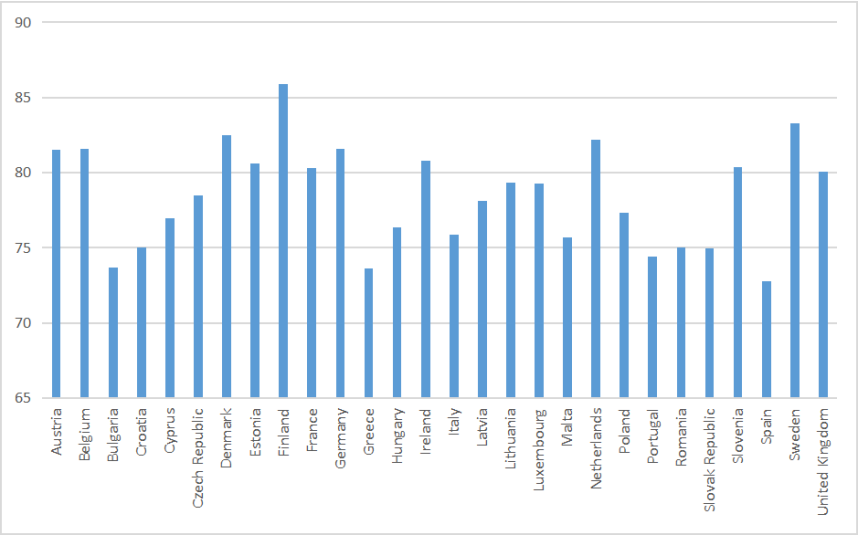

Figure 1: 2016 Human Capital Index For EU Members

Source: The Human Capital Report 2016 - World Economic Forum

Educational policies determine the effectiveness of the work force in the society. In developing educational policies, the government agencies and international organizations determine the future needs of the society. The government agencies then use those future needs to develop objectives of the educational policies, and those objectives form the learning objectives of the education system (World Economic Forum, 2016). The learning objectives are then used to develop curricula. The alignment between the curricula and the economic developmental objectives determines the value of human capital in economic development. In addition to the formal training, informal work-based knowledge development is a constituent of the educational policies. However, the policies for the informal education and development are determined by the organization and the industry level agencies. The structure of the training and development programs are often industry and organizational specific and as such, they influence the successful achievement of the industry and the organization.

The Erasmus program, under the European Union was developed by member states to identify educational needs in the population and determine ways in which to address these needs. The program coordinates with institutions and organizations towards providing knowledge gaps in the adult workforce, and design recommendations for addressing the gaps in skills and knowledge through vocational training. Through the adult lifelong learning framework, the program was able to identify skills required by the adult workforce, between 25 and 45 years of age, and develop programs to sponsor such vocational training (Adult Learning Statistics, 2017). The result of the program was achievement of literacy that allowed the participating countries to achieve higher economic development progress. Evidently, the role of the organizations in promoting and enhancing informal education and training while offering a means through which the required level of training was achievable influenced the direction of economic progression of the countries that participated in the program. This shows a clear link between the international organization, its role in human capital development and investment, and economic development in the member states.

In addition to the curricula development, policy targets the population and size of the work force by motivating and promoting the areas of specialization to which the society needs aligns. The concentration of expertise in a particular field would promote the output of the sector and hence increase economic development (O'Riordan, 2017). The role of the government agencies and policy makes in structuring the distribution of human capital among the different industrial needs can be measured by the determination of growth of effectiveness in the industry. Additionally, demand/supply gaps of different professions and human resource factors can be measured through the determination of the growing cost of securing the human capital required. This evaluation process helps in the determining the effectiveness of educational policies and as such, can be applied in evaluating the value of human capital.

The development of human capital, the government agencies are responsible

for the development of policies which secure the capital and ensure maximization of the output. There are a number of ways through which this is achieved. The development of work-safety policies improves the value output of human capital in two ways (See: EU Occupational Safety and Health (OSH) Strategic Framework 2014-2020). In the first instance, the workforce is free of injury and hence increased productivity. Productivity is greatly affected by the health status of human capital (Working Conditions Survey, 2015). World organizations and government agencies develop policy frameworks through which organizations develop policies to protect the human capital of the society. Different organizations develop different frameworks which align the working conditions of the industries, with effective achievement of productivity objectives. In promoting worker well-being, the organizations are, in essence, protecting the capital resources of the society and as such, increasing the productivity of the society. The need to improve working conditions follows from the economic principles of resource management. The government, in promoting the needs of the society identifies and develops policies towards ensuring economic development of the society.

Another way through which promotion of human factor welfare is achieved is through the development of work organizations. Work organizations encompass institutions formed by representations of homogeneous organizations, or firms with collective needs. The mandate of these institutions is to provide and develop expert advice on best practices in production processes (O'Riordan, 2017). Their role in human factor development and management is the determination of how organizations can exploit human capital effectively. These institutions also enhance the decision-making processes of the government agencies through research collaborations and case studies. The promotion of organizational development is pertinent to the increase of the value of human capital. Many organizational practices are structured around industry best practices in order to enhance production in the industry, and also to enhance working conditions of

the workers. Despite the fact that human capital is an organizational resource, their social nature represents a challenge in it management and its coordination. The work organizations, such as the Institute of Public Administration, ensure that the work conditions are optimum in order to promote human capital efforts.

The process of human resource development, coordination and control is more effective from a societal level. While international organizations and government agencies may develop policy framework upon which organizations can develop individualized policies, addressing societal needs is more effective at the grass-roots level. For instance, the Prima-EF (Psychosocial Risk Management Excellence Framework) is developed at the global level to address work related psychological risks (See: Prima-EF website). However, given the social nature of psychosocial challenges, the framework needs to be custom fitted to the needs of the organization, the society, and the local community. This allows for effectiveness of application of the framework in addressing the needs. The framework simply gives foundational modus operandi, viz-a-viz recommendations on risk identification measures, and management processes. These organizations, agencies, and the frameworks developed allow policy leaders and decision makers to structure the strategies of human capital management towards the objectives of the society. The alignment between strategies and societal economic development goals allows for the sustainable and efficient movement of the society and stakeholder organizations towards the desired objectives.

From this synopsis and discussion of the different approaches of government agencies and international institutions, it is notable that there is a relationship between; how the institutional policies are structured and the economic progression of a country. The significance of this relationship is that there is an apparent causal relationship between human capital management and economic development. The nature of the framework applied by the committees and international organizations is such that, changes in the conditions of the workforce align with

changes in the economic development of countries. The scholarship argument noted previously on the nature of the relationship between education, working conditions, and economic development can be settled. Evidently, improvement of the state of human capital significantly influences the state of the economy. As such, the two elements are not correlated, but rather causally related. Therefore, it is arguable that; changing the condition of human capital in the organizational, societal, and national level would, invariably, result in changes in the economic conditions of the country.

The present PhD dissertation befalls in the context of the social organisation of work, and human capital management, sustainable development. It is a microeconometric analysis of the working environment, that aims at shining some light on the dynamics of work organisation and the interactions between the different agents within the firm. It intervenes to provide a better understanding of the different mechanisms that determine the decision making process at the firm level and to treat specific questions that stem from the challenges of new organisational designs.

This dissertation precisely focuses on the following research questions:

Q1: How does informal help exchange influence employees' wages and productivity? Is it advantageous for employees to help and be helped?

This question relates to the topic of work organisation and the importance of social interactions among employees in the firm. In our case, we consider the return of help between employees exchanged informally without planning from the firm.

Q2: Does performance appraisal help decrease employees' psychosocial risks? Is the effect identical when measured from the firm's perspective?

In this question we approach the issue of the role of the management in improving employees' working conditions. We do so through the analysis of the impact of performance appraisal on employees' psychosocial risks.

Q3: How does workers' risk aversion impact their decision to be part of a financial participation plan?

This question helps identify factors that influence individuals decision to adhere to financial participation and clarify the hypothesis that firms implementing it attract workers with low risk aversion.

Q4: Are human resource management practices driving workers away from trade union representation?

This question treats of the topic of trade union substitution by human resources management practices in modern firms, it also brings question of the likelihood of coexistence of management practices with external organizations such as personnel representation.

To address the questions of this dissertation, developed above, we rely on three different databases drawn from three surveys developed and carried out by different French governmental institutions. The first is the "COI" survey. This survey is matched employer-employee survey on organizational changes and ICT. It was carried out, in 2006, by a consortium involving the Centre for Employment Studies (CEE), the Ministry of labour (DARES), the Ministry of Industry (SESSI), the Ministry of Agriculture (SCEES) and the National Institute of Statistics and Economic Studies (INSEE). Its objective is to assess skill development when firms change their organisations or equipment in Information and Communication Technologies. The second is the "Conditions de travail" survey. It is also a matched employer-employee survey on employees' working conditions. It was conducted, jointly by the National Institute of Statistics and Economic Studies (INSEE) and the French Ministry of Labour (DARES) in 2013. The employees' section aims at evaluating the organizational aspects of work in the firms such as work schedules, the physical risks and work-related accidents, and the psychosocial risks. The employers' section aims at assessing the firm's relations with its environment, its management of work organization, adopted practices

on risk prevention, human resources management and union representation. The third is the "Patrimoine" survey. It is a survey about household wealth and assets. It was realised by the Institute of Statistics and Economic Studies (INSEE) in 2010. Its role is to describe the financial, real-estate and professional assets of households, taking into account inheritances, incomes, financial situation, debts, real-estates and professional assets. It also includes three sections about; household consumption habits, risk aversion, and cultural, social and family aspects of the assets. We also complete our data sets with the "DADS" files, or Annual Declaration of Social Data. They are administrative files consisting of annual declaration of social information made by firms about the employees' number of working hours, wages, and social contributions of the firm.

This PhD dissertation is organised as follow :

Chapter I explores the dynamics of help exchange between employees, specifically the help that is informally exchanged and unanticipated by the firm management. It analyses the role of informal help at the workplace and identifies its determinants and outcomes. With an agency model, a multidisciplinary framework is proposed to understand how the "managerial" logic that shapes formal communication combines with the social logic underlying informal help in the context of organisational changes. With a sample of 12,475 employees of the French private sector extracted from the French "COI" Survey of 2006, we derive a measure of informal help. Since informal help is not directly observable, each help variable include both a formal and an informal help component. Then, with switching models, we estimate the determinants and impacts of informal help on wage and effort. Results show that informal help networks reproduce discriminatory stereotypes and they are driven by the firm's instability, organizational design of workstation and social mechanisms. When they help other workers, employees intensify their effort. It pays to be helped since recipients of help receive a wage premium. Results also suggest the existence of free-riding behaviours of workers who do not reciprocate help and decrease their level of

effort. This approach of work organisation focuses on the analysis of productive interdependencies and social interactions at the workplace. The link between the formal organisation and the informal social structure is analysed with the concept of informal help. It highlights the social dimension of performance.

In **chapter II**, we focus on the psychosocial risks workers are exposed to in the workplace such as work related stress caused by work overload, conflicts with the management or the costumers, ethical issues, or social insecurities. We also consider performance appraisal systems in the firm as one of the most widely used management practice that highly affect workers' psychosocial well being. In fact, the literature is not unanimous on either performance appraisals reduces or heightens psychosocial risks. The objective in this chapter is to disentangle the ambiguous effects of performance appraisals on employees' psychosocial risks. We use a cross-sectional linked employer-employee database collected from the French "Working Conditions" Survey 2013 that provides a wide range of work related risk measures. First, we aggregate these different measures to evaluate the overall level of psychosocial risks, the result is a weighted index with weights determined by Factor Analysis. Second, we evaluate the effect of performance appraisals on the employees' level psychosocial risks. A Propensity Score Matching with psychosocial risks as outcome and performance appraisal as treatment variable is implemented to assess the impact of performance appraisal on psychosocial risks. The results show that the reported levels of psychosocial risk decrease when employees receive performance evaluation reviews on a regular basis. Moreover, performance appraisal tends to reduce the strain related to personal matters such as social tensions but not the stress due to excessive work demands. This analysis stands out from the literature in the sense that it distinguishes the psychosocial risks perceived by the workers from the point of view of the employer.

The main interest of **chapter III** is to determine the role of individuals'

aversion towards risk in their willingness to engage in financial participation. Financial participation is a key managerial tool for firms, though, it includes a random component which implicates a certain risk for the employee. Hence, we expect it to attract the less risk averse persons and the firms that implement them will prefer workers with lower levels of risk aversion. The French "Household Wealth" Survey 2010 includes an experimental module that makes it possible to measure risk aversion in an objective manner. Using this survey, we analyse workers' attitudes towards financial participation with respect to their attitudes towards risk. Two methods are implemented, the first, classification or decision tree, helps determine which variables are implicated in the participation to a financial participation program, and in which order. The second method is the logistic regression model, to estimate the effect of risk aversion on financial participation. We find that above and below a certain level of wealth risk aversion does not intervene in whether to accept financial participation. But for individuals whose net wealth lies within a certain range, risk attitudes play a role in the decision of accepting or not financial participation. Furthermore, logistic regression indicate a significant positive impact of risk accepting behaviours on financial participation, which means that the less risk averse an individual is, the more likely he is to agree to financial participation.

In **chapter IV**, we are interested in the nature of the relationship between human resource management practices and trade unions either it indicates complementarity or rivalry. In fact, trade union membership has known a decline since the seventies, which coincided with the emergence of new management practices, also called high-involvement management practices, which led to believe that the need for unionism has been replaced by these practices. In this context, we would like to answer the question whether human resource management practices are driving workers away from unionism. To do so, we examine how the different human management practices affect the participation of workers to trade union activities. Using the French "Working Conditions" survey 2010,

we consider six main human resources management practices, and by applying bivarite probit models, we estimate their effects on the likelihood of becoming a trade union member or supporter. The results show that management practices are not directly driving workers away from unionism. Actually, for most of the human resources management practices considered, employees who benefit from them tend to support or adhere to a union. This result reinforces the idea of complementarity between unions and high-involvement practices.

Chapter I

Impacts of Informal Help on Effort and Wages

Joint work with Marc-Arthur DIAYE and Emmanuelle WALKOWIAK

Abstract

This chapter analyses the role of informal help at the workplace and identifies its determinants and outcomes. With an agency model, a multidisciplinary framework is proposed to understand how the "managerial" logic that shapes formal communication combines with the social logic underlying informal help in the context of organisational changes.

With a sample of 12,475 employees of the French private sector, a measure of informal help that distinguishes between the formal and informal components of help is derived from the data, then, switching models estimate the determinants and impacts of informal help on wage and effort.

Results show that informal help networks reproduce discriminatory stereotypes and they are driven by the firm's instability, organizational design of workstation and social mechanisms. When they help other workers, employees intensify their effort. While, it pays to be helped since recipients of help receive a wage premium. Results also suggest the existence of free-riding behaviours of workers who do not reciprocate help and decrease their level of effort. This approach of work organisation focuses on the analysis of productive interdependencies and social interactions at the workplace. The link between the formal organisation and the informal social structure is analysed with the concept of informal help. It highlights the social dimension of performance.

Keywords: Help, communication, effort, work organisation, social capital

JEL Classification: M54

1 Introduction

In a context of global rising uncertainty, rapid and permanent change driven by technological or organisational improvement, complexity and instability are growing, making it difficult to anticipate the full range of problems, which may arise during the production, and to codify solutions to solve them. In such an unpredictable environment, knowledge sharing through communication that represents a form of help could be an efficient coordination mechanism for firms (Mintzberg, 1979). A part of this help (called formal help) is designed by firms, while another part (called informal help) is designed by workers themselves independently from firms. It is this second which is interest in this paper. Informal help at the workplace (to the best of our knowledge) has been first analysed in the industrial sociology literature (Roy, 1954; Gross, 1953), in order to capture the relational dimension of work organisation. According to the industrial sociologists, firms can beneficiate from the existence of informal help at the workplace because of their positive effects on workers' intrinsic motivation and job satisfaction.

If informal help among employees is really beneficial for firms, then we need, as scientific observers of firms and workers, to understand why informal help exists and why workers informally help each other. The usual answer from the literature (Roy, 1959) is that, informal help is driven by (class, gender, ethnic, etc...) workplace camaraderie. This answer may be true, but we consider in this paper that some other (more down to earth) explanations are also plausible. For instance, informal help networks may represent a strategy developed by employees to cope with problems not anticipated by employers that workers have to solve by themselves. Indeed while such non-anticipated problems cannot, by definition, be contractualized by employers, they have an impact on employers' expected profit. Hence in firms with unpredictable environment, informal help (between workers) reduces the negative impact on their expected profits of the

non-anticipated problems. From the employees' standpoint, help (informal or not) is an effort (Itoh, 1991) and is therefore costly for those who help. Thus when an employee informally helps another employee, his help comes in addition to the effort he has to provide for his own task. This means that even in the presence of work design by employers in order to foster informal help between workers, the question of why they informally help each other cannot be taken for granted. In order to answer this question, we look at to the effect of informal help on workers expected utility, own effort and wage.

More precisely, our paper aims to understand how the formal organization and informal social networks co-evolve at the workplace, which is essential to understand the social dimension of firms' economic performance as pointed out by (McEvily et al., 2014).

At the workplace, workers are both in situation of productive interdependencies and social interactions. While the productive interdependencies result from the organisational design, social interactions may also be shaped by social mechanisms. Most of the literature, in economics or management, focuses on the relational architecture of work designed by managers, may it be in a hierarchical, networked or horizontal configuration of interactions. In a centralised firm, the interactions between the supervisors and subordinates play a central role to explain productivity and information flows on hierarchical lines (Garicano, 2000). In decentralized firms (for example Aoki (1990)), workers are more in contact with each other, generating a more "horizontal" communication or situations where information circulates through more complex networks. When they choose the organisation of the production, managers also design the relational architecture of work and their information system. Gant et al. (2002) demonstrate that in American firms adopting high performance work systems in the iron and steel industry, operators solve their operational problems by intensively communicating with their colleagues. They measure significant productivity gains associated with the intensification of communication at the workplace.

With the Workplace Employment Relations Survey, in the UK, Salis & Williams (2010) show that formal face-to-face communication practices generate productivity gains in British trading establishments, by improving knowledge sharing. These empirical results demonstrate that the relational architecture of communication resulting from the organizational design of the information system is a driver of performance. It refers to the anticipated dimension of tasks designed by employers. Our analysis focuses on the non-anticipated dimension, which is not directly decided by employers, but chosen by employees according to their personal preferences.

Our analysis aims at identifying the determinants of informal help at the workplace and by measuring its impact on effort and wage. Insights from different disciplines are integrated to analyse how the formal organization and informal social structure of help co-evolve at the workplace.

First of all, with a principal-agent model, we identify some mechanisms that may explain the determinants of informal help, its impact on effort and wages. We show that changes that generates instability at the workplace are major determinants of informal help. We also show that informal help is both a by-product of the organisational design of workstations and a by-product of social relationships that are interpreted with reference to the concept of "social capital". Our empirical analysis identifies some social and organizational characteristics that promote inclusion of employees in informal help networks. Secondly, switching models are tested to measure the impact of informal help network on effort and wage of employees. We observe that it pays to be helped since helped workers receive a wage premium. It also pays to help, but only in a context of reciprocity. Moreover, we show that help is associated with a higher level of effort from workers offering their help. However, our results also show a lower level of effort for workers receiving help, especially for those who do not reciprocate the help, suggesting some free-rider behaviours. Our tests are carried out on a sample of 12,475 employees and 5,878 firms from a matched employer-employee survey

on organisational change and ICT use (C.O.I survey in French for Changements organisationels et informatisation) of French firms between 2003 and 2006.

The next section introduces the framework of analysis. The third section presents the datasets, indicators used to measure formal and informal help and our econometric strategy. The fourth section interprets the results. The last section concludes.

2 Framework of Analysis

This section formalises informal help with an agency model and explains the role it may play on incentives at the workplace. This framework identifies the expected relationships between help, effort and wage tested in the empirical part. This model also guide us to categorise determinants of help.

2.1 The Non-Anticipated Dimension of Work

Let us consider a principal-agent model where the employer (the principal) imperfectly observes the effort of his employees (agents). When agents fill their tasks, they face some problems that they have to solve. The resulting output X is a random variable, with $X = 1$ when agents succeed to complete their task and $X = 0$ when they fail. The associated pay-offs for the principal are respectively R_1 or R_0 with $R_1 > R_0$.

An infinite number of states $s_1, s_2, \ldots, s_n, \ldots$ can arise during each task within the state space $S = \{s_1, s_2, \ldots, s_n, \ldots\}$. These states are generated by events which are either known or unknown by employers. Let us denote A the dimension related to all possible anticipated situations and NA the non-anticipated dimension. Indeed, some states of S are unknown by the employer who has an incomplete knowledge of S and is aware of it.

While the principal can contractually specify the A dimension of a task, the

NA dimension cannot be specified, generating an incomplete contract. Let us assume, without loss of generality, that both principal and agents know the A dimension. Agents know the NA dimension only when they start working. During the selection process, the principal employs agents who match the A dimension of production that is the only one known and codified. Therefore, agents are always able to solve by themselves all problems concerning the A dimension of their tasks when they provide the appropriate level of effort. However, when they face a problem, which belongs to the NA dimension of their tasks, then two situations can arise: either they are able to solve by themselves the problem or they are not able to solve it alone. In the latter case, they ask for some help from their colleagues. From this perspective, activating a social network at the workplace is a strategy aiming to cope the NA dimension of the task. *Ex ante* the principal cannot anticipate the NA dimension of the task. In our model, the informal help network to cope with the A dimension of the work is distinct from the relational architecture of the firm, designed to improve the circulation of the flow of information related to the A dimension. This definition is important since in economic theory, the concept of informal help network is not explicitly expressed. One can nevertheless find the concept of help. To the best of our knowledge, the first article which provides a complete formalisation of helping effort is Itoh (1991) which shows that the Principal (the manager) can use help in order to improve the productive performance of his employees. However the main motivation of Itoh (1991) is to find out the conditions which allow an endogenous formation of a team or an endogenous labour division within a work collective.

2.2 An Agency Model with Help

We assume that there is no monetary transfer between informal help network members, when they receive some help. Hence in the model, reciprocity is the main driver of informal help. Helped workers have to pay a cost, which is helping

another worker by reciprocity when required. This assumption echoes papers that show that helping norms are favoured by individual cooperation (Raver et al. , 2012) and long-term repeated interactions between employees (Che & Yoo, 2001). Within this framework, informal help may be considered as a kind of incentive mechanism that favours higher level of effort. We would expect a positive correlation between the level of effort and informal communication.

We note hr and ho belonging to the set of effort $\Theta_g = \{0, 1, e, \ldots, e_g\}$, respectively the levels of help offered and received to solve problems at work. Help constitutes a NA part of effort. As Arocena et al. (2010), we consider that the individual effort includes a controllable component (A dimension) and a discretionary component (NA dimension related to help). The employer captures the controllable component of effort (A dimension) through standard practices of monitoring and supervision. The agent's effort denoted K is a random variable for the principal. Given the incentive system designed by the principal, the legal and maximal level effort of each agent is $K = e$. For Arocena et al. (2010), the discretionary component (NA dimension) relies directly and only on the willingness of employees and is closely and positively correlated to intrinsic motivation. In our model, informal help directly relates to the discretionary effort, that we consider as the NA component of effort.

Let $Pr(X = 1|k, hr, ho)$ be the conditional probability of success of the task given that the agent's level of effort is k; the help received from other workers is hr and the help offered to other workers is ho. Concerning the effect of hr and ho on $Pr(X = 1|k, hr, ho)$, one can argue that more informal help, represented by higher levels of hr and ho, may lessen the level of effort k and, therefore, may decrease . However, let us remind that agents participate to informal help networks (to get or provide help) only on the basis of the NA dimension of work, while their level of effort k is based on the A dimension of work. As a consequence, $Pr(X = 1|k, hr, ho)$ is an increasing function of hr and a non-decreasing function of ho. With a risk-neutral Principal and Agents who are risk-averse, the utility

function U is:

$$U(w, k, hr, ho) = \hat{U}(w, k) + \Lambda_r(hr) - \Lambda_o(ho) \tag{I.1}$$

where $\hat{U}(w, k) = u(w) - v(k)$; u and Λ_r are strictly increasing concave functions; v and Λ_o are strictly increasing convex functions; Λ_r and Λ_o are utilities associated respectively with received help and given help; $\Lambda_r(0) = \Lambda_o(0) = 0$; and w is the wage. Moreover, the reservation utility of Agents is $\bar{U}$.

To present this optimal contract, first, let us briefly describe the timing of the contract for any agent:

1. The Principal writes a contract which relates to the A dimension of the task.
2. The Agent signs the contract with the Principal.
3. Production starts.
4. The Agent observes the NA dimension of the task and determines if he/she can solve it or not.
5. If the agent can solve it, then she/he provides effort (k), nature plays ($X = 1$ or 0) and pay-offs are delivered.
6. If the agent cannot solve problems related to the NA dimension, then the agent decides to join or not an informal help network.
7. If the agent does not join an informal help network, then she/he provides effort (k), nature plays ($X = 1$ or 0) and pay-offs are delivered.
8. If the agent joins an informal help network, then she/he provides effort (k), receives help (hr), provides eventually help to another worker (ho), nature plays ($X = 1$ or 0) and pay-offs are delivered.

Obviously, workers who join an informal help network (step 6), increase their expected utility by doing so.

Help also positively impacts the expected profit of the firm (with $hr \neq 0$ or

$ho \neq 0$) which writes:

$$[R_1 - w_1] \cdot Pr(X = 1|k, hr, ho) + [R_0 - w_0] \cdot [1 - Pr(X = 1|k, hr, ho)] \quad \text{(I.2)}$$

where w_1 is the Agent's wage when $X = 1$ and w_0 is the Agent's wage when $X = 0$.

The Principal maximizes the expected profit (for an effort $k = e$), under a participation constraint: $E[U(w, k, hr, ho)|k = e] \geq \bar{U}$ and under an incentive constraint: $E[U(w, k, hr, ho)|k = e] \geq E[U(w, k', hr, ho)|k' = e']$, whatever $e' < e$.

The participation constraint is:

$$Pr(X = 1|k = e, hr, ho)[u(w_1) - v(e) + \Lambda_r(hr) - \Lambda_o(ho)] +$$
$$[1 - Pr(X = 1|k = e, hr, ho)] [u(w_0) - v(e) + \Lambda_r(hr) - \Lambda_o(ho)] \geq \bar{U}$$

That is:

$$Pr(X = 1|k = e)u(w_1) + [1 - Pr(X = 1|k = e)]u(w_0) \geq \bar{U} + v(e) - \Lambda_r(hr) + \Lambda_o(ho)$$

The incentive constraint writes:

$$Pr(X = 1|k = e, hr, ho)u(w_1) + [1 - Pr(X = 1|k = e, hr, ho)] u(w_0) - v(e) \geq$$
$$Pr(X = 1|k' = e', hr, ho)u(w_1) + [1 - Pr(X = 1|k' = e', hr, ho)] u(w_0) - v(e')$$

whatever $e' < e$.

When the first order conditions are fulfilled, then we can replace the incentive constraint by the first order condition for maximising E[U(w,k,hr,ho)|k=e]:

$$Pr'(X = 1|k = e, hr, ho)u(w_1) + [1 - Pr'(X = 1|k = e, hr, ho)] u(w_0) - v'(e) = 0$$

where $Pr'(X = 1|k = e, hr, ho)$ and $v'(e)$ are respectively the value at $k = e$ of

the derivatives of $Pr(X=1|k=e,hr,ho)$ and $v(e)$ with respect to k.

Let L be the Lagrangian of the problem:

$$\begin{aligned} L &= [R_1 - w_1] \cdot Pr(X=1|k=e,hr,ho) + [R_0 - w_0] \cdot [1 - Pr(X=1|k=e,hr,ho)] \\ &+ \lambda \cdot [Pr(X=1|k=e,hr,ho)u(w_1) + [1 - Pr(X=1|k=e,hr,ho)]\, u(w_0) \\ &\quad -\bar{U} - v(e) + \Lambda_r(hr) - \Lambda_o(ho)] \\ &+ \mu \cdot [Pr'(X=1|k=e,hr,ho)u(w_1) + [1 - Pr'(X=1|k=e,hr,ho)]\, u(w_0) - v'(e)] \end{aligned}$$

where λ and μ are respectively the Lagrange multipliers associated with the participation and the incentive constraints.

Using the Kuhn-Tucker method leads to the following optimal wage:

$$\begin{aligned} w_1 &= u'^{-1}\left[\frac{Pr(X=1|k=e,hr,ho)}{\lambda Pr(X=1|k=e,hr,ho)+\mu Pr'(X=1|k=e,hr,ho)}\right] \\ w_0 &= u'^{-1}\left[\frac{Pr(X=0|k=e,hr,ho)}{\lambda Pr(X=0|k=e,hr,ho)+\mu Pr'(X=0|k=e,hr,ho)}\right] \end{aligned} \tag{I.3}$$

w_1 and w_0 directly depend on hr and ho.

In order to simplify our analysis, let us specify the wage-utility function: $u(w) = ln(w)$. Then equation (I.3) writes:

$$\begin{aligned} w_1 &= \frac{\lambda Pr(X=1|k=e,hr,ho)+\mu Pr'(X=1|k=e,hr,ho)}{Pr(X=1|k=e,hr,ho)} \\ w_0 &= \frac{\lambda Pr(X=0|k=e,hr,ho)+\mu Pr'(X=0|k=e,hr,ho)}{Pr(X=0|k=e,hr,ho)} \end{aligned} \tag{I.4}$$

One can analyse the agent's wage *ex-ante* or *ex-post*. Equation (I.4) is underlying an ex-post analysis, while an *ex-ante* analysis would require measuring the expected wage. As our objective is to test the prediction of the model, we analyse w_1 the *ex-post* wage when $X = 1$.

The derivative of w_1 with respect to hr, $\frac{\partial w_1}{\partial hr}$ is :

$$\frac{Pr(X=1|k=e,hr,ho)\cdot\left[\lambda\frac{\partial Pr(X=1|k=e,hr,ho)}{\partial hr}+\mu\frac{\partial Pr'(X=1|k=e,hr,ho)}{\partial hr}\right]-[\lambda Pr(X=1|k=e,hr,ho)+\mu Pr'(X=1|k=e,hr,ho)]\cdot\frac{\partial Pr(X=1|k=e,hr,ho)}{\partial hr}}{[Pr(X=1|k=e,hr,ho)]^2}$$

As a consequence, $\frac{\partial w_1}{\partial hr} > 0$ if and only if

$\mu\Big[Pr(X{=}1|k{=}e,hr,ho)\cdot\frac{\partial Pr'(X=1|k=e,hr,ho)}{\partial hr}-Pr'(X{=}1|k{=}e,hr,ho)\cdot\frac{\partial Pr(X=1|k=e,hr,ho)}{\partial hr}\Big]>0$

Since $\mu > 0$ then $\frac{\partial w_1}{\partial hr} > 0$ if and only if

$Pr(X{=}1|k{=}e,hr,ho)\cdot\frac{\partial Pr'(X=1|k=e,hr,ho)}{\partial hr}-Pr'(X{=}1|k{=}e,hr,ho)\cdot\frac{\partial Pr(X=1|k=e,hr,ho)}{\partial hr}>0$

This latter condition writes:

$$\frac{\frac{\partial Pr'(X=1|k=e,hr,ho)}{\partial hr}}{Pr'(X=1|k=e,hr,ho)} > \frac{\frac{\partial Pr(X=1|k=e,hr,ho)}{\partial hr}}{Pr(X=1|k=e,hr,ho)} \tag{I.5}$$

The quantity $\frac{\frac{\partial Pr(X=1|k=e,hr,ho)}{\partial hr}}{Pr(X=1|k=e,hr,ho)}$ in equation (I.5), is called, in statistics, a *likelihood ratio*. It represents (from the Principal' standpoint) the likelihood that the worker has been informally helped given that the Principal has observed $X = 1$. It also measures *the informal received help elasticity of probability of success* (denoted $\varepsilon_{Pr/hr}$) divided by the informal received help (hr). This elasticity shows the sensitivity of the probability of success to received informal help. Indeed $\frac{\frac{\partial Pr(X=1|k=e,hr,ho)}{\partial hr}}{Pr(X=1|k=e,hr,ho)} = \frac{\partial Pr(X=1|k=e,hr,ho)}{\partial hr} \times \frac{1}{Pr(X=1|k=e,hr,ho)} \times \frac{hr}{hr} = \frac{\varepsilon_{Pr/hr}}{hr}$. As a consequence, equation (I.5) writes: $\frac{\varepsilon_{Pr'/hr}}{hr} > \frac{\varepsilon_{Pr/hr}}{hr}$ where $\varepsilon_{Pr'/hr}$ is the informal received help elasticity of marginal probability. Hence,

$$\frac{\partial w_1}{\partial hr} > 0 \text{ if and only if } \frac{\varepsilon_{Pr'/hr}}{hr} > \frac{\varepsilon_{Pr/hr}}{hr} \tag{I.6}$$

In the same token, the derivative of w_1 with respect to ho ($\frac{\partial w_1}{\partial ho}$) is strictly positive if and only $\frac{\varepsilon_{Pr'/hr}}{hr} > \frac{\varepsilon_{Pr/hr}}{hr}$. That is :

$$\frac{\partial w_1}{\partial h0} > 0 \text{ if and only if } \frac{\varepsilon_{Pr'/hr}}{hr} > \frac{\varepsilon_{Pr/hr}}{hr} \tag{I.7}$$

2.3 Propositions to be Tested

Based on this model, let us formulate propositions on the determinants of informal help and impact on effort and wage.

The Determinants of Informal Help

Three kinds of determinants can favour informal help at the workplace: they are associated with the characteristics of workers, characteristics of the workstation and characteristics of the environment of the firm.

To understand how the individual characteristics of worker can influence their participation to social help network, we use the concept of social capital. According to Gant et al. (2002), social capital is a component of human capital. Typically, when they face a problem, workers communicate with other persons, asking their help and advice to solve this problem. It improves their human capital. From this perspective, we would expect that variables associated with human capital (such as education, skills or experience) lead to higher levels of help. Moreover, Leana & Van Buren (1999) points out that social capital has an affective component in addition to the component based on skills. The affective component means that memberships are socially built, at least partially, and may reproduce some social stereotypes. Turner (2000) refers to age, gender, localisation, religion, ethnic group, social class and social origins as being determinants of social capital. Informal help would be the by-product of the social structure proxied by some socio-demographic characteristics.

The role of organizational design is easy to understand looking at equation (I.2). As the expected profit positively depends on help, managers could favour helping behaviour through the organizational design of workstation. Indeed, informal help network can also complement and / or co-evolve with new technologies and the adoption of innovative HR practices (Milgrom & Roberts, 1990). For example, Gollac & Karamarz (2000) show that during the stage of computerization of workstation of the nineties, employees equipped with ICTs use them more efficiently when they belong to social networks, since they better configure their technology to meet their needs. The complementarity between ICT and help also comes from the properties of the technology itself, which mediates

interactions. When equipped, employees have new tools to maintain or create new relationships. Similarly, HR practices which reinforce interactions between workers, like teamwork or problem solving group, or which improves cooperation and the work atmosphere in general, can also shape informal help networks.

The environment of the firm, especially when it generates instability and uncertainty may also impact informal help at the workplace. Typically, environments characterised by strong technological and organisational changes or a restructuring may involve more unexpected situations (the NA dimension of work) and a lower codification of work. To cope with instability, workers will activate their (informal) help network.

Informal Help and Effort

A natural question that arises is to determine the impact of help on the level of effort. Does informal help decrease or increase the level of workers' effort? Will employees involved in informal help network free-ride their "informal team" and provide a lower level of effort or, will they exhibit a stronger intrinsic motivation translated into higher level of effort? According to our model, while there is no direct impact of informal help network membership on effort, the impact is indirect and comes from a selection effect. Indeed, ho represents the cost to pay to receive some help and to be a member of a help network. As a consequence, informal help network may attract workers with a low-disutility of effort with respect to v or Λ_0. Hence, on average, informal help network workers may provide an effort higher than "e", the effort reached with the incentive system designed by the principal. Said differently, belonging to an informal help network depends on workers' effort to help on NA dimension of tasks. Therefore, when a worker does not belong to a help network, it does not mean that this worker has better abilities and does not need help. Instead, it means that this worker is not good enough to be member an informal help network.

However, as in any team, informal help network may face free-riding from its members that we also need to take into account. When a member received help to solve an NA problem, the worker may have no incentive to help other members by reciprocity (which is the cost of help).

Informal Help and Wages

According to the model, the relationship between the ex-post wage and informal help depends on equations (I.6) and (I.7). If equations (I.6) and (I.7) hold, workers' wage increases with (received/offered) informal help. Even if norms of reciprocity are not respected, workers involved in an informal help network will receive higher wages. In this configuration, the wage premium is increasing with the intensity of help received and given.

The explanation is the following : (i) Since we are in the principal-agent framework, the principal remunerates or penalises staff only on the basis of verifiable variables : here the only verifiable variable is the outcome of variable X (task success or failure). This is why there are two types of wage in our model (w_1 : the wage in case of task success and w_0 : the wage in case of task failure). (ii) Even if the principal remunerates or penalises staff only on the basis of the outcome of X, the wage depends (see equation I.3) on : the agent's attitude towards risk (the convexity of concavity of functional u), the level of effort and the levels of informal (received and/or offered) help. (iii) We have taken $u(w) = ln(w)$, this means that the worker is risk averse. Moreover effort and (informal) help are not verifiable by the principal. (iv) However because of the incentive and participation constraints, the agent will play the required level of effort "e". (v) The principal knows that informal help may increase the probability of task success. More precisely, $Pr(X = 1|k, hr, ho)$ is an increasing function of hr and a non-decreasing function of ho. However, because informal help is based on the NA aspects of work, the principal cannot use the incentive constraint in order to guarantee that the agent plays a given level of informal help (hr or ho). (vi)

According to our model, the principal can use a wage-based informal incentive (this incentive is informal in the sense that it is not contractualized). But this requires for the principal to be able to infer from the verifiable variable X that the agent has been informally helped or has informally helped. (vii) This means that since the agent plays also the level of effort "e", then the principal might be able to distinguish the effect of this regular effort "e" from the effect of informal help, on the observed success of task ($X = 1$). (vii) In other words, the likelihood that the worker has been informally helped (or has informally helped) and has played the effort level "e", given that the Principal has observed $X = 1$, might be higher than the likelihood that this worker has played only the effort level "e". (ix) If this design condition is fulfilled then the Principal can reward informal help. This is possible because informal help increases the probability of task' success ($X = 1$) and thereby the Principal's expect profit.

However if equation (I.6) or (I.7) do not hold, workers' wage may decrease with (received/offered) informal help and participating to informal help network can generate a wage penalty.

The sign of the relationship between informal help and wages has to be tested empirically to reach a conclusion.

3 Data and Measures

3.1 The Datasets

The empirical analysis is based on the matched employer-employee survey on organizational change and ICT use (C.O.I survey) of 2006. This French survey was carried out by a consortium involving the Center for Employment Studies (CEE), the Ministry of labor (DARES), the Ministry of Industry (SESSI), the Ministry of Agriculture (SCEES) and the National Institute of Statistics and Economic Studies (INSEE). Response rates are very high: 82% for employers and 75% for

the employees. The employee section provides a detailed description of workstation characteristics, the job content, changes in the working environment, use of technologies as described by employees and their socio-demographic characteristics. The employer section provides information on the organization of the firm and adoption of innovative practices during the last three years, the context and goals of organisational changes. The survey covers stable employees (with a least one year of seniority) of the French private sector, including the manufacturing and service sectors.

We matched the COI survey with the Annual Declaration of Social Dataset (DADS). These administrative files collect annual declaration of social information made by firms about the employees' number of working hours, wages, and social contributions of the firm. We will use them to measure employees' wages. Our final sample includes 5,878 firms and 12,475 employees. This sample is representative of stable employees working in firms (of at least 50 employees) of the private sector in France. It provides information about, the help received and given by employees, the organization of the workstation, their level of effort, their wage and socio-demographic characteristics as well as the environment of the firm. This sample is unique in the sense that for any worker in this sample, we have full information about his socio-demographic characteristics, about his characteristics at the workplace, about his wage and about the characteristics of the firm for which he works. It is the richness of our sample that allows us to empirically define informal help and to estimate its effect on (formal) help and wage.

3.2 Measuring Informal Help

Help at the workplace is the combination of both formal and informal help. Let's denote TH, the total help that a worker can receive or give at the workplace. Let's denote FC, the formal communication that represents the flows of help

and information associated with the division of labour and the distribution of authority within the firm. FC directly depends on the organizational design of the workstation. Let's denote IH, the informal help. For each individual i, TH_i depends positively of both FC_i and IH_i. Our datasets provide good proxies of TH and FC, but do not directly measure informal help (IH). As informal and formal help variables are strongly correlated, our strategy to measure informal help consists in running a regression of total help (TH) over formal communication (FC). The predicted positive residuals obtained from this regression give the part of informal help that is not correlated to formal communication. Consequently, we follow three steps to measure informal help: 1. Measuring the total help TH; 2. Measuring the formal communication FC; 3. Collect the residuals from the regression of TH over FC.

Step one: The Total Help variable TH is based on questions from the employee section of the survey (see Appendix I..1). It takes values between 2 and 17. The Total Help variable TH measures the total help given and received but it does not distinguish between formal (A dimension) and informal help (NA dimension).

Step two: To proxy the formal dimension of social network (related to the A dimension of work), we measure a formal communication variable denoted FC, that represents the network of communication of each employee, given the division of labour and distribution of authority within the firm. The formal communication variable characterises the organisation of workstation from the point of view of the information system. Based on questions from the employee section of the survey (see Appendix I..1), it takes values between 0 and 7.

Step three: As we cannot directly measure informal help, we measure it indirectly by calculating the residuals of the regression of TH over FC. Indeed, as TH and FC are strongly correlated (with a significant correlation coefficient of 0.51), the predicted positive residuals obtained from this regression give the part of the total help not correlated to formal communication. We consider that these

residuals measure the informal help. This variable (of residuals) is by definition normally distributed with a 0 mean. We generated a binary variable IH taking value 1 if the residuals are strictly positive and 0 otherwise. More formally, for any worker i, IH_i is calculated as follow:

$$\begin{aligned} TH_i = &\quad \alpha_0 + \alpha_1 FC_i + \varepsilon_i \\ \Rightarrow &\quad \hat{TH}_i = \text{ Formal Help of worker } i \\ \& &\quad \hat{\varepsilon}_i = \text{ Informal Help of worker } i \end{aligned}$$

$$\text{if } \hat{\varepsilon}_i > 0 \text{ then } IH_i = 1; \quad \text{else } IH_i = 0 \tag{I.8}$$

According to this variable, only 66% of employees belong to an informal help network, not directly designed by the firm against around 96% for our indicator of formal communication.

In this informal network, we want to distinguish employees who receive informal help without helping other, employees who give informal help without receiving some help, and employees who are both giving and receiving informal help. We start by distinguishing between offered help (Ho) and received help (Hr). The first, second and fourth questions of questions listed in step 1 are combined to create Ho, the variable denoting the help offered. It takes values ranging from 2 to 9. The third, fifth, sixth, seventh and eighth questions are used to create Hr the variable denoting the help received, it takes values between 0 and 8. These two variables (Ho and Hr) do not distinguish between the A dimension and the NA dimension. In the same manner, as in the case of total help TH, we perform linear regressions of Ho on FC and Hr on FC. The informal offered help and the informal received help are derived from the residuals of these regressions, as in the equation (I.8). Informal offered help and informal received help variables are binary variables that take the value 0 or 1. Combining these two binary variables leads to four types of individuals: individuals who simultaneously offer and receive help (variable $IH = 1$ and 0 otherwise), individuals

who only offer help (variable $IHo = 1$ and 0 otherwise), individuals who only receive help (variable $IHr = 1$ and 0 otherwise), and individuals who neither offer, nor receive help (variable $IHnonr$=1 and 0 otherwise). The last line of table 1 provides the distribution of these variables. Over 12,475 observations, 23% are simultaneously giving and receiving help, 20% just offer their help and 22% just receive help from other. 33% of workers do not participate in an informal help network.

3.3 Measuring Wages and Effort

With the DADS file, we measure the logarithm of the annual net wage. The effort variable comes from two questions of the employee section of the COI survey. The first one is "*how frequently the employee works longer than the usual hours (frequently / occasionally / never or almost never)*" and the second is "*whether she/he receives a compensatory wage or rest in case of overtime*". By combining these two questions, our effort variable is an ordered variable taking values from 0 to 5, indicating if employees work more than the regular working hours with or without compensation. Table I.1 shows the distribution of these variables over different sub-samples. The average annual net wage is 23,656 euros and it is quite superior for individuals who only offer help (column (4)), while it is inferior for individuals not involved in an informal help network (column (5)). We also observe that the distribution of the effort variable follows a similar pattern, with a stronger level of effort for individuals who only offer help (column (4)), while effort is less intense for individuals not involved in an informal help network (column (5)). The econometric models tested in the following sections of the paper will determine if these differences are significant or if they are coming from selection biases.

Table I.1: Distribution of wage and effort

Variable	Total sample (1)	IH=1 (2)	IHo=1 (3)	IHr=1 (4)	IHnonr=1 (5)
	Mean of wage (standard deviation)				
Net Wage	23,656.65	23,954.35	25,950.54	23,022.85	22,354.72
	(15,528.87)	(14,915.34)	(17,048.93)	(14,822.59)	(15,165.91)
Log(Net Wage)	9.9357432	9.9605592	10.0245614	9.9100822	9.87696
	(0.4867583)	(0.4646943)	(0.4922616)	(0.4880774)	(0.4874217)
	Distribution of effort Number of observations for each modality (%)				
1	3,229	578	642	718	1,291
	(25.88 %)	(20.28%)	(23.41%)	(26.37%)	(31.04%)
2	4,425	1.04	886	1.041	1,458
	(35.47 %)	(36.49%)	(32.30%)	(38.23%)	(35.06%)
3	3,408	890	808	710	1,000
	(27.32 %)	(31.23%)	(29.46%)	(26.07%)	(24.04%)
4	1,413	342	407	254	410
	(11.33 %)	-0.12	(14.84%)	(9.33%)	(9.86%)
	Distribution informal help Number of observations (%)				
Number obs.	12,475	2,850	2,743	2,723	4,159
	(100.00 %)	(22.85%)	(21.99%)	(21.83%)	(33.34%)

Note: For the net wage et log(Net wage), we measure the mean followed by the standard deviation between brackets. For the variable measuring effort and informal help variables, we provide the number of observations followed by the percentage that it represents between brackets. This statistics are calculated on the total sample (column (1)), on the sub- of individuals who simultaneously receive and give help (column (2)), who only offer help (column (3)), who only receive help (column (4)) and who do not participate to a informal help network (column (5)). The last line shows the distributions of the sub-samples.
Source: COI survey and DADS files

3.4 Econometric Models

The central objective of this article is to identify the socio-organizational determinants and outcomes (in terms of effort and wage) of informal help at the workplace. The propositions to be tested have been formulated in the section 2.3.

To test these propositions, we adopt an endogenous regression model (Maddala & Nelson, 1975; Maddala, 1983). Indeed, based on an efficiency wage model, one can argue that our outcome variables (wages and effort) are endogenous. That is why it is important to control for the endogeneity of our dependent variables. Moreover, switching models that we implement also control for the selection bias. In our specification, a selection bias may come from the fact that help may be more intense when unexpected problems arise. Workers who face problems and require help are not directly comparable to workers who do not face problems.

Endogenous regression models use a maximum likelihood estimation to simultaneously fit two equations. The first equation (equation (I.9) below) determines if workers use informal help or not, this is the selection or switching equation. We will test our proposition on the selection effect of help with the results of the switching equation. The selection equation predicts two regimes that our outcome variables can fit in a second equation. For the two regimes, we will test a second equation and calculate the average difference in wage and effort between workers involved in a help network and individuals who are not. We will test our propositions on the outcomes of help based on the results of the second equation (equation (I.10)).

Formally, let $HELP$ denotes the vector of binary variables (IH, IHo, IHr), that takes $HELP_i = 1$ if the worker i exchanges a certain threshold of informal help and $HELP_i = 0$ if the worker i neither offers, nor receives help (variable $IHnonr = 1$). Let denote by $Y = (Log(NetWage), Effort$ the vector of outcome variables. For each worker i, the switching equation is calculated as follow:

$$HELP_i = \begin{array}{ll} 1 & \text{if } \ HELP_i^* = Z_i\gamma + u_i > 0 \\ 0 & \text{if } IHnonr = 1 \end{array} \tag{I.9}$$

Where u is the error term and Z is a vector of exogenous variables (determined by the proposition "selection effect of help") that explains the choice made in

terms of help. Each worker i is, either on Regime 1 if this worker exchanges informal help, or on Regime 2 if she/he does not. For both regimes, an outcome equation is fitted. The set of variables Z contains an exclusion variable that plays a key role in the assignment to a particular regime. To be robust, the exclusion variable must be highly correlated to $HELP$ but not correlated to Y. After checking that this condition is filled, we take as exclusion variable, *the working atmosphere in the firm (WORK_ATM) variable*. This variable represents a characteristic of the work environment in the firm, and promotes communication and exchange between employees. Moreover, it does not seem to have a direct influence on the determination of wages or effort which are associated to the nature of work and not to the atmosphere in the workplace. Statistically, this variable is not correlated with employees' wage and effort but is correlated with $HELP$, the informal help variable.

Let Y_{1i} be the outcome of employee i if he faces Regime 1 and Y_{2i} if he faces Regime 2. Our outcome equations are :

$$\begin{aligned} &\text{Regime 1 :} Y_{1i} = X_{1i}\beta_{1i} + \varepsilon_{1i} \text{ if } HELP_i = 1 \\ &\text{Regime 2 :} Y_{2i} = X_{2i}\beta_{2i} + \varepsilon_{2i} \text{ if } HELP_i = 0 \end{aligned} \tag{I.10}$$

where X_1 and X_2 are exogenous variables that explain the outcome variable Y, and β_1, β_2 and γ the vectors of estimated parameters. The error terms ε_1, ε_2 and u are assumed to have a trivariate normal distribution with mean zero and a covariance matrix given by :

$$\Omega = \begin{bmatrix} \sigma_u^2 & \sigma_{1u} & \sigma_{1u} \\ \sigma_{1u} & \sigma_1^2 & \cdot \\ \sigma_{2u} & \cdot & \sigma_2^2 \end{bmatrix}$$

Where σ_u^2 is the variance of u, σ_1^2 and σ_2^2 are the variances of ε_1 and ε_2, and σ_{ju}, $(j = 1, 2)$ are the covariances between u and ε_j, $(j = 1, 2)$. The covariance

between ε_1 and ε_2 is not defined because Y_{1i} and Y_{2i} are never observed simultaneously. From $\sigma_{ju},\ (j = 1, 2)$, we derive $\rho_{ju},\ (j = 1, 2)$ the correlation coefficient between u and $\varepsilon_j,\ (j = 1, 2)$.

After estimating the parameters of each equation and the evaluating of the interactions between them, we can measure the effect of informal help on the outcome Y. We calculate the average effect of treatment on treated (ATT) individuals. It represents the average difference in wage and effort, between workers who are involved in informal help networks compared to those who are not. The ATT measures the difference between the expected values of Y_1 and Y_2 conditional on $HELP = 1$ as expressed in equation (I.11):

$$\begin{aligned} ATT &= E[Y_{1i}|HELP_i = 1, X1i] - E[Y_{2i}|HELP_i = 1, X2i] \\ &= X_{1i}\beta_1 + \sigma_1\rho_1\tfrac{f(\gamma Z_i)}{F(\gamma Z_i)} - X_{2i}\beta_1 + \sigma_2\rho_2\tfrac{f(\gamma Z_i)}{F(\gamma Z_i)} \end{aligned} \tag{I.11}$$

Where f and F are respectively the density and the distribution functions of the normal distribution. The ATT shows the effect of informal help on Y, for employees who use informal help.

3.5 The Choice of Variables for the Switching Equation

The first step of the econometric model consists in calculating the switching equation I.9. Guided by our proposition on the selection effect in help (developed in section 2.3), we identified a set of variables in reference to the literature (Burt, 1992, 1998; Coleman, 1990) on the social capital arguing that informal help could be determined by both the social structure and the organizational characteristics of workstation. We also included variables on changes at the workplace that may be associated with the NA dimension of work. Appendix I..4 presents the distribution of these variables.

The social structure is measured by the socio-demographic characteristics of the individual such as gender, age, seniority, the educational level or occupation.

For gender, Burt (1998) shows that women do not benefit from their informal networks as men in their work since women face legitimacy problems. The influence of age on informal help is not obvious. Older employees may not accept or give help as younger generations. Seniority, because it is a vector of trust and a component of the human capital, would favour integration and use of informal help. Finally, according to Coleman (1990), human capital is favourable to the formation of social capital, so the educational level and occupation could also determine informal help. A variable for workers with disability who may have different needs in terms of help is also included.

Organizational determinants can strongly shape informal help. In addition to the participation to teamwork, five organizational characteristics of workstations are measured: holding a hierarchical position (being chief), the intensity of industrial and commercial constraint, the use of IT, autonomy of the worker, the work atmosphere and having appraisal interview. In new forms of organisation which are more decentralized, supervision and hierarchical role would become scarcer. However, it remains part of the role of managers to connect different communities of employees (Burt, 1992). The indicator of work intensity presented in appendix I..3, measures the accumulation of industrial constraints (linked to machines and to the production process) and commercial constraints (linked to clients). Both of then influence the rhythm of work and potentially the needs for help. A high intensity of work can also represents a preference of managers, for higher levels of effort, so we need to control it when we assess the impact of help on effort. The use of technologies could also drive informal help. By encouraging a good work atmosphere, managers may favour cooperation and help between employees. The variable indicating if the employee have a performance appraisal interview, which can be considered as an extrinsic incentive to informal help and which is positively correlated with most informal help variables. Finally, three variables are indicators of strong changes experienced at the workplace: the changes in the pattern of organization, techniques used and

restructuration of the firm. The technological and organizational reorganisations of the firm may increase the NA dimension of work. A restructuring, a takeover or a change in the management team also change the routine of work and require a period of adaptation. Our last variables describe, in general terms, the productive context in which the firm operates: size and its sector. Size is measured by the logarithm of the number of the firm's employees. Since the quantity of information processed by the firm increases with its size, this can play a role on help.

4 Results

4.1 Determinants of Help

Due to their length, the results of the switching equations are reported in appendix I..4. They confirm our proposition on the selection effect in help. Firstly, variables related to socio-demographic characteristics are significantly correlated with the probability to participate to informal help. The social structure plays a significant role in shaping informal help, at least when it is proxied by socio-demographic characteristics. These results confirm some sociological analysis which points out that socio-demographic characteristics may be good proxies to explain the accumulation of social capital. Informal help is not randomly distributed among the population of workers. Stereotypes and bias associated with age, gender, disability or occupation are embodied in informal help network.

Variables associated with the organizational design of workstations are also significant determinants of the probability to be involved in a help network. The intensity of work and use of ICT are associated with a higher probability of help for most variables. It confirms the transversal and universal role played by technologies as an infrastructure of communication. Being chief is also highly correlated with the help offered. Help in a hierarchical relationship can occur

informally. The informal component is generally associated with a paternalistic management, which is less procedural. It can also refer to the specific network of manager to bridge structural holes (Burt, 1992) in an organization.

To conclude, according to our estimations, informal help at the workplace depends on the social characteristics of individuals, the organizational characteristics of workstation and changes in the work environment. In the next part, we will determine the impact of informal communication on effort and wage with an endogenous switching model.

4.2 Outcomes of Informal Help

The switching equation generates two regimes, which means that a "control group" is generated to measure the impact of informal help on wages and productive effort variables. This model appropriately controls potential selection bias and endogeneity problem of the outcome variables. Table I.2 presents the ATT differences resulting from the endogenous switching regression. They estimate the impact of informal help variables on wage and effort. It summarises the results fully presented in appendix I..5. As a benchmark, the naive estimator, which gives the average difference of outcomes without controlling the selection bias and endogeneity, is also presented.

We remark that all naive estimators are positive and significant. It means that when selection effects are not controlled, individuals who participate in informal help network (i.e., informally help other workers and/or are informally helped by other workers), produce higher levels of effort than workers not involved in an informal help network (i.e., workers who neither offer nor receive informal help, noted $IHnonr$). More precisely, workers who offer their help (without receiving), noted IHo have the highest level of effort. They are followed by workers who both receive and offer their help, noted IH. Workers who receive help without reciprocating (IHr) are in third position. Moreover, the comparison of naive

Table I.2: Informal help, wage and effort

IH : Offered and received informal help				
	Log(Net Wage)		Productive Effort	
	$IH=1$	$IHnonr=1$	$IH=1$	$IHnonr=1$
	9.961	9.877	2.350	2.127
Naive Diff.	0.084***		0.222***	
Std. Dev.	(0.012)		(0.023)	
	$E[Y_1\|IH=1]$	$E[Y_2\|IH=1]$	$E[Y_1\|IH=1]$	$E[Y_2\|IH=1]$
	9.967	9.708	2.354	2.560
ATT	0.258***		-0.207***	
Std. Dev.	(0.01)		(0.011)	
IHo : Only offered informal help				
	Log(Net Wage)		Productive Effort	
	$IHo=1$	$IHnonr=1$	$IHo=1$	$IHnonr=1$
	10.025	9.877	2.357	2.127
Naive Diff.	0.148***		0.23***	
Std. Err.	(0.012)		(0.024)	
	$E[Y_1\|IHo=1]$	$E[Y_2\|IHo=1]$	$E[Y_1\|IHo=1]$	$E[Y_2\|IHo=1]$
	10.038	10.323	2.371	0.749
ATT	-0.286***		1.622***	
Std. Err.	(0.01)		(0.012)	
IHr : Only received informal help				
	Log(Net Wage)		Productive Effort	
	$IHr=1$	$IHnonr=1$	$IHr=1$	$IHnonr=1$
	9.910	9.877	2.184	2.127
Naive Diff.	0.033***		0.056**	
Std. Err.	(0.012)		(0.023)	
	$E[Y_1\|IHr=1]$	$E[Y_2\|IHr=1]$	$E[Y_1\|IHr=1]$	$E[Y_2\|IHr=1]$
	9.915	9.570	2.184	2.537
ATT	0.346***		-0.353***	
Std. Err.	(0.011)		(0.011)	

Note: 12,475 observations. The number of observations for each subsample is: 2,850 observations for IH ; 2,743 observations for IHo, 2,723 observations for IHr; 4,159 observations for IHnonr.
Significance levels: * : p<0.1 ** : p<0.05 *** : p<0.01
Standard Error in brackets ()
Source: COI survey and DADS files

estimators with the results of the switching model shows the importance of the selection effects on the links between informal help and effort. For helpers who do not receive any help (IHo), the estimators for the level of effort are positive and more important when the selection bias is controlled. It shows that these individuals are giving help for the proprieties of help itself and this produces real

outcome (in terms of effort), which goes beyond a selection effect. These individuals provide higher levels of effort, which may be due to a very low disutility of effort, compared to workers not involved in social help network. For recipients of informal help who are not reciprocating (IHr), the scenario is very different. Help that they receive, acts like a substitute to effort (free-riding behaviour). Indeed, workers who receive informal help without reciprocating produce a significantly lower of effort, compared to workers not involved in informal help. This may be due to a higher disutility of effort for this category of workers. Finally, for workers who both receive and offer informal help (IH), we observe also a lower level of effort compared to workers not involved in help network. However, the difference of average effort between the two groups is smaller in magnitude, compared to the difference of average effort between the group of workers who receive help without reciprocating and the group of workers not involved in help network.

Like for effort, all naive estimators concerning wage are positive and significant. It means that when selection effects are not controlled, individuals who participate in informal help network (i.e., informally help other workers and/or are informally helped by other workers), receive higher wages than workers not involved in an informal help network (i.e., workers who neither offer nor receive informal help, noted $IHnonr$). When looking at naive estimators, the wage premium and surplus of effort of workers involved in informal help networks are ordered in the same way. Workers who offer their help without receiving have the highest wage premium. They are followed by workers who both receive and offer their help (IH). Workers who receive help without reciprocating (IHr) are in third position. Workers who neither offer nor receive informal help ($IHnonr$) have the lowest wage premium. However, the comparison of naive estimators with the results of the switching model shows the importance of the selection effects on the links between informal help and wage. The evolution of the estimator depends on the variable that we are analysing (IH, IHr, IHo). For helpers who

do not receive any help (IHo), it does not pay to help other workers. When the help is not reciprocated, helpers face a wage penalty. For recipients of informal help who are not reciprocating (IHr), the scenario is very different: we observe a positive impact of help for this category. Despite a lower level of effort, receiving help may increase substantially their productivity and they benefit from a significant wage premium. Finally, we observe that workers who both receive and offer informal help (IH), also beneficiate from a wage premium.

To sum up, workers who offer their help without receiving have the highest wages and the highest level of effort. Speaking with the language of our model, the level of effort of such workers is equal to the sum of the effort level "e" and an extra effort which is the result of what has been called "selection effect". The switching model regression shows that workers who offer their help without receiving, face a wage penalty. This means that even if these workers have the highest wage (comparing with workers from the other groups IH, IHo and $IHnonr$), they should have been paid more, given the level of effort that they provide.

From the employers' perspective, as stressed in the model, informal help between workers increases their expected profit. However this result is ceteris paribus and it may be the case that the existence of informal help networks within a firm decreases its profit. Indeed as pointed by industrial sociologists (Roy, 1954, 1959; Gross, 1953), informal help networks can be used by workers in order to fight some aspects of the work organisation set up by managers. For instance, if there exists a performance target in a firm and if the management decides to increase this performance target, then workers can informally decide collectively to fail to reach this new target. This means that we need both to observe firms' profit and to compute an informal help index at firms' level, in order to conclude. Our dataset is a rich matched employer-employee dataset which contains firms' profit. However because for each firm, we observe at most 3 employees from this firm, it is not possible to compute an informal help index

at firms' level.

5 Conclusion

This article highlights the role of help at the workplace where employees are both in situation of productive interdependencies and social interactions. Beyond the formal relational architecture of the information system designed by management, employees develop help networks that they leverage to solve unexpected problems at work. The diffusion of innovative HR practices and new technologies, by changing the organizational design of workstation, impact directly and indirectly the help networks at the workplace. Most of the literature has focused on the direct effect associated with the relational architecture of organization the (for example, Salis & Williams (2010); or Grant (2007)). This article contributes to the literature from at least three standpoints. Firstly, we show that the informal help structure of the firm is also impacted through a modification of informal communication and cooperation between employees. By equipping employees with information technologies, the firm favours informal help. The intensification of work is also a significant determinant of informal help, since employees rely more often on their colleague to solve unexpected problem. Having hierarchical responsibilities, working in a good atmosphere are associated with an intensification of informal help between employees. Overall, at the workplace informal help is significantly driven by the organizational design of workstations. The social structure measured by the personal characteristics of employees does explain the level of help too, which highlights the stereotypes and discriminatory nature of informal help.

Secondly, informal help acts as a form of peer pressure arising in a team. Indeed, the results suggest that informal help is associated with a stronger motivation translated into higher level of efforts. Informal help could also signal a strong intrinsic motivation. When the selection bias is controlled, an asymmetry

appears between employees reciprocating help and employees who are not reciprocating help. While the former receive a wage premium and slightly decrease their effort, the latter, strongly decrease their effort suggesting a free-riding behaviour in help, while they obtain a wage premium from being helped. Finally, helpers who are not helped suffer from a wage penalty.

Thirdly, our article integrates the analysis of social mechanisms at the workplace, to understand how they shape behaviours of employees and impact their performance. It shows the strength of work organization that directly and indirectly impacts relationships at the workplace. Formal and informal communications play complementary role to favour pro-social behaviours at the workplace. Our results suggest that informal help could be a powerful vector of intrinsic motivation.

From a theoretical perspective, our article suggests to extend the Principal-Agent model. This claim is not new and has been advocated by many researchers, for instance on the argument that the reward/punishment incentive system derived from Principal-Agent model undermine workers' intrinsic motivation (Benabou & Tirole, 2003). Our paper uses a Principal-Agent framework but at the same time, workers' intrinsic motivation can increase through informal help networks. This is possible because in our model, informal help is not contractualized. Finally, our paper has three main limitations. The first limitation is that we do not provide an empirical evidence of the effect of informal help on firms' profit. This profit is, according to our model, expected to increase when workers informally help each other. But our model does not into account potential negative side effects of the existence of informal help networks. For instance according to Roy (1954), Roy (1959) and Gross (1953), informal help networks can be used by workers as a tool in order to collectively defeat some decisions (taken by managers) that they see as contrary to their interests. The second limitation is that we implicitly assume in the analysis of our empirical results that all firms in our sample have the same (wage-based) incentive system. However this assumption

may not be true as shown by Drago & Gravey (1998), on Australian data. The last limitation is that our model is not multi-agents and therefore it does not permit to fully identify the conditions under which the different informal help networks arise.

Appendix I

I..1 Measuring Total Help (TH) and Formal Communication (FC)

The Total Help variable (TH) is based on the below questions (from the employee section of the survey):

- Question 1: Do you ever help colleagues in the event of a technical problem, including a computer problem? Often (at least 2 to 3 times a month) / Sometimes (at least 2 to 3 times a year) / Never or almost never
- Question 2: Do other workers ask you help in case of difficulties within their team, clients, costumers or other people? Often (at least 2 to 3 times a month) / Sometimes (at least 2 to 3 times a year) / Never or almost never
- Question 3: If you have a temporary overload of work or if you are uneasy with a tricky or complicated task, are you helped by:
  - your supervisors? Yes/No
  - co-workers you usually work with? Yes/No
  - other persons in the firm? Yes/No
  - persons from outside the firm? Yes/No
- Question 4: Do you show your colleagues how to do their tasks? Often (at least 2 to 3 times a month) / Sometimes (at least 2 to 3 times a year) / Never or almost never

- Question 5: Has anyone from your company ever shown or explained to you how to operate an equipment or a complex machine? Yes/No
- Question 6: Has anyone from your company ever shown or explained to you how to execute a complex procedure or how to design a file or how to supply databases? Yes/No
- Question 7: Has anyone from your company ever shown or explained the attitude to be adopted in the interaction with clients (the public, the patients)? Yes/No
- Question 8: Has anyone from your company ever shown or explained to you other aspects of work? Yes/No

The Formal Communication (FC) is based on the following questions (from the employee section of the survey):

- Question 1: Do you regularly work with your supervisors? Yes/No
- Question 2: Do you regularly work with persons you supervise? Yes/No
- Question 3: Do you regularly work with colleagues from the same department? Yes/No
- Question 4: Do you regularly work with colleagues from other departments or colleagues in the company in general? Yes/No
- Question 5: Do you regularly work with people outside the firm? Yes/No
- Question 6: Do you ever work with employees belonging to other subsidiaries of the same group?" Yes/No
- Question 7: Do you ever work with other people (than the mentioned above)? Yes/No

I..2 Creation of the Informal Help Variable

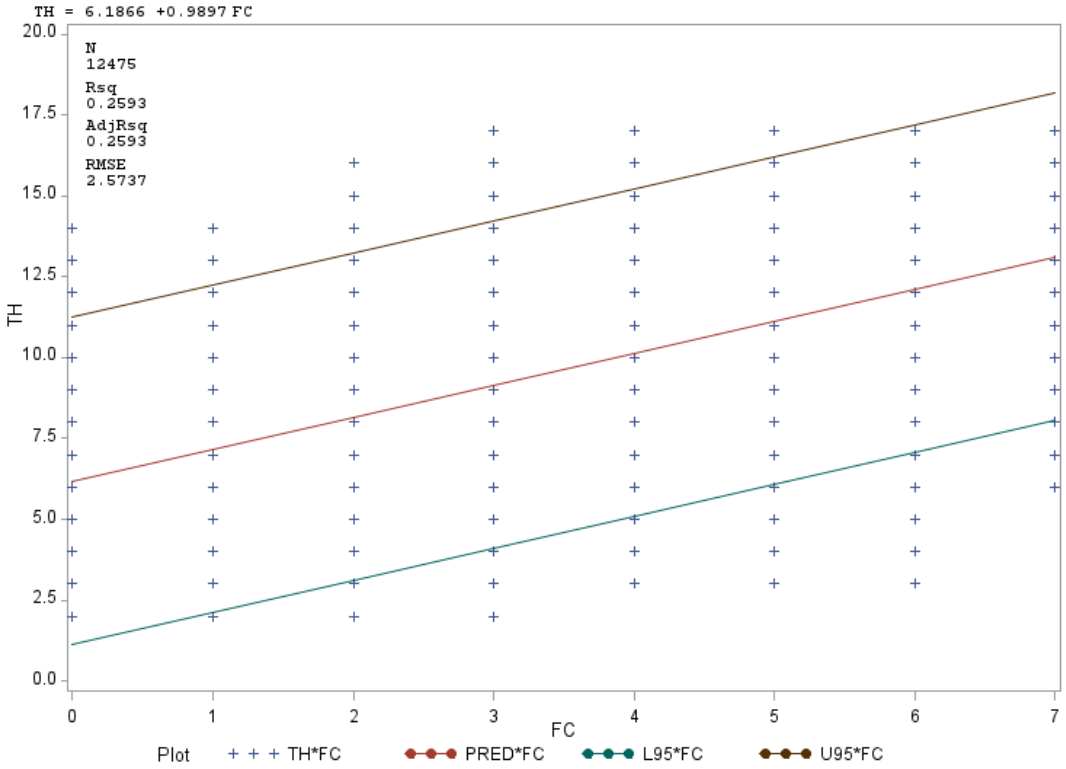

Figure I.1: Regression of the Total Help *TH* over Formal Communication *FC*

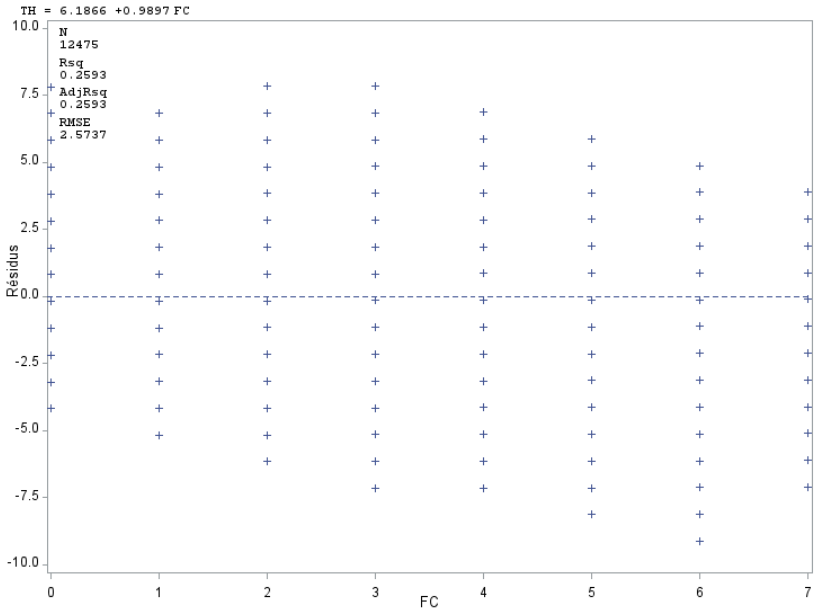

Figure I.2: Distribution the residuals $\hat{\varepsilon}$ over TH

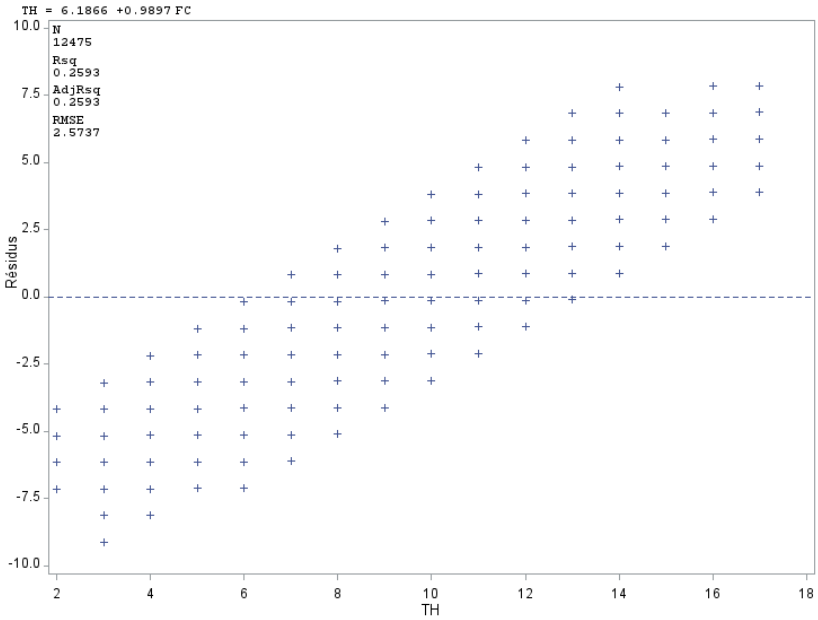

Figure I.3: Distribution the residuals $\hat{\varepsilon}$ over FC

I..3 Measuring the Intensification of Work

The intensification of work of employees measures the accumulation of industrial and market constraints.

Industrial constraints are measured with the following questions:
QB1 : Is your work rhythm imposed by the following:

a. Automatic moving of a product or a part?
b. Automatic pace of a machine?
c. Immediate dependence of one or more colleagues in the work done?
d. Production norms or deadlines to meet in an hour at most?
e. Production norms or deadlines to meet in a day at most?

The indicator of intensity of industrial denoted $IINDUS$ is:
$IINDUS = 1$ if (QB1a=yes or QB1b=yes or QB1c=yes or QB1d=yes or QB1e=yes), 0 otherwise.

The measure of market constraints relies on the following questions:
QB2 : Does your work rhythm imposed by the external demand (customers) need an immediate response? (yes/no).
QB3 : Are you in direct contact (face to face or by phone) with customers? 1) all the time, 2) regularly, 3) occasionally or 4) never.

The indicator of intensity of market constraints denoted $IMAR$ is:
$IMAR = 1$ if (QB2=yes or QB3=1 or QB3=2), 0 otherwise.

Finally, an intensification of work is observed when the worker cumulates the industrial and commercial constraints: $INTENS = 1$ if ($IINDUS = 1$ and $IMAR = 1$), 0 otherwise.

I..4 Descriptive Statistics

Table I.3: Descriptive statistics

INDIVIDUAL CHARACTERISTICS			
Variable	Description	%	
MALE	Gender: being male	62.37	
DIPLOMA	Highest diploma obtained by the employee		
Primary education		26.75	
Secondaryeducation		31.13	
Tertiary education		42.12	
SPC	Socio-professional category of the employee - Job		
Executives		16.18	
Middle managers		27.02	
Clerks		19.43	
Blue collars		37.37	
DISABLED	Having a health problem or disability that prevents from holding certain work positions or perform certain tasks	8.23	
Variable	Description	Mean	S.D.
AGE	Age of employee	40.01	9.99
Log(AGE)	Logarithm of *AGE*	3.66	0.27
AGE2	Square of *AGE*	1,700.53	805.88
Log(AGE2)	Logarithm of *AGE2*	7.31	0.53
ORGANISATIONAL DESIGN OF WORKSTATION			
Variable	Description	%	
MANAGER	Having employees under orders	28.17	
TEAM	Working with colleagues all or most the time (for more than 1/4 of the time)	64.07	
TRAINING	Having followed a certain training in the firm	78.36	
COMP_USE	Use of a desktop, laptop, or terminal computer	71.20	
INTENS	Intensity of industrial and commercial constraints	50.57	
AUTONOMY	Not having to strictly follow orders or procedures or instructions of use or not Receiving orders	55.91	
WORK_ATM	Having a good atmosphere in the workplace	56.83	
PERF_APPRAIS	Having a performance appraisal interview	49.54	
Variable	Description	Mean	S.D.
SENIORITY	Employee's seniority in the firm	12.77	10.02
Log(SENIORITY)	Logarithm of *SENIORITY*	2.17	0.95
ENVIRONMENT OF THE FIRM			
Variable	Description	%	
CHANG_MANAG	Restructuring, takeover or change in the management team of the firm over the past three years	55.85	
CHANG_ORG	Changes in the patterns or the organization of work in the firm over the past three years	45.51	
CHANG_TECH	Changes in the techniques used in work over the past three years	33.80	
SECTOR	Business sector of the firm		
manufacturing		40.22	
trade		17.72	
services		42.05	
Variable	Description	Mean	S.D.
FIRM_SIZE	Number of employees in the firm	1,888.40	8,673.62
Log(FIRM_SIZE)	Logarithm of *FIRM_SIZE*	6.01	1.72
NHIERA	number of hierarchical levels	4.53	1.76
Log(NHIERA)	Logarithm of *NHIERA*	1.44	0.38

Note: 12,475 observations
Source: COI survey and DADS files.

I..5 Results of the Switching Models

Table I.4: Results of switching models

		Log(Net Wage)			Productive Effort		
		Offered and Received Help	Only Offered Help	Only Received Help	Offered and Received Help	Only Offered Help	Only Received Help
Selection Equation							
MALE	Gender: being male	0.226***	0.215***	0.119***	0.239***	0.2***	0.133***
Log(AGE)	Logarithm of the age of the employee	-0.591***	-0.059	-0.585***	-0.643***	-0.113	-0.625***
DIPLOMA	Secondary education	0.048***	0.07	0.001	0.078*	0.048	0.034
	Tertiary education	-0.101***	0.094*	-0.12**	-0.055	0.019	-0.061
SPC	Middle managers	0.217***	-0.012	0.003	0.195***	0.058	-0.02
	Clerks	0.106***	-0.097	0.045	0.06	0.015	-0.027
	Blue collars	0.064***	-0.307***	-0.088	-0.031	-0.092	-0.229***
Log(SENIORITY)	Logarithm of employee's seniority in the firm	0.007***	0.071***	-0.107***	0.019	0.089***	-0.099***
CHIEF	Having employees under orders	0.319***	0.531***	-0.081*	0.328***	0.525***	-0.067
COMP_USE	Use of a desktop, laptop, or terminal computer	0.332***	-0.153***	0.297***	0.26***	-0.012	0.206***
INTENS	Intensity of industrial and commercial constraints	0.246***	0.112***	0.119***	0.299***	0.165***	0.158***
DISABLED	Having a health problem or disability that prevents from hold certain work positions or perform certain tasks	-0.118	0.195***	-0.181***	0.082	0.038	0.081
TEAM	Working with colleagues all or most the time (for more than 1/4 of the time)	0.076	0.086**	-0.014	0.062*	0.117***	-0.027
AUTONOMY	Not having to strictly follow orders or procedures or instructions of use or not Receiving orders	-0.074***	-0.051***	-0.049***	-0.133***	0.002	-0.112***
WORK_ATM	Having a good atmosphere in the workplace	0.192***	-0.069**	0.17***	0.205***	-0.065**	0.233***
CHANG_ORG	Changes in the patterns or the organization of work in the firm over the past three years	0.226***	0.029	0.061	0.227***	0.036	0.074*
CHANG_TECH	Changes in the techniques used in work over the past three years	0.246***	0.143***	0.235***	0.25***	0.114***	0.238***
CHANG_MANAG	Restructuring, takeover or change in the management team of the firm over the past three years	0.127	0.088***	0.072**	0.131***	0.065*	0.088**
Log(FIRM_SIZE)	Logarithm of the number of employees in the firm	0.029***	0.01	0.035***	0.033***	0.006	0.042***
SECTOR	Trade	0.177***	0.133***	-0.012	0.191***	0.099**	-0.012
	Services	0.122***	0.023	-0.009	0.127***	0.029	0.008
PERF_APPRAIS	Having a performance appraisal interview	0.287***	-0.092***	0.245***	0.227***	0.031	0.125***
cons.		0.57***	-0.445	1.422***	0.853***	-0.599*	1.679***
Regime 1							
MALE	Gender: being male	0.139***	0.242***	0.16***	0.124***	-0.043	0.208***
Log(AGE)	Logarithm of the age of the employee				-0.353***	0.205**	-0.355***
Log(AGE2)	Logarithm of the square of the age of the employee	0.234***	0.151***	0.218***			
DIPLOMA	Secondary education	0.051***	0.059***	0.04**	0.03	-0.014	0.08
	Tertiary education	0.187***	0.2***	0.145***	0.108**	0.062	0.124**
SPC	Middle managers	-0.482***	-0.437***	-0.478***	-0.373***	-0.406***	-0.459***
	Clerks	-0.667***	-0.625***	-0.668***	-0.647***	-0.575***	-0.669***
	Blue collars	-0.621***	-0.685***	-0.649***	-0.784***	-0.734***	-0.895***
Log(SENIORITY)	Logarithm of employee's seniority in the firm	0.063	0.085***	0.089***	0.007	-0.1***	-0.075***
CHIEF	Having employees under orders	0.04	0.229***	0.126***	0.223***	0.053	0.087*
TEAM	Working with colleagues all or most the time (for more than 1/4 of the time)	-0.05***	0.002	-0.046***	-0.118***	-0.222***	-0.14***
TRAINING	Having followed a certain training in the firm	0.054	0.034**	0.073***			
COMP_USE	Use of a desktop, laptop, or terminal computer				0.065	0.098*	0.144**
INTENS	Intensity of industrial and commercial constraints				0.133***	0.004	0.159***
DISABLED	Having a health problem or disability that prevents from hold certain work positions or perform certain tasks				-0.008	-0.014	-0.125*
CHANG_MANAG	Restructuring, takeover or change in the management team of the firm over the past three years	-0.021***	0.038***	-0.003	0.07*	0.012	0.122***
CHANG_ORG	Changes in the patterns or the organization of work in the firm over the past three years	-0.006***	0.027*	0.0002	0.167***	0.05	0.131***
CHANG_TECH	Changes in the techniques used in work over the past three years	-0.062**	0.019	-0.072***	0.016	-0.052	0.136***
Log(FIRM_SIZE)	Logarithm of the number of employees in the firm	0***	0.008*	-0.014***	0.008	0.025*	0.002
SECTOR	Trade	-0.068***	-0.045**	-0.069***	0.107**	0.117**	0.067
	Services	-0.041***	-0.046***	-0.012	0.166***	0.104**	0.059
Log(NHIERA)	Logarithm of the number of hierarchical levels in the firm	0.044***	0.027	0.063***	-0.006	-0.088	-0.034
cons.		8.55	8.393***	8.716***	3.309***	2.699***	3.097***
Regime 2							
MALE	Gender: being male	0.175***	0.219***	0.18***	0.192***	0.051	0.187***
Log(AGE)	Logarithm of the age of the employee				-0.086	-0.028	-0.096
Log(AGE2)	Logarithm of the square of the age of the employee	0.177	0.148***	0.184***	0.005	-0.031	0.002
DIPLOMA	Secondary education	0.039	0.052***	0.042***			
	Tertiary education	0.182	0.19***	0.182***	0.1**	0.077	0.099**
SPC	Middle managers	-0.495***	-0.478***	-0.465***	-0.415***	-0.473***	-0.433***
	Clerks	-0.642***	-0.652***	-0.627***	-0.706***	-0.687***	-0.713***
	Blue collars	-0.68***	-0.716***	-0.648***	-0.836***	-0.719***	-0.855***
Log(SENIORITY)	Logarithm of employee's seniority in the firm	0.058**	0.063***	0.073***	-0.056***	-0.092***	-0.067***
CHIEF	Having employees under orders	0.107**	0.206***	0.149***	0.21***	-0.112**	0.177***
TEAM	Working with colleagues all or most the time (for more than 1/4 of the time)	-0.037***	-0.021*	-0.027**	-0.136***	-0.19***	-0.143***
TRAINING	Having followed a certain training in the firm	0.072***	0.075***	0.071***			
COMP_USE	Use of a desktop, laptop, or terminal computer				0.088**	0.074	0.087**
INTENS	Intensity of industrial and commercial constraints				0.134***	0.012	0.125***
DISABLED	Having a health problem or disability that prevents from hold certain work positions or perform certain tasks				-0.043	-0.06	-0.043
CHANG_MANAG	Restructuring, takeover or change in the management team of the firm over the past three years	-0.004***	0.018	0.0003	0.043	-0.011	0.04
CHANG_ORG	Changes in the patterns or the organization of work in the firm over the past three years	0.004***	0.032**	0.018	0.194***	0.163***	0.182***
CHANG_TECH	Changes in the techniques used in work over the past three years	-0.048***	-0.003	-0.052***	-0.021	-0.126***	-0.019
Log(FIRM_SIZE)	Logarithm of the number of employees in the firm	0.003***	0.01***	0.001	-0.001	-0.009	-0.0004
SECTOR	Trade	-0.105***	-0.078***	-0.089***	0.132***	0.055	0.116***
	Services	-0.06***	-0.047***	-0.052***	0.077**	0.037	0.069**
Log(NHIERA)	Logarithm of the number of hierarchical levels in the firm	0.018***	0.017	0.021	-0.029	-0.018	-0.03
cons.		8.678*	8.955***	8.516***	2.961***	2.512***	3.078***
Number of observations		7,009	6,902	6,882	7,009	6,902	6,882

Note: Total number of observations: 12,475
Levels of significance: * : p<0.1 ** : p<0.05 *** : p<0.01
Source: COI survey and DADS files

Chapter II

Do Performance Appraisals Decrease Employees' Psychosocial Risks?

Joint work with Marc-Arthur DIAYE

Abstract

This chapter focuses on the psychosocial risks, workers are exposed to in the workplace, and the performance appraisal system in the firm, since it is a management practice that impacts workers' psychosocial well being. The objective in this chapter is to disentangle the ambiguous effects of performance appraisals on employees' psychosocial risks.

It uses a cross-sectional linked employer-employee database collected from the French "Working Conditions" Survey 2013 to create an aggregate index that measures the employees' level of psychosocial risks, and to evaluate the effect of performance appraisals on employees' psychosocial risks. A Propensity Score Matching with psychosocial risks as outcome and performance appraisal as selection variable or treatment is implemented to assess the impact of performance appraisal on psychosocial risks.

The results show that the reported levels of psychosocial risk decrease when employees receive performance evaluation reviews on a regular basis. Moreover, performance appraisal tends to reduce the strain related to personal matters such as social tensions but not the stress due to excessive work demands.

This analysis stands out from the literature in the sense that it distinguishes the psychosocial risks perceived by the workers from the point of view of the employer.

Keywords: psychosocial risks, performance appraisals

JEL Classification: C43, J28, M54

1 Introduction

1.1 Psychosocial Risks

Working conditions have a significant impact on the performances of both employees and firms and encompass a wide range of components. A poor working environment deeply affects employees physically, psychologically and socially. The physical risks are well known and have been widely studied. They include all the physical factors that can affect individuals' physical health or cause an occupational illness and which are therefore addressed as they arise (Pease, 1981; Burton, 2001; Yakovlev & Sobel, 2010). The question of the psychosocial effects of working conditions is a more recent one; one that has gained attention since the 1980s mainly by psychologists and sociologists, as a result of increasingly demanding working environments (Hatzfeld, 2013; Poggi, 2010). The most recognizable aspect of psychosocial risk is work-related stress but it also includes violence, harassment, economic insecurities, ethical issues, etc. The workplace environment, changes in the organization and work management, increasing challenges and firms' managerial policies have a direct effect on employees' well-being (Askenazy & Caroli, 2010), and could be potential sources of risk for employees, like stress (Dahl, 2011) or psychosocial risks (Aziza-Chebil et al., 2017).

There is a consensus in the literature that inadequate working conditions are a complex issue that has many medical, psychological, social and economic aspects and implications. The importance of a positive working environment was first highlighted in the fields of psychology and sociology. Iaffaldano & Muchinsky (1985) used a meta-analysis of statistical data to show the high correlation between job satisfaction (working conditions being a component of job satisfaction) and employee's performance. This meta-analysis gave rise to a variety of papers (Warr, 1999; Martin, 2005).

In order to better understand occupational stress and psychosocial hazards

in general, it is necessary to establish reliable definitions, structured models, and methods of measurement of these risks. Theoretical models have been developed to explain the mechanisms leading to occupational stress; Among them is the "demand-control model" developed by Karasek (1979). The latter defines a job strain situation as being a combination of two factors: high demands and low decision latitude. To these two factors, Karasek & Theorell (1990) added a third one: social support, which helps to minimize the negative effects of job strain. This model has been a benchmark in the mapping of occupational stress. Let us also mention the Siegrist "effort-reward model" (Siegrist, 1996; Siegrist et al., 2004). And more recently, Bakker & Demerouti (2007) introduced the "job demands-resources model" as an alternative to those models. In this model, "high job demands" exhaust the mental and physical resources of employees, but in situations where employees have autonomy and receive supervisor feedback and support, motivation and performance improve. Thus, interactions between job demands and job resources help to buffer job strain.

Scholars in the field of economics have also shown interest in the question of well-being in the workplace (Poggi, 2010). Examining the relations between working conditions and well-being and performance, earnings and economy in general, Akerlof & Kranton (2000) have developed a model of how personal identities and social interactions between individuals shape economic outcomes. Easterlin (2001) explores the relationship between subjective well-being and income; Groot & van den Brink (1999) analyze the price of occupational stress. Concerning the economic implications of working conditions and job satisfaction on individual's perceived health and well-being, Robone et al. (2011) examine the impact of contractual and working conditions on employees' self-assessed physical and mental health, and Poggi (2010) focuses on the relation between employees' job satisfaction and aspirations. Askenazy & Caroli (2010) and Dahl (2011) investigate the impact of work practices and organizational change on employees' health, in France and Denmark respectively. They find that certain

work practices significantly increase stress-related risks. Similarly, Wooden et al. (2009) examine the effect of working time mismatch, or mismatch between actual and desired hours of work, on reported levels of job and life satisfaction, and find, inter alia, that it is not the number of hours worked that matters for subjective well-being, but working time mismatch .

The prevalence of psychosocial risks has given rise to public concern and has prompted various labour and health organizations to provide an overview of the situation worldwide and to define and identify psychosocial risks in actual situations. In this context, the World Health Organization publication by Leka & Jain (2010) focuses on the methodology of establishing appropriate risk measures, their estimation and their effect on human health. Using a similar approach, the Gollac College of experts, set up in France in 2010 Gollac (2010) addresses the same question, with the aim of identifying the different risk factors implicated, listing the existing mechanisms of risk monitoring and evaluation and establish a more comprehensive tracking system.

Once identified, psychosocial risk factors must be quantified. This is a difficult task in that it involves measuring the psychological well-being of individuals, which by definition is difficult to describe objectively. Different methods have been used to assess the overall psychosocial risk levels. For instance, to estimate global stress levels, Bellinghausen & Vaillant (2010) use Generalized Estimating Equations, which take into account the heterogeneity of the different factors. Bergh et al. (2014) have developed a scale to measure psychosocial risk, by calculating the weighted sum of the different risk factors. The weightings are based on experience data derived from previous surveys.

Many aspects of managerial and organizational practices have a direct effect on the well-being of employees and could be potential sources of risk (Askenazy & Caroli, 2010; Dahl, 2011). Aziza-Chebil et al. (2017) question the relation between firms' organizational and structural changes and increasing psychosocial

risks among employees.

1.2 Performance Appraisal

Performance appraisal is an important managerial process used by a company to evaluate and improve its employees' performance (Murphy & Cleveland, 1995). Cappelli & Conyon (2018), using data from one single firm over 7 years period (2001-2007), analyse how performance appraisal is applied in practice and they find that it is really informative of employees performance, in the sense that it differentiates between employees, that it does shape employment outcome, such as pay increases and promotions, and also that the result of a performance appraisal interview vary considerably over time for the same person and among individuals. From the employee's perspective, performance appraisal can be viewed as a tool for career development, but it can also generate a great amount of stress. In fact, for an employee, performance appraisals are a means of improving communication, of developing one's career within the firm and of setting goals, but it is also a source of tensions and sometimes injustice. Performance evaluation can be viewed as an incentive to improve the work situation but it can also be an obstacle to the well-being of workers.

Many aspects of the influence of performance evaluation on employees' situations, wages and performance have been investigated. First, Brown & Heywood (2005) and Addison & Belfield (2008) set the determinants of performance appraisal respectively in the Australian and British contexts, they find that high tenure is negatively associated with performance appraisal and incentive pay has a positive effect on it. Furthermore, Prendergast & Topel (1993) address the bias resulting from the fact that interviews do not always make it possible to thoroughly evaluate employee's performance. Diaye et al. (2007) provide a model of the effects of performance appraisals on employees' levels of effort and wages; and find, in the French context, that evaluation interviews have a positive impact

on productivity and earnings, and help employees gain a better understanding of their working environment. The relationship between management practices and workplace performance has been studied by many scholars, such as Ramsay et al. (2000), who address the question using three different conceptual models. Another aspect concerns social relations in the workplace. In a study focusing on Germany and European countries, Grund & Harbring (2013) find that monitoring by supervisors is negatively related to employees' trust in their managers and that it also affects the correlation between the existence of a performance appraisal system and individuals' trust in others.

On the relationship between firms' appraisal systems and employees' well-being, White et al. (2009) identify, on British firms, a negative - albeit small - effect on the work-life balance of long working hours and selected high-performance management practices including the appraisal system. Coutrot & Sandret (2015), in a study using the Karasek model and based on a French survey that monitors medical surveillance of employees' exposures to occupational risks ("SUMER" survey), assess the likelihood of exposure to psychosocial risks under manager supervision (given by the use of performance appraisals and imposing quantified objectives). Their results show that the existence of a structured evaluation decreases the likelihood of being in a job strain situation. This might seem counter-intuitive if we consider that evaluation increases workers' stress. Furthermore, this result could be due to the existence of a perception effect whereby employees have a subjective impression of improvement in their work environment.

1.3 Hypotheses to be Tested

Performance appraisal belongs to the class of subjective evaluation models (MacLeod, 2003), as opposed to objective evaluation models in which the evaluation of employees' performance is based on a verifiable variable (for instance, the output of the task that an employee has to perform). In the class of of subjective evaluation

models, the evaluation of the employee's performance is based on a subjective assessment of his performance by his supervisor. According to Gibbs & Hendricks (2004), performance ratings are based on the so-called DOGNUT scale, where DOGNUT means "Distinguished, Outstanding, Good, Needs improvement, Unsatisfactory, Too new to evaluate". But the subjective aspect of performance appraisals raises the question of their manipulability. Indeed the assessment of an employee's performance expresses to some extent the subjective point of view of the evaluator, and this point of view could be biased (Catano et al., 2007). For instance, the point of view of the evaluator could be biased because the he/she could make some errors in his evaluation, or he/she could deliberately has a biased behaviour, or the criteria of assessment themselves are biased. The manipulability of performance appraisals may create a situation of insecurity for employees and this could increase their psychosocial risks. Moreover some behavioural criteria (especially those linked to the so-called "firm's values") can create, for employees, a cognitive dissonance (conflict of values) between their own and "firm's values". For instance, while loyalty is a positive value for any firm, it could sometimes be in contradiction with another general positive value: integrity. Therefore if being loyal to the firm means accepting to cover to some practices that are unacceptable to the employee, this could create a cognitive dissonance for this employee and increase his psychosocial risk.

We derive from the above literature review, the below working hypothesis.
Hypothesis 1 : Performance appraisals increase employees' psychosocial risks.

However according to Cappelli & Conyon (2018), performance appraisals have actually many positive aspects for employees that may contribute to reduce workers' psychosocial risks. For instance, performance appraisals permit employees to better communicate with their supervisors about their working conditions and about the mismatch between their skills and what the job requires. They also permit the supervisors to take the work context into account when evaluating employees. In sum, performance appraisals are a ritual which permits, despite

their subjectivity, a more objective evaluation of the work context. Finally it seems also that, in practice, performance appraisals are not biased on average, either concerning the criteria used or the way they are implemented. In France for instance (Benhamou & Diaye, 2011), in 2006, around 90% of evaluated workers think that performance appraisals' criteria are precise and measurable.

As a consequence, it may be the case that,
Hypothesis 2 : Performance appraisals decrease employees' psychosocial risks.

The objective in this paper is to disentangle the ambiguous effects of performance appraisals on employees' psychosocial risks (*Hypothesis 1* vs *Hypothesis 2*). To this end, we use the 2013 French Working conditions survey. It is a matched employer-employee dataset with 4850 employees and 4167 firms. In order to take into account of the potential selection effects, we use a propensity score matching method.

The remaining of the paper includes three other sections. Section 2 is devoted to the dataset and the construction of the psychosocial risks variable. Section 3 presents the econometric regressions and the results. Finally section 4 concludes.

2 The Dataset and the Main Variables

The "Working Conditions" ("Conditions de Travail", in French) survey, jointly conducted by the National Institute of Statistics and Economic Studies (INSEE) and the French Ministry of Labour (DARES) in 2013 is a matched employer-employee survey on the organizational, physical, and psychosocial aspects of employees' working conditions. The employee section focuses on a sample of employed individuals who are at least 15 years old and includes personal data, information about the participants' occupation, physical stress, psychological stress and work organization. A self-administered questionnaire provides a large part of the data on psychosocial constraints. The firm section targeted a sample

of firms and provided information on the characteristics of each company, on their management and work organization, ICT, health and safety management and the percentage of employees exposed to psychosocial risks.

We focused more specifically on private-sector companies and on employees who had been employed for at least one year in one of the companies. Thus we obtained a database on 4850 individuals distributed over 4167 firms. We use a variable that indicates whether or not a performance appraisal interview system exists in the company, and different variables indicating the existence or not of psychosocial risks for each employee, as perceived by the employee on the one hand, and the firm on the other, and variables related to general information about the firms and employees.

2.1 The Variables

The variables of concern are performance appraisals and the level of psychosocial risks for each employee. The performance appraisals variable (denoted *EVA*) is a binary variable that takes value 1 if the employee undergoes at least one performance evaluation interview per year and 0 otherwise. The distribution of this variable indicates that 61% of employees in France, in 2013, went through at least one evaluation interview a year. There exist in France two main categories of interview within firms: the performance appraisals ("Entretien individuel annuel d'évaluation" in French) and the professional interview. The latter is mandatory (since the National Inter-professional Agreement of December 5, 2003) and specifically devoted to the professional training needs of the employee and the improvement of his skills. The professional interview has to take place at least once every two years. The former is not mandatory, is devoted to the evaluation of performance (and of course to the work context) and depends to the will of firms. However once a firm has decided to set up a performance appraisals scheme in order to evaluate some or all its employees, this firm has to comply

to some legal rules, whose role is to prevent bias in the performance appraisals scheme.

Concerning the psychosocial risks variable, the French "Working Conditions" survey provides various psychosocial risks related variables. From the employees' section of the "Working Conditions" survey, we derive a list of 58 binary psychosocial risks variables (see appendix II..1) coded 0 or 1, according to the employee's answer to a "yes" or "no" question concerning a specific risk factor. Since these psychosocial risks variables measure psychosocial risks from the employees' standpoint, they are a measurement of the employees perception of their own psychosocial risks.

Coutrot & Sandret (2015) uses variables from the French "SUMER" survey to evaluate management supervision impact on psychosocial risks. For comparability, we consider a second list of psychosocial risk variables that matches Coutrot & Sandret (2015) list, and includes 17 items (see appendix II..3). Even though, the first paper uses the *SUMER* survey, the variables can be retrieved from the "Working Conditions" survey. Furthermore, this survey also measures psychosocial risk from the employees' standpoint. The use of different lists of variables helps compare the results for different indexes and sources of information, and gives an idea of the exportability of the results. This list will be denoted by *SUMER* list.

Moreover, the employers' section of the French "Working Conditions" survey includes also eight variables (see appendix II..2) regarding the level of their workers' psychosocial risks. These variables indicate the percentage of employees (0%, less than 10%, between 10% and 50% and more than 50%) who, according to the firm, are exposed to a given psychosocial risk (eight in total).

Finally, let us point that the psychosocial risks variables in the French "Working Conditions" survey have a sound theoretical ground, since they are based on the models of Karasek (1979); Karasek & Theorell (1990); Siegrist (1996).

Based on these models, the Gollac college of experts (Gollac, 2010) provides a 6-dimensional classification of the factors of psychosocial risks: *Dimension 1: work demands - Dimension 2: emotional demands - Dimension 3: autonomy and leeway - Dimension 4: social and work relations - Dimension 5: conflicts of values & Dimension 6: economic insecurity.*

2.2 Psychosocial Risks Index as declared by Employees

In order to implement a measure of psychosocial risk, we adopt an aggregation method so that the index created is a measure of intensity. The aggregate index have to take into account the cumulative and the compensation effect between the items; and to account for the heterogeneity of situations, i.e. two individuals with the same scores should not be in very different situations.

Several aggregation methods are available. In Bergh et al. (2014), which evaluates psychosocial risks in the oil and gas industry, a weighted summation is used. The weights are determined based on their effect on the well-being of employees in an earlier survey. In our case, weighting is not a measure of the theoretical importance of each item but intervenes to correct for overlapping information between two or more correlated indicators.

Construction of a Weighted Index

The method that we use is called Factor Analysis Method (see the "Handbook on Constructing Composite Indicators", Nardo et al. (2005)). Factor analysis is a general method of data analysis related to principal component analysis. In our case, since the variables are dichotomous, the factor analysis method is performed using the tetrachoric correlation matrix. Then, for each dimension c, the factorial axis that are kept are those with associated eigenvalues larger than one and such that their contribution to the global variance is larger than 10% and the sum of their contributions is larger than 60%. A varimax rotation is then used to minimize the number of individual indicators that have a high

loading on the same factor. The weight of the k^{th} risk item in the i^{th} dimension is estimated by:

$$w_{ik} = \sum_c p_{ikc} \frac{l_{ikc}^2}{\sum_{k=1}^{N_i} l_{ikc}^2}$$

with l_{ikc} the coordinate of I_{ik} on the factorial axis c (after rotation), and p_{ikc} the proportion of variance explained by the factor c relative to the global variance. N_i is the number of variables in the dimension i.

Moreover the weights are such that $\sum_{k=1}^{N_i} w_{ik} = 1$.

Thus, the index obtained for the dimension i is:

$$IND\_FA_i = \sum_{k=1}^{N_i} w_{ik} I_{ik}$$

Finally the global index is determined by performing another factor analysis method to the six dimension-indexes:

$$IND\_FA = \sum_{i=1}^{6} w_i \ IND\_FA_i$$

where

$$w_i = \sum_c p_{ic} \frac{l_{ic}^2}{\sum_{i=1}^{6} l_{ic}^2}$$

By applying the weighted summation method to our list of 58 variables (see appendix II..1), we obtain a global index (*IND_ FA*), and six indexes per dimension (IND_FA_i, $i = 1 \dots 6$).

Using the *SUMER* list of variables, we create a second weighted index based on Factor analysis method, denoted *IND_ FA'*. The distributions of the produced global index and six dimension indexes is given in appendix II..4. The indexes *IND_ FA* and *IND_ FA'* have a Pearson correlation of 0.737. The distributions of *IND_ FA* and *IND_ FA'* are represented along with their densities in appendix

Table II.1: Distribution of the Global Index

	Mean	SD	Min	Max
IND_FA	0.347	0.136	0.034	0.796

Note: 4850 observations
Source: "Conditions de Travail" Survey 2013

Table II.2: Distribution of the Dimension-Indexes

Dimension	Mean	SD	Min	Max
Dim. 1 (IND_FA_1): work demands	0.377	0.188	0	0.949
Dim. 2 (IND_FA_2): emotional demands	0.448	0.232	0	1
Dim. 3 (IND_FA_3): autonomy and leeway	0.347	0.222	0	1
Dim. 4 (IND_FA_4): social and work relations	0.286	0.168	0	0.914
Dim. 5 (IND_FA_5): conflicts of values	0.347	0.223	0	1
Dim. 6 (IND_FA_6): economic insecurity	0.318	0.234	0	0.750

Note: 4850 observations
Source: "Conditions de Travail" Survey 2013

II..5

3 Methods, Regressions and Results

3.1 Estimation Strategy

The question we address is whether performance appraisals decrease workers' psychosocial risks. To answer this question we use a propensity score matching (PS-Matching) method which takes into account the potential selection bias. For instance, it may be the case that managers do not evaluate workers that they expect to have high psychosocial risks; or it may be the case that evaluated workers are also workers who have been hired through a tough pre-recruitment (medical, psychological, resistance to mental tension or effort) procedure.

However, since the psychosocial risks are measured from the workers' side, it may be the case that the change in psychosocial risks that follows a performance

appraisal is just a perception effect from workers. In order to check whether workers are subject to a perception effect, we restrict the sample to workers in firms which report high psychosocial risks for their workers. And we re-estimate the effect of performance appraisal on workers' psychosocial risks in this sub-sample, where we know that all workers faced high psychosocial risks. Then if the difference in terms psychosocial risks between workers who have a performance appraisal interview and workers who have not, is statistically significant then this difference is a perception effect. On the contrary, if this difference is not statistically significant then there is no perception effect and the results found on the whole sample are robust.

It should be noted that we do not also restrict the sample only to workers in firms that report low psychosocial risks for their employees, since it is known that firms, comparing to their employees, tend to underestimate the psychosocial risks (van Stolk et al., 2012). As a consequence, when a firm reports high psychosocial risks, we expect this reporting to be true.

To resume, our estimation strategy is in two steps. In step one, we estimate the causal effect of performance appraisal on workers' psychosocial risks. In step two, we check whether there exists or not a perception effect.

3.2 Step 1 : Estimation of the Effect of Performance Appraisal on Workers' Psychosocial Risks

Effect of Performance Appraisals on the Global Psychosocial Risks Index

The propensity score matching technique, introduced by Rubin (1974) and Rosenbaum & Rubin (1983) is widely used to estimate the treatment effect on the variable of interest or outcome, by comparing the means of the outcomes of the treated and the control groups, and by taking into account the bias effect resulting from the difference in their structures. This is done by matching each treated individual to a non-treated individual who is similar in terms of a function of

observable characteristics (the propensity score). The characteristics or control variables X are chosen so that they affect both the treatment variable (here, the performance appraisals variable EVA) and the outcome variable (here, the psychosocial risks variable IND_FA). The matching technique used in our case is based on "kernel matching" (Heckman et al., 1998).

Depending on the value of EVA_i, a potential outcome is defined for *each individual* as :

$$IND\_FA_i = \begin{cases} IND\_FA_{1i} & if\ EVA_i = 1 \\ IND\_FA_{0i} & if\ EVA_i = 0 \end{cases}$$

The causal effect of the treatment is given by $IND\_FA_{1i} - IND\_FA_{0i}$ though IND_FA_{1i} and IND_FA_{0i} are never observed simultaneously since only one situation is real and the other is hypothetical. The matching allows the creation of a counter-factual for the unobserved group based on the confounding variables and the comparison is shown through the estimation of the average treatment respectively on the treated (ATT) or the untreated (ATU). The Average Treatment effect on the Treated (ATT) is defined by :

$$\begin{aligned} ATT &= \mathbb{E}[IND\_FA_{1i} - IND\_FA_{0i}|EVA_i = 1, p(X_i)] \\ &= \mathbb{E}[IND\_FA_{1i}|EVA_i = 1, p(X_i)] - \mathbb{E}[IND\_FA_{0i}|EVA_i = 1, p(X_i)] \end{aligned}$$

and the Average Treatment effect on the Untreated (ATU) is defined by :

$$\begin{aligned} ATU &= \mathbb{E}[IND\_FA_{1i} - IND\_FA_{0i}|EVA_i = 0, p(X_i)] \\ &= \mathbb{E}[IND\_FA_{1i}|EVA_i = 0, p(X_i)] - \mathbb{E}[IND\_FA_{0i}|EVA_i = 0, p(X_i)] \end{aligned}$$

Where $p(X)$, the propensity score, is defined by :

$$p(X_i) = \mathbb{E}[EVA_i|X_i] = \mathbb{P}(EVA_i = 1|X_i)$$

Since we investigate the effect of performance appraisals, we are interested on the ATT. As a consequence, the counter-factual is $\mathbb{E}[IND\_FA_{0i}|EVA_i = 1]$.

$p(X)$ the propensity score is built in such a way that the Conditional Independence is fulfilled:

$$IND\_FA_{1i}, IND\_FA_{0i} \perp\!\!\!\perp EVA_i \mid p(X_i)$$

In fact, the confounding variables must capture all relevant differences between the two groups such that the outcome variable IND_FA is independent of EVA conditionally on X. But as X comprises a high number of variables, we replace them with a propensity score, $p(X)$, which must maintain the Conditional Independence.

From Addison & Belfield (2008) and Brown & Heywood (2005), we select the following variables in table II.3 for estimating the propensity score.

Table II.3: Definition of Control Variables

Variable	Description	%
SPC	1. executives	19.24
	2. middle managers	28.74
	3. clerks	22.14
	4. blue collars	29.88
ACTV	2. manufacturing sector	29.84
	3. construction sector	6.62
	4. transportation sector	7.86
	5. trade sector	16.45
	6. service sector	39.24
TPP	1. full-time contract	84.70
	2. part-time contract	15.30
ENV_CERT	1. use of environmental certification or ethical labelling in the firm	28.08
	2. no environmental label	71.92

Note: 4850 observations
Source: "Conditions de Travail" Survey 2013

Finally since we use the propensity score to replace the conditioning by X, we perform a balancing t-test on these co-variates to ensure that the conditional

distribution of X given $p(X)$ is independent of EVA. The results (see table II.14 appendix II..6) prove conclusive and the chosen model significantly reduces the bias in the distribution between the matched and unmatched samples in the different models. Furthermore, the common support condition is fulfilled, which implies that for each individual in one group there is an individual in the other group with the same propensity score.

The results of the ATT estimates (and of the naive mean difference without matching) for the global index IND_FA are provided below (table II.4).

Table II.4: Results of PS-Matching for the Global Index

IND_FA	EVA=1	EVA=0
	0.338	0.362
Naive diff.	-0.024***	
	(0.004)	
	0.338	0.403
ATT	-0.064**	
	(0.03)	

Notes: 4850 observations
Significance levels: * : p<0.1 ** : p<0.05 *** : p<0.01
Standard Error in brackets.
Source: "Conditions de Travail" Survey 2013

The results clearly show that in French firms, workers who are evaluated (through a performance appraisals scheme) have a lower psychosocial risks level compared to workers who are not evaluated. This decrease in psychosocial risks level is even more pronounced in the matched estimation than in the naive one. This indicates that other elements in the underlying situation tend to attenuate the effect of the evaluation interview.

The ATT estimates for the global index IND_FA' are provided in appendix II..7. The results provided by the ATT on IND_FA' show similar results to those using IND_FA. Workers who go through a performance appraisal interview have a lower level of psychosocial risks. This result also support the findings of

Coutrot & Sandret (2015) which indicate the decrease of job-strain situations under performance appraisal systems.

Effect of Performance Appraisals on Psychosocial Risks per Dimension

Our estimates clearly show that performance appraisal decreases employees' perception of their own psychosocial risks. We want to check whether this result is true for any dimension of the psychosocial risks. Let us remind that the dimensions are : work demands, emotional demands, autonomy and leeway, social and work relations, conflicts of values, and economic insecurity. The result are provided in table II.5.

Table II.5: Results of PS-Matching per Dimension

				IND_FA				
Dim. 1	EVA=1	EVA=0	**Dim. 2**	EVA=1	EVA=0	**Dim. 3**	EVA=1	EVA=0
	0.3710	0.3860		0.4490	0.4450		0.3290	0.3750
Naive diff.	-0.015***		Naive diff.	0.004		Naive diff.	-0.046***	
	(0.006)			(0.007)			(0.006)	
	0.3710	0.3790		0.4490	0.4840		0.3290	0.3550
ATT	-0.008		ATT	-0.034		ATT	-0.026	
	(0.042)			(0.054)			(0.042)	
Dim. 4	EVA=1	EVA=0	**Dim. 5**	EVA=1	EVA=0	**Dim. 6**	EVA=1	EVA=0
	0.2710	0.3090		0.3330	0.3690		0.3130	0.3260
Naive diff.	-0.037***		Naive diff.	-0.035***		Naive diff.	-0.014**	
	(0.005)			(0.007)			(0.007)	
	0.2710	0.3770		0.3330	0.4160		0.3130	0.4290
ATT	-0.106**		ATT	-0.083*		ATT	-0.117**	
	(0.042)			(0.049)			(0.049)	

Notes: 4850 observations
Significance levels: * : p<0.1 ** : p<0.05 *** : p<0.01
Standard Error in brackets
Dim. 1 : work demands - Dim. 2 : emotional demands - Dim. 3 : autonomy and leeway - Dim. 4 : social and work relations - Dim. 5 : conflicts of values - Dim. 6 : economic insecurity.
Source: "Conditions de Travail" Survey 2013

We observe that for dimension 1 (work demands), dimension 2 (emotional demands) and dimension 3 (autonomy and leeway), there is no significant effect of performance appraisals on employees' psychosocial risks. However, for

dimension 4 (social and work relations), dimension 5 (conflicts of values) and dimension 6 (economic insecurity), the effect is significant and there is a decrease in psychosocial risks due to performance appraisals.

These results suggest that the psychosocial risk aspects affected by performance evaluation are more related to the social implications of work that affects the employee personally such as the quality of the relations, ethics and perspectives and less by the pressure created by the job.

In the previous section, the indexes *IND_FA* and *IND_FA'* presented similar results for the effect of performance appraisal on the the global level of psychosocial risks. We, hereby, consider the six dimensions; work demands, emotional demands, autonomy and leeway, social and work relations, conflicts of values, and economic insecurity. And we would like to check if the effect on each dimension measured by the *SUMER* psychosocial risk variables will remain the same. The result are provided in appendix II..8.

The results given by the second index (*IND_FA'*) are closely similar to those given by *IND_FA*. On the dimensions work demands, emotional demands and autonomy and leeway, no significant effect is measured. While, on the social and work relations, conflicts of values, and economic insecurity dimensions the effect of performance appraisal is significantly negative, indicating that workers who undergo evaluation interviews have lower risks in these dimensions.

3.3 Step 2 : Estimation of the Effect of Performance Appraisal on Workers' Psychosocial Risks for Employees Working for Firms declaring High Psychosocial Risks

The previous sub-section shows that performance appraisals decrease workers' psychosocial risks. However since psychosocial risks are measured from the employees' side, this result does not indicate whether the changes in the level of reported psychosocial risks correspond to real improvements, or whether they,

in fact, correspond to a (pure) perception effect. Remind that the term "perception effect" means that the employees subjectively perceive an improvement, while there is objectively no improvement. An explanation for the existence of a perception effect is the following: During the evaluation interview, evaluated employees can talk about their working conditions and their psychosocial risks with their managers. As a consequence, evaluated employees may better objectivize their psychosocial risks than non-evaluated employees. Because of this better objectivization, evaluated employees may report a lower level of their psychosocial risks and this in turn, when comparing the groups of evaluated and non-evaluated employees, leads to an artificial decrease of the level of psyshosocial risks.

In order to check whether the decreasing effect of performance appraisal on psychosocial risks that we found is a real one, we restrict to the sub-sample of workers in firms which report high psychosocial risks for their workers. Of course, firms report of psychosocial risks faced by their workers in their own perception. And we do not argue that this perception is more objective than the perception from workers. We argue that at least, in the French context, firms usually underestimate the issue of psychosocial risks from workers. That is, workers from a given firm always report a higher level of psychosocial risks than the one reported by such firm. As a consequence, if a firm reports a high level of psychosocial risks, we expect this report to be true.

In practice, in our database, each firm report the percentage of their employees affected by psychosocial risks, with respect to eight psychosocial risks criteria (see appendix II..2). In the survey, the percentage variable is actually a categorical variable (that we denote $PCAT$), taking the values :

- 0 if (according to the considered firm), the percentage is 0.
- 1 if (according to the considered firm), the percentage belongs to the interval $]0, 10]$.
- 2 if (according to the considered firm), the percentage belongs to the in-

terval $]10, 50]$.

- 3 if (according to the considered firm), the percentage is higher than 50.

The psychosocial risks indicator from firms' side is defined as $IND\_FIRM = \sum_1^8 PCAT_i$, with $PCAT_i \in \{0, 1, 2, 3\}$ and i is a criteria of psychosocial risks, $i = 1..8$. Hence, IND_FIRM provides two informations about firms' point of view concerning their employees' psychological risks. It provides an information about the average intensity (that is the number of criteria involved) of psychosocial risks faced by any employee and it provides an information about the extent of these psychosocial risks (that is, the average percentage of workers who faced psychosocial risks in this firm).

For instance when $IND\_FIRM = 1$, we know that only one criterion is involved and less than 10% of workers are of concern by psychosocial risks. Finally for any employee in the database, we know his own assessment of his psychosocial risks (through IND_FA) and we know the general assessment of psychosocial risks by the firm in which this employee works. We use IND_FIRM to select some workers who, according to the firms in which they work, are likely to be subject the most to psychosocial risks. Over the initial 4850 employees in the dataset, around 30% work for a firm which does not report any information about $PCAT_i, i = 1..8$. The distribution of IND_FIRM over the remaining 3347 employees is given in the following table II.6.

Figures in table II.6 are a perfect example of the difference of point of views between workers and firms where they work, concerning the state of psychosocial risks in these firms. For instance, 145 firms declare that psychosocial risks are not an issue ($IND\_FIRM = 0$), however workers in these firms do not agree ($IND\_FA = 0.2999$).

From table II.6, we derive a sub-sample which includes the 318 employees working for firms having $IND\_FIRM \geq 13$. This corresponds to approximately 9.5% of individuals from the 3347 employees sample (or 6.5% of individuals from

Table II.6: Distribution of *IND_FIRM* with Average *IND_FA*

IND_FIRM	Number of firms	Number of employees	Average IND_FA
0	145	152	0.2999
1	93	102	0.3354
2	109	118	0.3610
3	147	153	0.3275
4	157	167	0.3260
5	195	212	0.3387
6	240	280	0.3582
7	312	371	0.3401
8	348	427	0.3420
9	291	363	0.3561
10	263	312	0.3559
11	161	209	0.3741
12	139	163	0.3602
13	73	100	0.3581
14	67	80	0.3772
15	42	56	0.3785
16	31	32	0.3554
17	12	13	0.3659
18	19	22	0.3432
19	7	8	0.4075
20	3	3	0.4719
23	1	1	0.3990
24	3	3	0.3768

Note: 3347 observation
Source: "Conditions de Travail" Survey 2013

the initial 4850 employees sample). Workers in this sub-sample have, according to their employers, a high probability of psychosocial risks.

The below table II.7 provides descriptive statistics about the socio-demographic characteristics of employees in the 318 employees sub-sample.

By comparing these characteristics to those of the whole sample of 4850 employees, we notice that the sub-sample, of the most affected employees as reported by firms, have a higher mean age and it is made up of slightly more executives and considerably less blue collars, then that part-time contracts are more common. Moreover the firms in the 318 employees sub-sample have a higher number of employees on average and these employees are at 51.7% in

Table II.7: Descriptive Statistics of Control Variables for the Most Affected Workers as Reported by Firms

Variable	Description	%
SPC	1. executives	22.01
	2. middle managers	30.82
	3. clerks	27.67
	4. blue collars	19.5
ACTV	2. manufacturing sector	27.99
	3. construction & transportation sectors	8.18
	4. trade sector	12.26
	5. service sector	51.57
TPP	1. full-time contract	77.67
	2. part-time contract	22.33
ENV_CERT	1. use of environmental certification or ethical labelling in the firm	25.47
	2. no environmental label	74.53

Variable	Description	Mean	S.D.
Log(AGE)	Log of employee's age	3.71	0.25
Log(SENIORITY)	Log of employee's seniority	2.19	0.95
Log(FIRM_SIZE)	Log of firm's number of employees	5.20	1.70

Note: 318 observations : 9.5% most affected workers
Source: "Conditions de Travail" Survey 2013

the service sector (while in the whole sample it represents 39.24% in the service sector). Finally there is also fewer firms in the 318 employees sub-sample that adopt environmental labelling.

Let us remind that we want to check whether the observed decrease of psychosocial risks for employees who are evaluated (see section 3.2), is due to perception effect (which means that the observed decrease of psychosocial risks is not a real one). If the perception effect story is true then over the 318 employees sub-sample we expect also a decrease in the psychosocial risks for evaluated employees.

Indeed our 318 employees work for firms which report high and widespread psychosocial risks for their employees, regardless of whether they are evaluated or not. Hence, if there is no perception effect, there will be no statistically significant difference in the average subjective levels of psychosocial risks of evaluated

and non evaluated employees.

The PS-Matching results in table II.8 reject the existence of a perception effect, since the ATT is not significant. Consequently, our results in sub-section 3.2 are robust and performance appraisals seem to reduce psychosocial risks.

Note that if use the *IND_FA'* measure of risk to evaluate psychosocial risks over the sub-sample of 318 employees who work for firms that report high psychosocial risks for their employees, then going through performance appraisal does not have significant impact on the level of psychosocial risks of the employees (see appendix II..9). This is in accordance with the results given by using *IND_FA*, and confirms the real positive effect of performance appraisals on psychosocial risks.

Table II.8: Results of PS-Matching for the Most Affected Workers as Reported by Firms

9.5% most affected workers		
IND_FA	EVA=1	EVA=0
Naive diff.	0.361	0.382
	-0.021	
	(0.016)	
ATT	0.361	0.408
	-0.047	
	(0.035)	

Notes: 318 observations : 9.5% most affected workers
Significance levels: * : p<0.1 ** : p<0.05 *** : p<0.01
Standard Error in brackets.
Source: "Conditions de Travail" Survey 2013

Finally since it may the case that the size of our sub-sample (318 employees) has an influence on our estimates, we perform another regression on a sub-sample (see table II.6) which includes the 690 employees working for firms having $IND\_FIRM \geq 11$. This corresponds to approximately 20.61% of individuals from the 3347 employees sample (or 14.22% of individuals from the initial 4850 employees sample). The results (appendix II..8) confirm our results in table II.8.

4 Conclusion

We highlight the effects of annual performance appraisals on the psychosocial risks of employees. We provide empirical evidence, in the French context, that performance appraisals decrease employees' psychosocial risks levels. This is a good news since a high level of psychosocial risks has a negative impact on workers' productivity. Moreover when looking closely at the effect of performance appraisals on each of the six dimensions of psychosocial risks, we find that performance appraisals have no effect on the "work demands" dimension related psychosocial risks, on the "emotional demands" dimension related psychosocial risks and the "autonomy" dimension related psychosocial risks. However we find that performance appraisals reduce psychosocial risks in the dimensions concerning "work relations", "conflicts of values" and "economic insecurity".

The second contribution of our paper is to distinguish the point of view of the employees from that of the firms. By estimating the effects of performance appraisals on employees' psychosocial risks, in firms where psychosocial risks are prevalent, we find that the decrease in employees' psychosocial risks is real and not merely a perception byproduct. Aziza-Chebil et al. (2017) and White et al. (2009) find opposite results when examining respectively the effect of organizational changes on psychosocial risks, and the effect of performance appraisals on work-life balance. However our result is partly in accordance with Coutrot & Sandret (2015) who show, in a descriptive analysis on the "Medical Monitoring Survey of Professional Risks (SUMER 2010)", that the likelihood of exposure to psychosocial risks decreases when an employee is evaluated through precise and measurable criteria but increases when he is evaluated by targets that he has to reach.

Appendix II

II..1 Psychosocial Risks Items (from the Employees' Section) I

Psychosocial Risks Items Used to Create *INF_FA*

Dimension 1 : Work demands
Not having at least 48 consecutive hours of rest in a week
Working beyond the scheduled time
The pace of work is imposed by technical constraint
The pace of work depends on the work of one or more colleagues
The pace of work is imposed by production standards or deadlines to meet in one day at most
The pace of work is imposed by an external demand (customers, public)
Having to hurry (often or always)
Having to frequently interrupt a task to do another unscheduled
Occupying different positions
Not being able to take a break when desired
Having to work despite of sickness
Not having enough time to properly execute one's job
Not being able to cooperate to properly execute one's job
Not having a sufficient number of staff to properly execute one's job
Not having sufficient means to properly execute one's job
Being asked to perform an excessive amount of work
Working under pressure
Dimension 2 : Emotional demands
An error at work can lead to serious consequences for the quality of service or product, or a significant financial costs for the company
An error at work can lead to dangerous consequences for the safety of the employee or of other people
An error at work can lead to sanctions against the employee (risk of unemployment, significant decrease in earnings)
Having suffered a hostile behaviour
Being in direct contact with the public
Being harassed by the public
Experiencing situations of tension in the relationships with the public
Being in contact with people in distress, as part of the job

Psychosocial Risks Items Used to Create *INF_FA*

Having to calm people, as part of the job
Having to conceal one's emotions or pretend to be cheerful
Fear for own safety or that of others
Dimension 3 : Autonomy and leeway
Not having the possibility to change quantified targets
Not having the possibility to vary the deadlines
Having very little freedom to decide how to do the job
When something wrong occurs during work, solving the incident personally most of the time
Repeating the same series of gestures or operations
The job involves monotonous tasks
The job does not provides the opportunity to learn new things
The pace of work is imposed by permanent (or daily) checks and surveillance exercised by the management or a computer-based monitoring
Not being able to organize the work in the manner that best suits oneself
Not having the opportunity to develop professional skills
Not having the opportunity to do things that he/she likes
Dimension 4 : Social and work relations
The Supervisor does not specify how to perform the task
Not receiving the supervisor's assistance when struggling with a difficult or tricky task
Not receiving assistance from other workers when struggling with a difficult or tricky task
Experiencing situations of tension in the relationship with supervisors
Experiencing situations of tension in the relationship with colleagues
Experiencing situations of tension in the relationship with the persons supervised
Current professional position does not corresponds to the qualifications of employee
Disagreeing with supervisors on how to do the job well
Disagreeing with colleagues on how to do the job well
Supervisors do not pay attention to what the employee says
Having experienced a hostile behaviour from one or more persons from the firm
Dimension 5 : Conflicts of values
Being bothered by unfair treatment
Not being remunerated in accordance with responsibilities
Lacking certain skills to do the job properly
Some professional skills are not exploited in work
Having to do things one disapproves
Being bothered by not getting the esteem one deserves
Not experiencing the pride of a job well done
Not having the feeling of doing something useful to others
Dimension 6 : Economic insecurity
Working without a contract
Fear for loosing one's job
Important changes in the working environment that creates insecurity regarding one's career
Promotion prospects are not in accordance efforts made
Not having the means to do one's job properly

II..2 Psychosocial Risks Items (from the Employers' Section)

Percentages (0%, less than 10%, between 10% and 50%, more than 50%) of employees in the firm exposed to :

- The necessity to work in a hurry
- The feeling of not being able to do quality work
- Tensions between colleagues
- Tensions with the hierarchy
- Tensions with the public, customers
- The fear of becoming unemployed
- Unpredictable work schedules
- Excessive workload

II..3 Psychosocial Risks Items (from the Employees' Section) II (used in *INF_FA'*)

Psychosocial Risks Items Used to Create *INF_FA'*

Dimension 1 : Work demands
Having to hurry (often or always)
Not having enough time to properly execute one's job
Being asked to perform an excessive amount of work
Dimension 2 : Emotional demands
Suffer a hostile behaviour
Being aggressed by the public
Living situations of tension in relations with the public
Dimension 3 : Autonomy and leeway
Having very little freedom to decide how to do the job
Repeating the same series of gestures or operations
Not having the opportunity to develop professional skills
Dimension 4 : Social and work relations
Not being helped by his superiors when struggling with a difficult or tricky task
Not being helped by other persons of the establishment when struggling with a difficult or tricky task
Superiors does not pay attention to what the employee says
Dimension 5 : Conflicts of values
The employee is treated unfairly and it bothers him
The employee does not get the esteem he deserve and it bothers him
Dimension 6 : Economic insecurity
Job security threatened
Great change in the working environment that questions the future of the employee's job
The employee does not have the means to do his job properly

II..4 Distribution of the Psychosocial Risk Index *INF_FA'*

Table II.11: Distribution of the Global Index *INF_FA'*

	Mean	SD	Min	Max
IND_FA'	0.319	0.187	0	0.867

Note: 4850 observations
Source: "Conditions de Travail" Survey 2013

Table II.12: Distribution of the Dimension-Indexes based on *INF_FA'*

Dimension	Mean	SD	Min	Max
Dim. 1 ($IND\_FA'_1$): work demands	0.396	0.363	0	1
Dim. 2 ($IND\_FA'_2$): emotional demands	0.304	0.318	0	1
Dim. 3 ($IND\_FA'_3$): autonomy and leeway	0.369	0.313	0	1
Dim. 4 ($IND\_FA'_4$): social and work relations	0.222	0.274	0	1
Dim. 5 ($IND\_FA'_5$): conflicts of values	0.389	0.346	0	1
Dim. 6 ($IND\_FA'_6$): economic insecurity	0.132	0.221	0	1

Note: 4850 observations
Source: "Conditions de Travail" Survey 2013

II..5 Distribution of the Psychosocial Risk Indexes *INF_FA* and *INF_FA'*

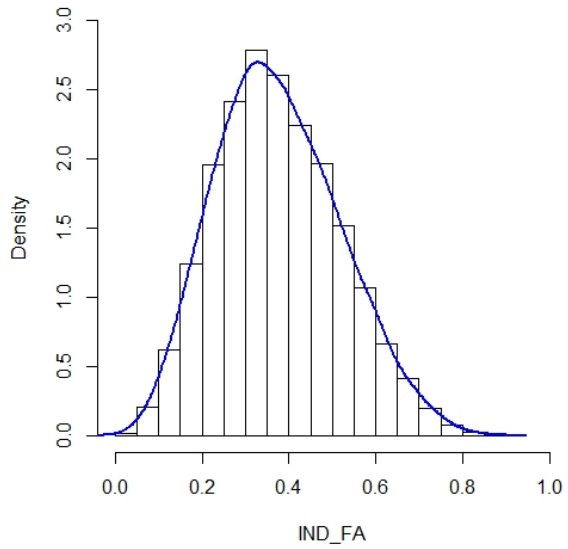

Figure II.1: Distribution and Density of *INF_FA*

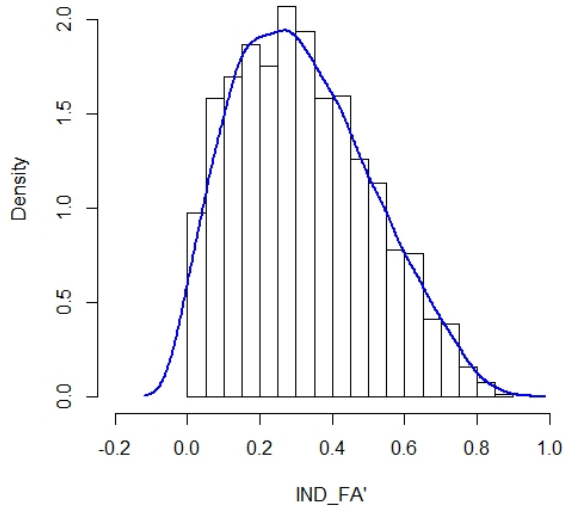

Figure II.2: Distribution and Density of *INF_FA'*

II..6 PS-Matching: Logistic regression and Balancing Score Test

Table II.13: Logistic regression with *EVA* as dependent variable

EVA		Coef.	Std. Err.
intercept		-1.461***	(0.102)
SPC	executives	1.459***	(0.085)
	middle managers	1.088***	(0.092)
	clerks	0.583***	(0.135)
ACTV	manufacturing sector	0.554***	(0.164)
	transportation sector	0.507***	(0.145)
	trade sector	0.505***	(0.136)
	service sector	0.693***	(0.089)
TPP	full-time contract	0.483***	(0.081)
ENV_CERT	environmental label	0.993***	(0.154)
AIC = 5933.169			

Notes: 4850 observations
Significance levels: * : p<0.1 ** : p<0.05 *** : p<0.01
Source: "Conditions de Travail" Survey 2013

Table II.14: Balancing of Control Variable in PS-Matching for *IND_FA*

Variable	Unmatched Matched	Mean Treated	Control	%bias	%reduct |bias|	t-test t	p>|t|
executives	U	0.246	0.108	37		12.120	0.000
	M	0.246	0.246	0	100	0.000	1.000
middle managers	U	0.332	0.218	26		8.640	0.000
	M	0.332	0.331	0	99	0.060	0.956
clerks	U	0.199	0.256	-14		-4.690	0.000
	M	0.199	0.200	0	99	-0.070	0.948
manufacturing sector	U	0.315	0.272	9		3.190	0.001
	M	0.315	0.315	0	100	0.000	1.000
transportation sector	U	0.073	0.087	-5		-1.680	0.093
	M	0.073	0.072	0	92	0.150	0.881
trade sector	U	0.158	0.175	-5		-1.640	0.100
	M	0.158	0.160	-1	87	-0.250	0.803
service sector	U	0.406	0.371	7		2.500	0.013
	M	0.406	0.406	0	100	0.000	1.000
full-time contract	U	0.875	0.804	19		6.700	0.000
	M	0.875	0.877	-1	97	-0.240	0.813
environmental label	U	0.346	0.179	39		12.810	0.000
	M	0.346	0.344	0	99	0.110	0.913

Note: 4850 observations
Source: "Conditions de Travail" Survey 2013

II..7 Effect of Performance Appraisal on the Psychosocial Risks measured by *INF_FA'*

Table II.15: Results of PS-Matching for the Index *IND_FA'*

IND_FA'	EVA=1	EVA=0
Naive diff.	0.296	0.356
	-0.06***	
	(0.005)	
ATT	0.296	0.392
	-0.096**	
	(0.04)	

Notes: 4850 observations
Significance levels: * : p<0.1 ** : p<0.05 *** : p<0.01
Standard Error in brackets.
Source: "Conditions de Travail" Survey 2013

II..8 Effect of Performance Appraisal on the Psychosocial Risks per Dimension measured by *INF_FA'*

Table II.16: Results of PS-Matching per Dimension using *IND_FA'*

IND_FA'									
Dim. 1	EVA=1	EVA=0	**Dim. 2**	EVA=1	EVA=0	**Dim. 3**	EVA=1	EVA=0
Naive diff.	0.396	0.397	Naive diff.	0.293	0.322	Naive diff.	0.328	0.433
	-0.0002			-0.029***			-0.105***	
	(0.011)			(0.009)			(0.009)	
ATT	0.396	0.377	ATT	0.293	0.368	ATT	0.328	0.377
	0.019			-0.075			-0.049	
	(0.078)			(0.074)			(0.063)	
Dim. 4	EVA=1	EVA=0	**Dim. 5**	EVA=1	EVA=0	**Dim. 6**	EVA=1	EVA=0
Naive diff.	0.188	0.275	Naive diff.	0.352	0.446	Naive diff.	0.115	0.159
	-0.087***			-0.094***			-0.043***	
	(0.008)			(0.01)			(0.006)	
ATT	0.188	0.313	ATT	0.352	0.606	ATT	0.115	0.212
	-0.125**			-0.254***			-0.096*	
	(0.064)			(0.081)			(0.051)	

Notes: 4850 observations
Significance levels: * : p<0.1 ** : p<0.05 *** : p<0.01
Standard Error in brackets
Dim. 1 : work demands - Dim. 2 : emotional demands - Dim. 3 : autonomy and leeway - Dim. 4 : social and work relations - Dim. 5 : conflicts of values - Dim. 6 : economic insecurity.
Source: "Conditions de Travail" Survey 2013

II..9 Effect of Performance Appraisal on the Psychosocial Risks for the 690 most affected workers as reported by firms

Table II.17: Results of PS-Matching for the Most Affected Workers as Reported by Firms

14.22% most affected workers		
IND_FA	EVA=1	EVA=0
	0.360	0.385
Naive diff.	-0.026**	
	(0.011)	
	0.360	0.399
ATT	-0.038	
	(0.030)	

Notes: 690 observations : 14.22% most affected workers
Significance levels: * : p<0.1 ** : p<0.05 *** : p<0.01
Standard Error in brackets.
Source: "Conditions de Travail" Survey 2013

II..10 Effect of Performance Appraisal on the Psychosocial Risks measured by *INF_FA'* for the 313 most affected workers as reported by firms

Table II.18: Results of PS-Matching for the Most Affected Workers as Reported by Firms for **IND_FA'**

9.5% most affected workers		
IND_FA'	EVA=1	EVA=0
	0.315	-0.372
Naive diff.	-0.053***	
	(0.012)	
	0.315	0.396
ATT	-0.081	
	(0.05)	

Notes: 318 observations : 9.5% most affected workers
Significance levels: * : p<0.1 ** : p<0.05 *** : p<0.01
Standard Error in brackets.
Source: "Conditions de Travail" Survey 2013

Chapter III

Workers' Risk Attitude and Financial Participation

Joint work with Marc-Arthur DIAYE and Jean-Max KOSKIEVIC

Abstract

This chapter is devoted to the analysis of the relationship between workers' attitudes towards risk and financial participation. Since financial participation implicates a certain risk component, we expect it to attract the less risk averse persons.

The French "Household Wealth" Survey 2010 includes an experimental module that makes it possible to measure risk aversion in an objective manner. Using this survey, we analyse workers' attitudes towards financial participation with respect to their attitudes towards risk.Two methods are implemented, the first, classification or decision tree, helps determine which variables are implicated in the participation to a financial participation program, and in which order. The second method is the logistic regression model, to estimate the effect of risk aversion on financial participation.

We find that above and below a certain level of wealth risk aversion does not intervene in whether to accept financial participation. But for individuals whose net wealth lies within a certain range, risk attitudes play a role in the decision of accepting or not financial participation. Furthermore, logistic regression indicate a significant positive impact of risk accepting behaviours on financial participation, which means that the less risk averse an individual is, the more likely he is to agree to financial participation.

Keywords: Risk aversion, financial participation

JEL Classification: J33, J54, M52

1 Introduction

Financial participation is a key managerial tool for firms and has motivated a substantial body of literature. The documented determinants of financial participation include workers' risk attitudes Kurtulus et al. (2011). Financial participation, irrespective of the design of such a programme, always includes a random component and is therefore risky. For instance, according to Amar (2010), the amount of financial participation-related premiums distributed in France in 2008 represented a 7% decrease relative to 2007.

Economic theory predicts that the less risk adverse the worker is, the more he/she will be attracted by financial participation. Moreover, firms prefer workers with low levels of risk aversion, all things being equal, because these workers can be paid a smaller risk premium.

Our paper is devoted to an analysis of the relationship between workers' attitudes towards risk and financial participation. This issue has been studied in the literature, not only with respect to financial participation but also for the general case of contingent pay. Cable & Judge (1994), using an experimental data set and three self-reported risk aversion scales (developed by Slovic (1972) and Drankoski & Judge (1992)) to demonstrate that risk aversion is inversely correlated with the likelihood that individuals will select contingent-pay over fixed-pay. Cadsby et al. (2007), using an experimental data set and an objective measure of risk aversion, obtain the same result. Kurtulus et al. (2011) use an NBER-sponsored survey of approximately 40000 workers and reach the same result. However, the latter study employed a self-reported risk aversion scale.

The purpose of our paper is to complete the work of Kurtulus et al. (2011) by using both an official database and an objective measure of risk aversion. This is made possible by the existence of an official French statistical database called "Enquête Patrimoine", which includes a risk measurement component. Risk is

objectively measured by making workers choose between a series of lotteries. Using a utility-free definition of risk attitudes, a worker will be risk averse if he chooses to have an amount $a > 0$ with certainty instead of playing a risky lottery L with an expected value that is strictly greater than a.

The remainder of the paper is organised as follows. Section 1 includes a brief literature review on the theoretical relationship between risk attitudes and financial participation. In section 2, we present the database and the main variables. Section 3 addresses the empirical tests, and finally, section 4 concludes.

2 What does theory say about financial participation and attitudes towards risk?

The standard economic theory on profit sharing inaugurated by Weitzman (1984) predicts that a profit-sharing system can be expected to increase a worker's effort relative to that under a fixed wage system. Because the worker has a stake in the outcome, he will devote greater effort and produce more output. This result has given rise to an abundant body of theoretical and empirical literature (see Weitzman & Kruse (1990) for a survey). However, all of these simple models omit certain aspects of reality, as they abstract from risk-bearing issues associated with financial participation that may expose workers to considerable income fluctuations that they would find undesirable [1].

Blanchflower & Oswald (1987) argue that Weitzman's theory and the other models that focus on this topic fail to address the problem of risk allocation between workers and the firm in profit-sharing schemes, although empirical evidence

[1] Weitzman (1980) derives a formula for the optimal mix of a base wage and profit sharing, which is typically a complicated function that is inversely related to the degree of risk aversion. However, he concludes that explicitly modelling risk considerations does not per se eliminate the argument for profit sharing, though it likely entails a reduction in the degree of profit sharing to reduce the worker's exposure to risk. More important, he demonstrates that under standard assumptions, it is quite difficult to derive a corner solution in which the efficient pay contract involves only fixed wages and no profit sharing.

suggests that firms' and employees' attitudes towards risk obviously constitute an important element in the formation of financial participation schemes. In a deterministic context, linking a worker's pay to his output is sensible because it will encourage the optimal level of effort, but what will the outcome be in the presence of risk? Intuitively, a higher degree of financial participation relative to a fixed base wage will elicit greater effort from the worker but will also expose him to greater risk. For example, Estrin et al. (1987) or Pissarides (1987) note that financial participation (e.g., profit sharing) would expose workers to considerable income fluctuations, which they would not desire, and give rise to a disincentive effect on worker effort.

This issue has been extensively examined in the theoretical literature under the heading of the well-known "Principal-Agent" or "Employer-Employee" problem. A basic assumption in most theoretical models is that the worker is risk averse, deriving greater utility from a fixed wage than from a variable wage of equal expected value (Holmstrom, 1979; Milgrom & Roberts , 1992). Focusing on the risk imposed by performance pay, the classic agency model involves a trade-off between incentives and insurance (Prendergast, 2000; Holt & Laury, 2002). While the firm can increase effort through performance pay, it must compensate risk-averse workers for the greater earnings risk such that the agent still receives his reservation utility. Thus, the classic agency model predicts that no relationship exists between risk attitudes and utility, even if workers receive a performance payment. However, workers who are highly risk averse will prefer to have lower compensation risk compared with those who are less risk averse. Therefore, an alignment of risk preferences and compensation risk is likely to lead to improved utility.

Based on these facts, it has been worthwhile to develop a theoretical framework that incorporates the risk attitudes of firms and workers into Weitzman's share economy to apply it and thus shed light on the role of sharing schemes in the presence of income fluctuations.

The efficiency wage theory (Chang, 2006) and sorting models literature (Cornelissen et al., 2011) have recently pursued this approach. Chang (2006) establishes a theoretical model that combines remuneration from financial participation schemes and the shirking-type of efficiency wage theory proposed by Shapiro & Stiglitz (1984). Departing from the usual efficiency wage model, it allows both employees and the firm to be risk averse (see Hart (1983)), and employees exert effort according to the compensation they receive and the risk costs that they incur. Accordingly, firms can unilaterally set base wages and sharing coefficients to induce worker effort and diversify risks. Based on this model, Chang (2006) finds that the risk attitudes of firms and workers are the crucial elements in determining the workers' effort and the firms' choice of payment method. Specifically, if firms are risk neutral and workers are more risk averse, the fixed-wage system will prevail. Second, a higher sharing coefficient (the ratio of financial participation to an employee's total wage) is not necessarily a sufficient motivator to increase work effort, particularly when employees are more risk averse, because even if it creates a stronger incentive effect, it also exposes employees to a greater amount of income risk. Third, if firms are risk averse and workers are risk neutral, firms facing greater output fluctuation will increase their sharing ratio to diversify the risk among their workers but will decrease the base wage. If the firm is risk neutral and workers are risk averse, increased output fluctuations will increase the fixed base wage but have an ambiguous effect on the sharing coefficient.

While Shapiro & Stiglitz (1984) focuses on the relationship between the firm's and worker's risk tolerance, Cornelissen et al. (2011) extends the sorting models of Lazear (1986) and Booth & Franck (1999) by considering two sectors (a performance pay sector and a time rate sector) to account for the income risk associated with performance pay and allow for different risk attitudes across workers and abilities. While standard agency analyses are limited to risk-averse workers, their model allows for the presence of risk-neutral and risk-loving workers. Levine & Tyson (1990) have noted that because firms employing financial

participation schemes will pay varying wages, risk-averse workers will tend to leave them for employment in other firms. In addition, assuming that financial participation replaces a share of basic wages, in a recession, remuneration in a financial participation firm may fall below that of its non-financial-participation competitors - which will tend to have greater recourse to lay-offs, redundancies and short-time work. The financial participation firm may then run the risk of losing its best staff to other firms, at which the levels of pay are temporarily higher. However, it is unclear how important this argument will be in practice.

Levine & Tyson (1990) predicts, first, that the more able and risk tolerant workers will sort themselves into performance pay schemes to capture rents and thereby increase their on-the-job satisfaction. Second, workers with greater risk aversion benefit to a lesser extent from working in the performance pay sector, all else being equal. If workers in the performance pay sector are risk averse, they will suffer from both a disutility of effort and a disutility resulting from income risk. If workers in the performance pay sector are risk loving, two opposing components remain, namely the disutility of effort and the utility of having an uncertain income. Thus workers in the performance pay sector receive a rent that decreases in their degree of risk aversion. These results obviously contrast with the classic agency model in which employers offer earnings that precisely compensate agents for their disutility of effort and their disutility of income risk. Because workers are typically assumed to be risk averse, a clear, negative relationship between performance pay and utility emerges after controlling for compensating earnings. Our approach accounts for the possibility that at least some workers may be risk loving (or at least less risk averse than others), implying an ambiguous relationship between performance pay and utility after controlling for earnings.

3 The Database and the main variables

3.1 The database

We use the survey *"Enquête Patrimoine 2010"* (*"2010 Household Wealth Survey"*) designed by the French National Institute of Statistics (INSEE). This survey is administered every six years, and its purpose is to describe the financial, real-estate and professional assets of French households, such as, inheritances, income and financial situation, debts. It also gathers information about socio-demographical characteristics of the households, education, marital history, children living away from home, career path. The *"Household Wealth"* Survey of 2010 also includes three sub-samples, respectively devoted to household consumption habits, risk aversion, and cultural, social and family aspects of the assets (immaterial wealth).

The survey generates a database of a size of approximately 15,006 households and 35,729 individuals. In this paper, we consider the sub-sample on risk attitude, it initially includes 4960 individuals. However, we restrict our attention to the 430 individuals who are (1) active; (2) full-time workers with permanent contracts; (3) employed in the private sector (agriculture and artisan handicrafts are excluded); (4) not self-employed; (5) not managers; and (6) between 18 and 55 years old.

3.2 Measurement of the Attitude towards Risk

Note that the survey assesses risk attitudes in an objective manner through an experimental device. Namely, a member of the household reveals his attitude towards risk through his choice between different sets of lotteries.

First, the individual is offered to choose between two job offers; one that guarantees him the same income and a second job where he has a 50% chance of

doubling his current income and 50% chance of reducing it by the third. If the person accept the first offer, he is invited to choose between the following two job offers; the first where he keeps the same income, as in the very first offer, and a second that provides him double his income with 50% chance or reduce it by the fifth with 50% chance. If the person accept the second offer, he is invited to choose between a job where, again, he keeps the same income, and a job that provides him double his wage with 50% chance or reduce it by half with 50% chance.

To map this situation let's consider, $L1$ and $L2$, $L3$ and $L1$ and $L4$ and $L1$, the four offers or lotteries. $L1 = (w, 1)$ is the degenerate lottery of obtaining his current wage w with certainty, $L2 = (2w, 0.5; \frac{2}{3}w, 0.5)$ is the lottery that awards twice the current wage of the individual with probability 0.5 and two-thirds of the current wage with probability 0.5, $L3 = (2w, 0.5; \frac{1}{2}w, 0.5)$, and $L4 = (2w, 0.5; \frac{4}{5}w, 0.5)$. See appendix III..1 for a representation of the choices.

The choices are sequential, and the individuals are first asked to choose between $L1$ and $L2$. Then, only individuals who chose $L2$ over $L1$ are asked to choose between $L3$ and $L1$. Individuals who chose $L1$ over $L2$ are asked to choose between $L1$ and $L4$. As $L1$ is a degenerate lottery, its certainty equivalent is equal to its mathematical expectation $E(L1) = w$. As a consequence, if we assume a Von-Neuman and Morgenstern setting, then individuals who choose $L1$ over $L2$ are more risk averse than individuals who choose $L2$ over $L1$. In other words, $L1$ is the least risky lottery, followed by $L4$, then $L2$ and, finally, $L3$ (the most risky).

3.3 The main variables

The outcome variable is a binary variable denoted *FPART* that is equal to 1 if the employee reported being part of a financial participation plan (profit sharing, employee stock and ownership plan-ESOP) and 0 otherwise. In the considered

sample, 33.49% are taking part into a financial participation program.

The risk attitude variable (denoted $RACCEPT$) is constructed based on the individuals' choices between the lotteries mentioned in 3.2. It takes the value 1 if the individual first rejects $L2$ then $L4$; $RACCEPT = 2$ if the individual does not choose $L2$ but then chooses $L4$; $RACCEPT = 3$ if the individual chooses $L2$ but does not choose $L3$; and $RACCEPT = 4$ if the individual chooses both $L2$ and $L3$. Thus, the higher $RACCEPT$ is, the less risk averse the individual is (see Appendix III..1).

Because an individual's risk attitudes may depend on his wealth, we add wealth as a control variable. As individuals with more extended wealth will be less affected with having lower income and it will not threaten the stability of the household, the may be less averse to risk in this situation. Moreover wealth also influence the decision to participate to financial participation programs. Finally, as further explanatory variables, we consider the worker's personal characteristics; gender (SEX), age (AGE), characteristics of the household; whether the worker is single or in couple ($NOTSINGLE$), the number of dependent children ($NDEPCHILD$), these variable are related to the stability in the household, and the geographic zone ($GEOZONE$) since being in a larger area is favourable to the implementation of large companies which are more likely to implement financial participation programs.

Table III.1 provides a complete definition of our variables, while tables III.3 and III.2 present a brief statistical summary of each variable.

4 Empirical tests

Recall that economic theory predicts that the less risk averse an individual is, the more likely he is to accept financial participation. We apply two methods to assess this prediction.

Table III.1: Definition of Variables

Variable	Description
FPART	Binary variable = 1 if the individual holds *FP* and 0 otherwise.
RACCEPT	Risk attitude variable. Takes four values, from 1 to 4. the lower the value, the less risk averse the individual.
LNETWEALTH	(log) Total net wealth in Euros (total gross wealth minus debts).
AGE	Continuous variable. Age of the individual.
SEX	Binary variable = 1 if female and 0 otherwise.
NOTSINGLE	Binary variable = 1 if the individual is not single and 0 otherwise.
NDEPCHILD	Number of dependent children.
DEPCHILD	Binary variable = 1 if the number of dependent children (NDEPCHILD) is > 0 and 0 otherwise.
GEOZONE	Binary variable = 1 the individual lives in Paris or the Paris region and 0 otherwise.

Source: "Patrimoine" Survey 2010

Table III.2: Summary Statistics of Real-Valued Variables

Variable	Mean	Std Dev	Min	Max
RACCEPT	1.67	0.93	1	4
LNETWEALTH	10.2	4.62	-10.19	15.41
AGE	40.32	9.01	18	55
NDEPCHILD	1.01	1.09	0	6

Note: 430 observations
Source: "Patrimoine" Survey 2010

4.1 Classification Tree Method

The first method permits us to check for the existence of a link between financial participation and risk attitudes. Specifically, we construct a classification tree for

Table III.3: Summary Statistics of Categorical Variables

Variable	Values	Freq.	%	Variable	Values	Freq.	%
RACCEPT	1	255	59.3	*NDEPCHILD*	0	183	42.56
	2	88	20.47		1	112	26.05
	3	61	14.19		2	94	21.86
	4	26	6.05		3	34	7.91
FPART	0	286	66.51		4	4	0.93
	1	144	33.49		5	2	0.47
SEX	0	247	57.44		6	1	0.23
	1	183	42.56	*DEPCHILD*	0	183	42.56
NOTSINGLE	0	114	26.51		1	247	57.44
	1	316	73.49	*GEOZONE*	0	314	73.02
					1	116	26.98

Note: 430 observations
Source: "Patrimoine" Survey 2010

the variable *FPART* with respect to the above-mentioned explanatory variables: risk attitude, net wealth, age, sex, whether the worker is single, the number of dependent children and the geographic zone.

Recall that a classification tree, sometimes called a decision tree, is a non-parametric supervised learning method used for classification and regression. It allows to create a model that predicts the value of the target variable using the most appropriate variable that divides the population into the most homogeneous sub-groups. It is composed of *nodes* and *edges*. Each node represents a group of the population and each edge represents a split.

In this case, we have at the top node the total population with 33.49% of the population using a financial participation plan.

In the next level, we have two nodes. The node to the left, 29.6% of the population, represents persons having a net wealth less than 21,971.5€. They, at 81.1%, will not choose financial participation regardless of their risk aversion level or any other characteristics. The node to the right are individuals with a net

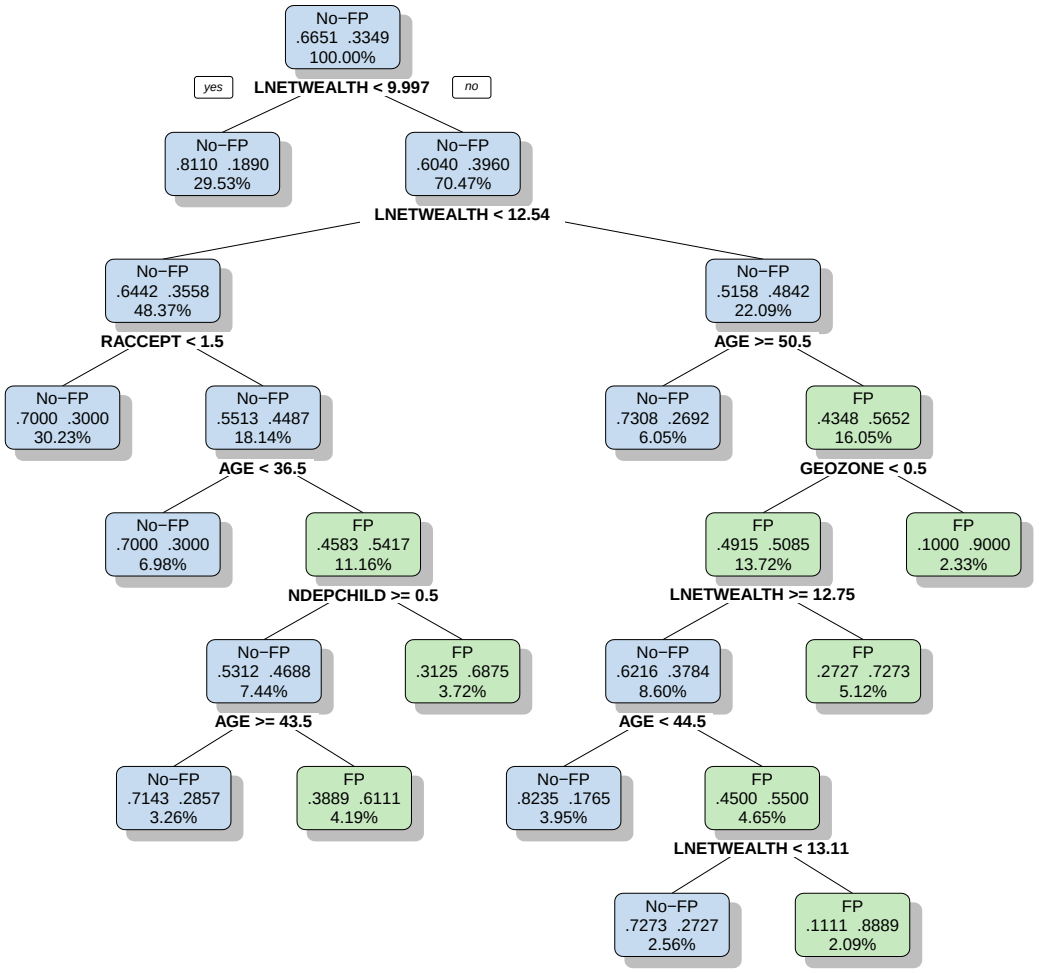

Figure III.1: Decision tree of having financial participation

wealth higher than 21,971.5€, and only 29.6% are part of a financial participation plan.

In the next level, they are divided into two groups; those with a net wealth higher than 278,392.5€(to the right), (22% of the population) who are equally distributed for and against financial participation (respectively 48.42% and 51.58%). This groups decision does not depend on their level of risk aversion($RACCEPT$), but rather by their age, region and net wealth. For the other group (to the left), (48% of the population) it is composed of 35.58% of person who adopt financial

participation. For this group the next variable that enters in the decision process is RACCEPT. And 70% of individuals having a level of risk aversion equal to 1 (the more risk averse) will not participate in a financial participation plan.

So, according to the decision tree, the first variable that explains the division of our sample into two parts with respect to whether a worker is compensated through financial participation ($FPART$=1 or 0) is net wealth ($LNETWEALTH$). The next variable is the risk attitude variable ($RACCEPT$). Specifically, there are two main branches that are, respectively, applicable to 22% and 48% of our sample:

- For individuals whose net wealth is higher than 278,392.5€, risk attitudes do not play a role in the decision of whether to accept financial participation.

- For individuals whose net wealth is between 21,971.5€ and 278,392.5€, risk attitudes play a role in the decision of whether to accept financial participation. For instance, according to the decision tree, highly risk-averse individuals ($RACCEPT = 1$) whose net wealth is between 21,971.5€ and 278,392.5€ do not accept financial participation, whatever their other socio-demographic characteristics.

4.2 Logistic Regression Model

In the second method, we employ a *logistic regression model*, since the outcome variable $FPART$ is a binary variable. Specifically, the model will be:

$$FPART = \begin{cases} 1 & \text{if } FPART^* = X'\beta + \varepsilon > 0 \\ 0 & \text{otherwise} \end{cases}$$

where $FPART^*$ is the latent variable, ε is the error term, it follows a *standard logistic distribution*. And X and β are the matrix of explanatory variables and

the vector of regression coefficients:

$$X = (RACCEPT, LNETWEALTH, AGE, SEX, NOTSINGLE, DEPCHILD, GEOZONE)'$$
$$\beta = (\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7)'$$

The results of the logistic regression of *FPART* are presented in table III.4.

Table III.4: Logistic Regression of the variable *FPART*

Analysis of Estimates				
Parameter	*Estimate* *Modality*	*Standard* *Error*	*Wald* *Chi-Square*	*Pr>KhiSq*
Intercept	-3.07***	0.63	23.78	<0.0001
RACCEPT	0.26**	0.11	5.48	0.02
LNETWEALTH	0.09**	0.03	6.17	0.01
AGE	0.02	0.01	2.54	0.11
SEX	-0.09	0.108	0.68	0.4
NOTSINGLE	0.15	0.13	1.29	0.25
DEPCHILD	-0.04	0.11	0.11	0.73
GEOZONE	-0.17	0.12	1.81	0.18
Wald Score	20.85	**AIC**	550.32	

Note: 430 observations
Significance levels: $* : p < 0.1$ $** : p < 0.05$ $*** : p < 0.01$
Source: "Patrimoine" Survey 2010

Note that *RACCEPT* has a positive effect on *FPART*. In other words (and in accordance with economic theory and Kurtulus et al. (2011)), the less risk averse an individual is, the more likely he is to agree to financial participation.

Net wealth (*LNETWEALTH*) also has a positive and significant effect on the probability of accepting financial participation. No other explanatory variables have a significant effect.

Therefore, from the point of view of individuals, risk aversion and net wealth play an important role in the engagement in financial participation. In the sense

that financial participation is more likely to attract the less risk averse, as the are more willing to accept potential loss, and the wealthier, since it provides more security. So that their role is complementary. Though unexpectedly other variables such as, the age, the gender or the family situation, do not have a significant role in financial participation appeal to employees.

These results confirm the hypothesis that risk averse employees tend to avoid financial participation plans in the French context, this goes along with the present literature (Kurtulus et al., 2011; Cable & Judge, 1994; Cadsby et al., 2007). This may lead firms that implement financial participation schemes to attract more risk neutral and risk loving persons, and therefore, may do so in order to free itself from a part of the risk of loss by sharing it with employees.

5 Conclusion

The implementation of financial participation schemes (profit sharing, ESOP) within firms depends on the workers' attitudes towards risk. The less risk adverse the worker is, the more likely it is that he/she will be attracted by financial participation. Moreover, firms will prefer workers with low levels of risk aversion, all things being equal, because they will pay the workers a lower risk premium. The purpose of this article is to test the link between workers' attitudes towards risk and financial participation, using an original French data set that provides us with an objective measure of risk aversion. Our paper contributes to the literature by asserting that attitudes towards risk are a key determinant of workers attitudes towards financial participation. This issue is important because economic theory predicts that firms that are implementing financial participation schemes will prefer to hire workers with low levels of risk aversion to pay a lower risk premium. Thus, it may be the case that financial participation could be biased against some types of individuals. For instance, according to some studies Agnew et al. (2008), women are more risk adverse than men. As a consequence,

ceteris paribus, by hiring individuals with low levels of risk aversion, firms may hire more men than women.

Appendix III

III..1 Definition of the Risk Variable (*RACCEPT*)

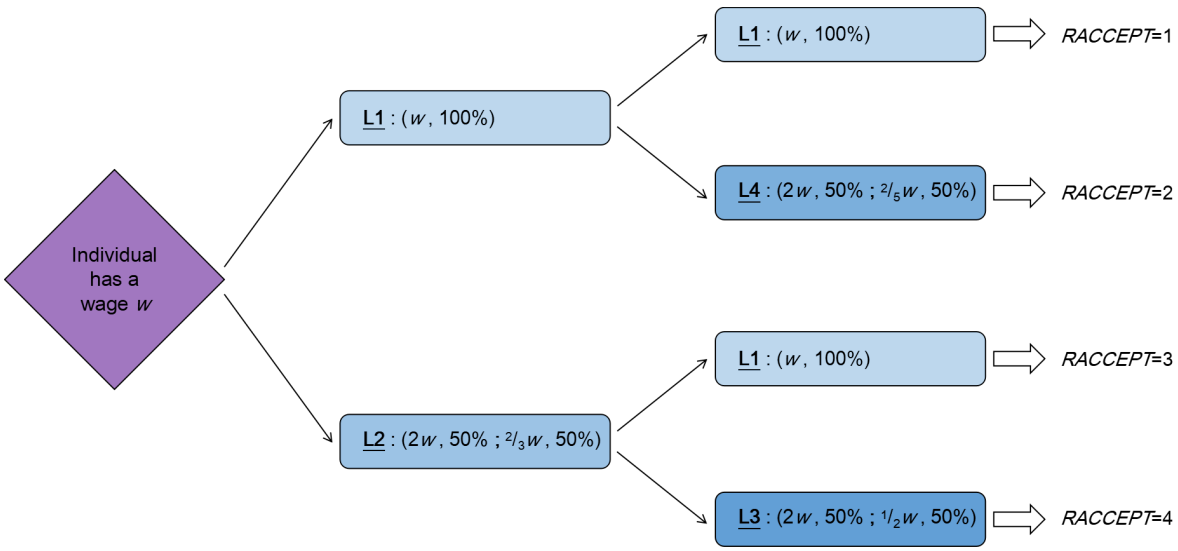

Figure III.2: Diagram of choice between the Lotteries: $L1$, $L2$, $L3$ & $L4$

III..2 Correlations between Control Variables in the Logistic Regression

Table III.5: Correlation Matrix of Control Variables

	AGE	NDEPCHILD	NETWEALTH	SEX	NOTSINGLE	GEOZONE
AGE	1	-0.0155	0.2344	0.0001	0.0004	0.0004
NDEPCHILD	-	1	0.0527	0.0073	0.0823	$1.98 \cdot 10^{-5}$
NETWEALTH	-	-	1	0.0115	0.0088	0.0062
SEX	-	-	-	1	0.1650	0.0251
NOTSINGLE	-	-	-	-	1	0.0029
GEOZONE	-	-	-	-	-	1

Note: 430 observations
Correlation between continuous variables measured using *Pearson coefficient*
Correlation between categorical variables measured using *Cramer's V*
Correlation between categorical and continuous variables measured using *correlation ration (η)*
Source: "Patrimoine" Survey 2010

Chapter IV

Are Human Resource Management Practices Driving Away Workers from Trade Union Representation?

Abstract

In this chapter, we explore the nature of the relationship between human resource management practices and trade unions. We would like to answer the question whether human resource management practices, also called High-involvement management practices, are driving workers away from unionism. To do so, we examine how the different human management practices affect the participation of workers to trade union activities.

Using the French survey "Working Conditions" 2010, we consider six main human resources management practices, and by applying bivarite probit models, we estimate their effects on the likelihood of becoming a trade union member or supporter.

The results show that management practices are not directly driving workers away from unionism. Actually, for most of the human resources management practices considered, employees who benefit from them tend to be more willing to support or adhere to a trade union.

Keywords: Trade union, management practices

JEL Classification: C35, J51, J53, M54

1 Introduction

The trade union movement can be traced back to the 18th century and it had reached its peak of growth during the 1940s. The primary role of a trade union is to negotiate with the employer on matters that affect the employees at work and the members of the union. Nevertheless, unionism growth have known a halt in later years mainly due to changes in labour market and labour legislation (Yates, 2000).

The decline of unionism has been a feature worldwide since the late 70s. For instance, between 1978 to 1988, there was a great decline of unionisation in France. This meant that many members left unions, and the recruitment rate of union members reduced. The number further dropped in 2003, where members of unions among French workers reduced, and there was a total membership of between 1.7 to 1.9 million of the total workforce in French. This was the lowest rate of trade union members in OECD countries (Andolfatto & Labbé, 2012). The rate of decline in unionism was also witnessed in Britain. In Britain, the late 1970s, over 13 million (70%) individuals were members of the trade unions. Unionisation has however fallen, and in 2003, less than 30% of workers in Britain were members of a trade union (Machin & Wood, 2005).

The decline in trade union representation have coincided with the emergence of intensified human resource management practices, this led many to think that with the present rise in HRM practices, the role of unionism is being challenged.

The active role of human resource management (HRM) is to oversee and manage the workers. Human resource recruitment and selection practices are normally based on the organization's workplace culture and goals. For instance, organizations that acknowledge the importance of workplace diversity employ recruitment practices aimed at attracting a wide applicant pool. Training and Development is also another human resource function that involves new-worker

orientation, professional development, leadership training, and job skills training. Training and development aims at improving the workers' job skills in their present position. Furthermore, professional development and training practices reflect promotion from within the practices and support workers' goals. Another HR practice is workers' compensation, benefits and compensation are normally viewed simultaneously, presenting a complete view of how an organization rewards their workers. Job satisfaction is also another human resource practice that ensures that the worker can accomplish his tasks comfortably in the organization. Job satisfaction entails respectful treatment of all workers at all levels; compensation, job security, opportunities to use abilities and skills, and management's recognition.

These practices have been positively related to the firm outcome, in Delaney & Huselid (1996), an empirical analysis conducted over US firm shows that the adoption of progressive HRM practices significantly improves organizational performance. In a similar framework, Huselid (1995) finds that high performance work practices tend to decrease employees turnover and increase productivity.

Agreeing with the weakening of unionism, there has been an increased use of human resource management practices, and diverse and new forms of work organizations that trade unions cannot offer. According to Fiorito (2001) in his article "union substitution", there has been an increase in the adoption of human resource practices in firms, and this establishes a win-win relationship between the managers and employees reducing the need for unionism.

Several articles have explored the effects of HRM practices on trade unions. Works as early as Eaton & Voos (1989) were interested in union response to firm practices that emerged in the 1980s and that they call "workplace innovations". Union responses identified by Eaton & Voos (1989) in the United States were; saying no to these innovations out of fear of loosing workers interest in unionism or because they consider them disadvantageous to workers, or distanc-

ing themselves from them if they are deemed significantly disadvantageous for workers and would disappear by themselves. Further responses include; the use of protective involvement by maintaining and protecting existing collective bargaining institutions from being supplanted or weakened, the use of wholehearted cooperation and collaboration by embracing these workplace innovations, or the use of innovation to assert union interests such as union involvement in the new program to expand the arena of collective bargaining and the union ability to improve the quality of work-life.

In Fiorito (2001), positive human resource practices reduce trade unionism. The results from Fiorito (2001) suggest that positive HRM practices reduce unionism in the sense that it reduces employees' intentions to vote for unions. Fiorito (2001) adds that Human resource increases employees' satisfaction, thus challenging part of the motivation for unionisation.

A different conclusion is suggested by Machin & Wood (2005), the authors use British workplace data for the years from 1980 to 1998 to investigate whether the increased use of HRM practices that coincided with decline in unionism functions as a substitute to unionisation. The findings from this longitudinal analysis suggest that the increased use of human resource practices did not lead to the decline in unionism among the workers. And not only is the hypothesized "substitution" effect not supported, it even uncovers some evidence of a complementarity between unions and HRM practices.

In the same line, Bryson et al. (2005) uses data from Workplace Employee Relations Survey 1998 and investigates the connections between high involvement management practices and unionisation, they find that high involvement management had a positive effect on work productivity. However, in Bryson et al. (2005), the impact is limited to unions in workplaces, and appears more described by concessionary salary bargain than "mutual gains". Additionally, the article also finds that there seem to be significant differences in the features of high involvement management and traditional place of work in the union sector

which binds the applicability of high involvement management in the union sector. Thus, Bryson et al. (2005) suggests that the union sector does not use high management practices.

Amossé & Wolff (2008) addresses the issue of union decline and of HRM practices diffusion by testing the hypothesis of the replacement of employee representation by HRM practices on the French and British cases. It also distinguishes between direct and indirect substitution. The direct substitution corresponds to HRM practices strictly replacing unions in the sense that they achieve the same role. The indirect substitution, which is considered more plausible by Amossé & Wolff (2008), consists on having some HRM practices, in process of filling their function, could incidentally lower employee need for representation. They find little evidence for the substitution scenario. Both in France and Great Britain, representative structures and management techniques rather coexist side by side than exclude each other. In France, HRM practices seem to have very little effect on employee representation, whereas in Great Britain, they seem to be mutually strengthening each other.

In another research, Heywood & Jirjahn (2009) provided the connection between the provision of family-friendly work and worker representation. The results of the study confirms that each of the three practices presented in the study was likely to impact the decline of unions. Furthermore, the seeming irrelevance of the effect of collective bargaining in trade unions, and the primacy of the employment councils fits in the German industrial relation which is responsible for the negotiations of agreement. In short, Heywood & Jirjahn (2009) highlights the function of work councils, the study identifies that the influence of the councils were stronger in the institutions covered by collective bargain agreements.

More recently, Kim (2017) uses longitudinal data set in South Korea from 2005 to 2013 to explore the association between HRM practices and the decline in union strength and addresses its underlying theoretical mechanisms. This paper results show that the firms that implement HRM practices have unions with

a weaker organizational base, and that in the presence of unions with a strong collective voice certain HRM programs correlate well with unionism. Laroche & Salesina (2017) investigates the opposite effect of the presence of employee representation on the use of high-performance practices in French firms. The findings show that the effect depends on the form of representation and the type of management practice considered, but that positive influence especially on variable compensation practices outweighs evidence of negative influence. In the same vein, Pohler & Luchak (2014) based on a model of the firm's response to union impact, shows that these institutions are better seen as complements. Furthermore, based on a sample of Canadian firms finds that employees covered by a union and under high-involvement work practices experience fewer intensification pressures. Turner & Cross (2018) focuses on the link between HRM practices and earnings on Irish firms and finds that human resource practices are positively associated with higher earnings and that these positive effects are associated with a union earnings premium.

In this paper, we examine various human management practices, how these practices affect the participation of workers to union activities, and which practices tends to strengthen the complementarity between unionism and HRM practices and which ones hinders it. Therefore the main aim of this paper is to carry the investigation about the *union substitution* phenomenon in France. In any case, we consider that the *union substitution* hypothesis in today's economy tend to be necessarily an indirect substitution as high involvement practices are deemed a fundamental feature in modern firms independently of the presence of employee representation.

This paper articulates as follow; section 2 introduces the data exploited in the empirical analysis, and the measurements adopted to account for union representation and human resource practices. Section 3 presents the econometric strategy used to assess the effect of HR practices on unionisation, and the results

provided by the implementation of the model and their interpretation. Finally, section 4 concludes.

2 The Data

The French survey "Conditions de travail 2013" (Working conditions) provides useful information about both the presence of trade unions in the firm and various human resource management (HRM) practices dispensed by the firm. In fact, the Working Conditions survey, which is conducted jointly by the bureau of statistics (INSEE) and the Ministry of Labour (DARES) every seven years, has for objective to assess the environment in which evolve the workers and the physical and psycho-social risks they are confronted with in their job. The survey produces a matched employer-employee database, with an employee section which is the main section, and a section giving information about the firms in which these employees work. For the purpose of this paper the database is restricted to firms in the private sector i.e. firms that are not owned by governmental institutions since government firms follow different regulations for management and unions. Thus, the database counts 4,811 employees and 4,144 firms.

The variables of interest of this analysis are chosen to express the workers reliance on trade unions in one side and management services on the other.

2.1 The Measures of Unionism and HRM practices

Different variables related to unionism are available in the database such as the presence of a union organisation in the firm, being member of a union, or receiving information from unions about the risks that the job involves. Only one variable is considered here, because it fits better the purpose of the paper which is to describe the importance of unionism for the employees. For other variables, for example, the presence of a union can be determined by other characteristics of the firm, namely the size of the firm or sector of activity. The variable

related to union affiliation used in our case is a binary variable, referred to as *UNION*. It comes from the employee section and it takes "1" if the worker answers "yes" to the following question and "0" otherwise : "*Are you a member or supporter/sympathiser of a union organisation?*".

The measurement of HRM practices provided by the firm to its workers is not given by a single variable, since various practices are used by the firm and management practices axed on human resources can take many forms. To cite some references in HRM practice measurements, Bryson et al. (2005) divides management practices, commonly referred to as "high involvement practices", into three groups; the extensive use of *task practices* such as team-working and problem solving groups, the use of *individual support* such as information disclosure, training in problem solving and communication, and the use of *organisational support* such as financial participation schemes and internal promotion. Fiorito (2001), to give insight on the link between HR practices and unionism, insists on employees involvement practices as a key issue. These practices include stock ownership or profit sharing programs, open-door policy for resolving workers problems, the presence of HRM department, regular meetings. Machin & Wood (2005) uses similar measures, essentially flexible pay, presence of a consultative committee and problem solving groups and regular meetings to consult and communicate with workers. Amossé & Wolff (2008) mainly adds to these variables the diffusion of newsletters or firm newspaper and the existence of annual performance appraisals.

From these practices and using "Working Condition" survey we select the following variables. They give information on the main aspects that are communication, training, discussion, evaluation and incentive. These variables, named *HRM*, *TRAINING*, *INFORM*, *DISCUSS*, *PERF_APP* and *INCENT_PAY*, take "1" if the answer is "yes" to the following questions, and "0" otherwise :

HRM - "*Is there, in your company, a human resource management service?*"

TRAINING - "*Do you receive an adapted off-the-job training in order to carry out your job properly?*"

INFORM - "*Have you received, in the past twelve months, a document from the management outlining the risks related to your work?*"

DISCUSS - "*Do you have the opportunity to discuss collectively organizational or operational issues encountered in your work unit?*"

PERF_APP - "*Do you have at least one performance appraisal interview per year?*"

INCENT_PAY - "*Are employees, in your company, covered by a profit-sharing agreement or a company savings plan?*"

Contrarily to the other HRM practices variables, *HRM* and *INCENT_PAY* do not come from the employee section but from the employer section, so they are answers of firms representatives to the questions of the presence of human resource management department and profit sharing programs available to employees in the firm.

The distribution of the variables of interest are given in table IV.1.

At first, we notice that the percentage of workers affiliated to unions is only 16.17% but that for the percentages of reliance on HRM practices vary from 39.22% to 81.92%. This mainly highlights the decline of unionism and the emergence of new HRM practices, but does not tell if the decline is due to these practices.

The effect of HRM practices variables will be studied individually to identify the effect of each aspect of these practices on the interest of workers on unionism.

Table IV.1: Definition of Outcome Variables

Variable	Description	%
UNION	1 being a union member or sympathiser	16.17
	0 else	83.83
HRM	1 having a human resource management service in the firm	81.92
	0 else	18.08
TRAINING	1 having an adapted off-the-job training	56.64
	0 else	43.36
INFORM	1 having received a document outlining the risks related to the work	39.22
	0 else	60.78
DISCUSS	1 having the opportunity to discuss collectively organizational or operational issues of the work	81.81
	0 else	18.19
PERF_APP	1 having at least one performance approval interview a year	59.68
	0 else	40.32
INCENT_PAY	1 firm covered by a profit-sharing agreement or an employee savings plan	66.35
	0 else	33.65

Note: 4,811 observations
Source: "Conditions de Travail" Survey 2013

3 The Effect of Human Resource Management practices on Union Membership

3.1 The Econometric Strategy

The outcome variables are all binary variables, both the dependant variable (*UNION*) and each of the regressors (*HRM*, *TRAINING*, *INFORM*, *DISCUSS*, *PERF_APP* and *INCENT_PAY*). Furthermore, the effect of each HRM practice variable on union membership potentially presents endogeneity problems. In fact, the HRM practice variables could themselves be influenced by underlying factors to the presence of trade unions, since they are dictated by the same need to improve workers situation. According to Bryson et al. (2005) HRM practices introduction itself depends on the bargaining power and objective of the union, who can lower or rise the cost of introduction of these practices. One way to address endogeneity in this situation, is to use the *Bivariate Probit Model*.

The *Bivariate Probit Model* is used when the outcome variable is dichotomous and the set of regressors include a dummy variable which is possibly endogenous. The model fits two simultaneous probit model equations either recursive or seemingly unrelated, they are estimated jointly using maximum-likelihood (Heckman, 1978).

In this paper we adopt the recursive bivariate probit model to highlight the effect of each HRM practice variable on union affiliation. We perform six regression, one for each HRM practice aspect, these variables are denoted by *MP* in the general model (equation IV.1), and union membership indicator is noted *UNION*. The first equation of the model fits the *UNION* variable on *MP* and a set of control variables X_1, and the second equation fits *MP* on a second set of control variables X_2, as follow :

$$\begin{aligned} UNION &= \begin{cases} 1 & \text{if } UNION^* > 0 \\ 0 & \text{otherwise} \end{cases} \\ MP &= \begin{cases} 1 & \text{if } MP^* > 0 \\ 0 & \text{otherwise} \end{cases} \end{aligned} \tag{IV.1}$$

With

$$UNION^* = X_1\beta_1 + MP\gamma + \varepsilon_1$$

$$MP^* = X_2\beta_2 + \varepsilon_2$$

Error terms ε_1 and ε_2 follow normal distributions with zero means, unit variances, and correlation coefficient ρ. The estimation and significance test of ρ allows the evaluation of the degree of endogeneity.

Furthermore, the set of controls X_2 includes one or more instrumental variables in order to take into account the endogeneity of *MP*, estimate its correlation with *UNION* and fully specify the model. These variables have to be correlated to *MP* but not to *UNION*.

To implement this model, we need to specify all the implicated variables, namely the control variables. Other than the outcome variables, both in the

first and second equation, the model includes personal information about the employee such as his age, gender, socio-professional category, his level of education and the wage he perceives in his current job at the firm. Are also included determinants of the firm like essentially the sector, the size of the firm measured by the number of employees and the age of the firm that is the number of years since the beginning of its activity. We additionally use the region (we use the NUTS1 nomenclature - ZEAT in France), if the firm is multinational firm, if it operates in a single or multiple sites and the size of its market, regional, national or international, (see Blanden et al. (2005), Bloom & Van Reenen (2007), Bloom et al. (2012) and Delaney & Huselid (1996)).

In the second equation, we add to these controls, as instruments, information about whether the firm has known changes in CEO or the majority shareholder in the last years. In fact, according to Bloom & Van Reenen (2007) and Bloom et al. (2012), head management and ownership play an important role in the quality of HRM practices. However, the existence of an influence of changes in management and ownership on union membership seems unlikely, Schnabel & Wagner (2005) and Riley (1997) do not find similar variables to be significantly relevant in the determination of union membership. Furthermore, we find that the statistical correlation between them is non significant.

The definition of all control variables and their distribution is given in table IV.2.

3.2 The Results

Table IV.3 sums up the main effects of the six chosen HRM practices. The detailed results of the bivariate probit regressions are available in the Appendix (tables IV.6 to IV.11). To answer the question whether benefiting from HRM practices has a negative influence on the choice to be part of a trade union, we analyse the effect associated with each HRM practice in the bivariate probit estimates. Then, in order to assess for the presence of endogeneity we also

Table IV.2: Definition of Control Variables

Variable	Description	%
MALE	1 being male	56.72
	0 being female	43.28
SPC	1 executives	19.1
	2 middle managers	27.98
	3 clerks	22.59
	4 blue collars	30.33
DIPLOMA	1 primary school	16.59
	2 professional diploma	28.58
	3 high school	17.79
	4 university	37.04
SECTOR	1 industry	29.02
	2 services	70.98
FIRM_AGE	1 firm in business for less than 4 years	10.43
	2 firm in business for 5 to 19 years	32.68
	3 firm in business for 20 to 49 years	38.64
	4 firm in business for more than 50 years	18.25
GEO_ZONE	0 overseas departments	8.46
	1 Parisian region	13.78
	2 South of the Parisian region	15.07
	3 Nord-pas-de-Calais-Picardie	11.16
	4 Alsace-Champagne-Ardenne-Lorraine	9.94
	5 North-West	12.41
	7 Grand South-West	13.14
	8 Auvergne-Rhône-Alpes	12.39
	9 South-East	3.66
SINGLE_SITE	1 firm having only one site	37.37
	0 else	62.63
MULTINATIONAL	1 firm belongs to a multinational group	23.09
	0 else	76.91
MARKET	1 local	48.85
	2 national	23.11
	3 international	28.04
CHANG_CEO	1 change in the management team that affected work environment	18.04
	0 else	81.96
SHAREHOLDER	1 change of the majority shareholder	9.48
	0 else	90.52

Variable	Description	Mean	Std.Dev.
AGE	age of the employee	41.8123	10.3908
Log(AGE)	logarithm of *AGE*	3.6993	0.2677
FIRM_SIZE	number of employees in the firm	588.5887	288.0083
Log(FIRM_SIZE)	logarithm of *FIRM_SIZE*	4.6584	1.6486
WAGE	wage of the employee	1,915.0830	1,641.3830
Log(WAGE)	logarithm of *WAGE*	7.3775	7.6190

Note: 4,811 observations
Source: "Conditions de Travail" Survey 2013

examine the correlation coefficient ρ. Afterwards, we will examine the effect of other variables in the model.

Table IV.3: Summary of the effects of HRM Practices on Union membership using Bivariate Probit Regression

Variable	Description	Coef.	ρ
HRM	presence of a human resource management service	0.6199***	-0.3765***
		(0.2025)	(0.1262)
TRAINING	having an adapted off-the-job training	-1.2290***	0.6969**
		((0.2246))	(0.1337)
INFORM	having received a document outlining the risks related to the work	0.7029	-0.3582
		(0.4837)	(0.2927)
DISCUSS	having the opportunity to discuss organizational or operational issues	1.3342***	-0.6413*
		(0.4507)	(0.3376)
PERF_APP	having at least one performance approval interview a year	0.8923***	-0.4681**
		(0.2419)	(0.1488)
INCENT_PAY	firm covered by a profit-sharing agreement or an employee savings plan	0.6019**	-0.3321**
		((0.2152)	(0.1454)

Notes: 4,811 observations
Significance levels: *** : p<0.01 ** : p<0.05 * : p<0.1
Standard error in brackets ()
Source: "Conditions de Travail" Survey 2013

First, the results indicate that the correlation coefficient estimates (given by ρ) are significant for five of the six models. In the bivariate probit regression of the variable *UNION* (being member or sympathiser of a union) over the variable *INFORM* (being informed of work related risks), the estimation of ρ indicates that *INFORM* is not correlated to *UNION*. This could be explained by the fact that informing employees about work related risks is a weak measure of HRM practices, it is a more commonplace and a reinforced measure, and thus does not interfere with the role of unions in the firm. For the other HRM practices, correlations estimates confirm the idea that human resources management practices and union participation have reciprocal effects on each other. Benefiting from the considered HRM practices and being member of a union are results of the same conditions in modern work environment. Besides, the correlations of these variables with *UNION* is positive for all the variables except *TRAINING* (having an off-the-job training). This means that employees who benefit from an appropriate training tend not to adhere to unions, while those who profit from a HRM service in the firm (*HRM*), have the possibility to discuss organizational or operational issues in the firm (*DISCUSS*), have a performance approval interview a year (*PERF_APP*), or benefit from a profit-sharing agreement or an

employee savings plan (*INCENT_PAY*) tend to be more active in unions.

Concerning the effect of each HRM practice on union support, we find that receiving information about job related risks from management (variable *INFORM*), does not affect employees' desire for union representation. This result corroborates the previous result of lack of correlation indicated by the ρ coefficient. Providing information about work related risks is not a source of conflict between the firm and union representatives to drive employees away or toward unions. It is the only variable which has no significant effect on union membership.

Additionally, we find that having an adapted off-the-job training (variable *TRAINING*) negatively affects the desire for union representation, contrarily to all other HRM practices. It could indicates that having the adequate skills is a necessity to be well integrated into the firm and could be the result of training being offered more often to new employees.

For the remaining variables: *HRM*, *DISCUSS*, *PERF_APP*, and *INCENT_PAY*, they all have a significant positive effect on the engagement in unionism. These practices concern communication with employees by providing a human resources management service, involvement in the decision making and problem solving process via clear discussions, and establishing performance appraisal and incentive pay programs that allow effort recognition and reward. The HRM practice that shows the highest influence on union affiliation is being able to discuss the firm matters with colleagues and management while having access to an incentive pay program has the lowest, but the effects remain globally positive and significant.

This positive effect means that employees who have access to most HRM practices are more willing to participate in union activities, and we do not find proof that HRM practices are not driving employees away from unions. This goes against the idea of the *union substitution theory* even in the form of col-

lateral effect as described in the *indirect substitution hypothesis*. These results support the findings of Machin & Wood (2005) and Amossé & Wolff (2008), in the first, a longitudinal analysis of firms from the UK also uncovers no evidence that unionism decline is due to HRM practices, and that HRM practices are more likely to be implemented in non-unionised firms, in the second, a comparative analysis in France and Great Britain shows that it is best for unions and HRM practices to exist simultaneously in both contexts. Though, Amossé & Wolff (2008) evaluates the tested effect through the use of correlations and by implementing binomial or ordinal multinomial models, thus does not take into account the potential endogeneity of the phenomena. The use of the bivariate probit model fixes the endogeneity issue and provides more precise estimations. Our results are however in contradiction with the findings of Fiorito (2001) in which the effect of human resource practices on union voting intentions in the UK also varies depending on the practice but is globally negative implying a union substitution effect.

Concerning the effect of the other explanatory variables, the analysis of the estimates in both equations of the bivariate probit shows that male employees and employees with higher wages are more active in both HRM practices and unions. For firms characteristics, the bigger the firm the better it uses HRM practices. But the firm age (or number of years of activity) does not have a significant impact on HRM practice, except for incentive pay programs which are used more often in younger firms. This means that older firm are not less willing to implement good management practices or that they are more open to union representatives, this supports Machin & Wood (2005) results concerning the link of union decline and HRM practice emergence with workplace age. Also, firms who operate in single sites have less chance to have union representatives or to implement strong HRM practices, while, multinational firms are better at implementing good HRM practices, this goes in line with Bloom et al. (2012). Finally, changes in CEO or shareholder have no significant effect on unions but

have varying effect on HRM practices.

4 Conclusion

This paper is motivated by the overall idea that human resource management practices are replacing union representation in firms. This hypothesis stems from the fact that HRM practices could be reducing employees dissatisfaction and doing unions' job, consequently driving employees away from unions, in what is called *union substitution effect* (Fiorito, 2001). In fact, HRM practices are mainly motivated by the effort to improve productivity and efficiency, through providing better services to employees, more guidance, and more involvement in the decision making process. This substitution effect be seen as a direct substitution where management forces out unionism, or an indirect substitution where the presence of some HRM practices fulfils the role of unions (Amossé & Wolff, 2008).

The findings of this paper show that, for French employees, benefiting from good HRM practices is not causing them to abandon unions, rather, the opposite phenomenon is observed, receiving good HRM practices incites to be a union member or supporter. This is partially in accordance with Machin & Wood (2005), Amossé & Wolff (2008) and Wood (1996) results who find no evidence that HRM practices are replacing unionism, though they do not find a positive effect. Otherwise, our results go against those of Fiorito (2001) who considers that whether designed toward union substitution or not, HRM practices are questioning its usefulness.

This empirical paper contribute to the analysis of the union-management relation in France. It suggest that unionism and HRM practices are interacting concurrent phenomenons of a changing work environment. Our findings show that except for the use of an adapted training, which is negatively correlated to union support, and dispensing appropriate information about work related

risks, which is not correlated to union support, the six remaining HRM practices have positive impact on employees support and adherence to unions. This paper could, though, be improved in the sense that we do not view the global effect. Further works could include more various indicators and develop a composite measure of human resources management practices to analyse the overall effect on unions. Moreover, the firm position and motives are not treated here, whether it is aimed to workers welfare or to suppress unionisation.

Appendix IV

IV..1 Correlation Between the Variables

Table IV.4: Correlation Matrix of Management Practices Variables

	HRM	*TRAINING*	*INFORM*	*DISCUSS*	*PERF_APP*	*INCENT_PAY*
HRM	1	0.08	0.13	0.07	0.26	0.41
TRAINING	-	1	0.17	0.08	0.23	0.12
INFORM	-	-	1	0.08	0.19	0.17
DISCUSS	-	-	-	1	0.16	0.08
PERF_APP	-	-	-	-	1	0.30
INCENT_PAY	-	-	-	-	-	1

Notes: 4,811 observations
Correlation measured using *Cramer's V*
Source: "Condition de Travail" Survey 2013

Table IV.5: Control Variables Correlation Matrix

	MALE	*SPC*	*DIPLOMA*	*SECTOR*	*FIRM_AGE*	*GEO_ZONE*	*SINGLE_SITE*	*MULTINATIONAL*	*MARKET*	*CHANG_CEO*	*SHAREHOLDER*	*AGE*	*FIRM_SIZE*	*WAGE*
MALE	1	0.38	0.11	0.17	0.04	0.05	0.04	0.10	0.12	0.01	0.03	$9.88\ 10^{-5}$	$1.5\ 10^{-6}$	0.020
SPC	-	1	0.36	0.29	0.07	0.15	0.09	0.13	0.17	0.04	0.05	0.004	0.007	0.165
DIPLOMA	-	-	1	0.10	0.05	0.11	0.07	0.08	0.08	0.05	0.03	0.089	0.004	0.053
SECTOR	-	-	-	1	0.26	0.19	0.11	0.21	0.47	0.00	0.04	0.005	$6.44\ 10^{-4}$	0.001
FIRM_AGE	-	-	-	-	1	0.10	0.06	0.06	0.16	0.05	0.03	0.020	0.003	0.001
GEO_ZONE	-	-	-	-	-	1	0.09	0.13	0.18	0.05	0.05	0.004	0.015	0.029
SINGLE_SITE	-	-	-	-	-	-	1	0.37	0.20	0.08	0.05	$2.62\ 10^{-4}$	0.007	0.008
MULTINATIONAL	-	-	-	-	-	-	-	1	0.30	0.06	0.08	$6.78\ 10^{-5}$	0.003	0.007
MARKET	-	-	-	-	-	-	-	-	1	0.04	0.05	0.001	0.032	0.018
CHANG_CEO	-	-	-	-	-	-	-	-	-	1	0.13	$5.31\ 10^{-4}$	$3.79\ 10^{-4}$	$8.03\ 10^{-5}$
SHAREHOLDER	-	-	-	-	-	-	-	-	-	-	1	$1.02\ 10^{-4}$	$7.64\ 10^{-4}$	$4.09\ 10^{-4}$
AGE	-	-	-	-	-	-	-	-	-	-	-	1	0.023	0.115
FIRM_SIZE	-	-	-	-	-	-	-	-	-	-	-	-	1	0.086
WAGE	-	-	-	-	-	-	-	-	-	-	-	-	-	1

Notes: 4,811 observations
Correlation between continuous variables measured using *Pearson coefficient*
Correlation between categorical variables measured using *Cramer's V*
Correlation between categorical and continuous variables measured using *correlation ration (η)*
Source: "Condition de Travail" Survey 2013

IV..2 Detailed Results of the Bivariate Probit Regression

Table IV.6: Effect of *HMR* on Union membership using Bivariate Probit Regression

		UNION		*HRM*	
Variable	Description	Coef.	Std.Err.	Coef.	Std.Err.
HRM	presence of a human resource management service	0.6199***	(0.2025)		
Log(AGE)	logarithm of the age of the employee	0.6945***	(0.1005)	0.1409	(0.1032)
MALE	being male	0.1846***	(0.0511)	-0.0206	(0.0601)
SPC	middle managers	0.2679***	(0.0734)	-0.0089	(0.0905)
	clerks	0.1546*	(0.091)	-0.1203	(0.1042)
	blue collars	0.2398***	(0.089)	-0.0755	(0.1046)
DIPLOMA	professional diploma	0.1417**	(0.0696)	-0.0335	(0.0792)
	high school	0.1893**	(0.0822)	-0.0472	(0.0938)
	university	0.106	(0.0839)	0.0682	(0.0943)
SECTOR	industry	0.0267	(0.0606)	-0.064	(0.0739)
Log(FIRM_SIZE)	logarithm of the number of employees in the firm	0.0581**	(0.0255)	0.5954***	(0.0262)
FIRM_AGE	firm in business for 5 to 19 years	-0.0394	(0.0849)	-0.0159	(0.0865)
	firm in business for 20 to 49 years	0.0362	(0.0832)	0.0395	(0.0875)
	firm in business for more than 50 years	0.1237	(0.0929)	0.1406	(0.1123)
GEO_ZONE	Parisian region	-0.7337***	(0.1002)	0.0622	(0.1148)
	South of the Parisian region	-0.7305***	(0.0929)	0.0454	(0.1044)
	Nord-pas-de-Calais-Picardie	-0.7004***	(0.1007)	-0.1407	(0.113)
	Alsace-Champagne-Ardenne-Lorraine	-0.4961***	(0.0975)	0.1414	(0.1185)
	North-West	-0.7616***	(0.0974)	0.0666	(0.108)
	Grand South-West	-0.6425***	(0.0935)	0.1422	(0.1064)
	Auvergne-Rhône-Alpes	-0.7299***	(0.099)	-0.087	(0.109)
	South-East	-0.4669***	(0.1349)	-0.1536	(0.1541)
Log(WAGE)	logarithm of the wage of the employee	0.0761**	(0.0381)	0.0214	(0.0383)
SINGLE_SITE	firm having only one site	-0.1775**	(0.0712)	-0.7486***	(0.057)
MULTINATIONAL	firm belongs to a multinational group	-0.048	(0.0582)	0.4253***	(0.0988)
MARKET	national	-0.0945	(0.063)	0.0648	(0.0702)
	international	-0.053	(0.0669)	0.2527***	(0.0826)
CHANG_CEO	change in the management team			0.2225***	(0.0751)
SHAREHOLDER	change of the majority shareholder			-0.1662*	(0.0921)
Intercept		-4.6571***	(0.478)	-1850947***	(0.5083)
ρ		-0.3765***	(0.1262)		

Notes: 4,811 observations
Significance levels: *** : p<0.01 ** : p<0.05 * : p<0.1
Standard error in brackets ()
Source: "Condition de Travail" Survey 2013

Table IV.7: Effect of *TRAINING* on Union membership using Bivariate Probit Regression

		UNION		*TRAINING*	
Variable	Description	Coef.	Std.Err.	Coef.	Std.Err.
TRAINING	having an adapted off-the-job training	-1.229***	(0.2246)		
Log(AGE)	logarithm of the age of the employee	0.5661***	(0.1077)	-0.1359*	(0.0759)
MALE	being male	0.1636***	(0.0482)	0.0061	(0.0414)
SPC	middle managers	0.1897***	(0.0717)	-0.1413**	(0.0598)
	clerks	0.0908	(0.0849)	-0.1413**	(0.0721)
	blue collars	0.0989	(0.0884)	-0.2746***	(0.0722)
DIPLOMA	professional diploma	0.1056	(0.0654)	-0.0133	(0.0575)
	high school	0.142*	(0.0768)	-0.039	(0.0669)
	university	0.124	(0.0771)	0.0637	(0.0678)
SECTOR	industry	-0.0004	(0.0559)	-0.0358	(0.0504)
Log(FIRM_SIZE)	logarithm of the number of employees in the firm	0.1219***	(0.0145)	0.0624***	(0.013)
FIRM_AGE	firm in business for 5 to 19 years	-0.0632	(0.0776)	-0.0754	(0.0654)
	firm in business for 20 to 49 years	0.0502	(0.0761)	0.0139	(0.0651)
	firm in business for more than 50 years	0.134	(0.0856)	0.038	(0.0757)
GEO_ZONE	Parisian region	-0.589***	(0.1104)	0.1087	(0.0849)
	South of the Parisian region	-0.5585***	(0.1065)	0.1449*	(0.0806)
	Nord-pas-de-Calais-Picardie	-0.5658***	(0.1097)	0.1102	(0.0859)
	Alsace-Champagne-Ardenne-Lorraine	-0.3111***	(0.1041)	0.2348***	(0.0884)
	North-West	-0.6051***	(0.1089)	0.0889	(0.0834)
	Grand South-West	-0.5454***	(0.0973)	-0.0113	(0.0822)
	Auvergne-Rhône-Alpes	-0.5448***	(0.1139)	0.1906**	(0.0839)
	South-East	-0.3285**	(0.1338)	0.2066*	(0.1173)
Log(WAGE)	logarithm of the wage of the employee	0.1461***	(0.0357)	0.1698***	(0.0285)
SINGLE_SITE	firm having only one site	-0.3215***	(0.0498)	-0.1438***	(0.0424)
MULTINATIONAL	firm belongs to a multinational group	0.0365	(0.055)	0.1128**	(0.0504)
MARKET	national	-0.1058*	(0.0575)	-0.0937*	(0.0499)
	international	-0.066	(0.0617)	-0.0738	(0.0552)
CHANG_CEO	change in the management team			-0.2206***	(0.0448)
SHAREHOLDER	change of the majority shareholder			0.0676	(0.0611)
Intercept		-3.6287***	(0.5545)	-0.7164**	(0.3615)
ρ		0.6969**	(0.1337)		

Notes: 4,811 observations
Significance levels: *** : p<0.01 ** : p<0.05 * : p<0.1
Standard error in brackets ()
Source: "Condition de Travail" Survey 2013

Table IV.8: Effect of *INFORM* on Union membership using Bivariate Probit Regression

		UNION		*INFORM*	
Variable	Description	Coef.	Std.Err.	Coef.	Std.Err.
INFORM	having received a document outlining the risks related to the work	0.7029	(0.4837)		
Log(AGE)	logarithm of the age of the employee	0.6641***	(0.1235)	0.1862**	(0.0781)
MALE	being male	0.1215*	(0.071)	0.2103***	(0.0424)
SPC	middle managers	0.2761***	(0.0738)	-0.0174	(0.0601)
	clerks	0.2104**	(0.0932)	-0.2093***	(0.074)
	blue collars	0.2768***	(0.0886)	-0.1389*	(0.0733)
DIPLOMA	professional diploma	0.1233*	(0.071)	0.0468	(0.0589)
	high school	0.1652**	(0.0841)	0.0513	(0.0692)
	university	0.1135	(0.0831)	-0.0242	(0.0701)
SECTOR	industry	-0.0623	(0.0823)	0.2941***	(0.051)
Log(FIRM_SIZE)	logarithm of the number of employees in the firm	0.0824***	(0.0276)	0.0938***	(0.0133)
FIRM_AGE	firm in business for 5 to 19 years	-0.0517	(0.0843)	0.0632	(0.0681)
	firm in business for 20 to 49 years	0.0345	(0.083)	0.0466	(0.0677)
	firm in business for more than 50 years	0.1367	(0.092)	-0.0135	(0.0779)
GEO_ZONE	Parisian region	-0.6997***	(0.1198)	-0.1428	(0.0886)
	South of the Parisian region	-0.7327***	(0.0993)	0.0603	(0.0834)
	Nord-pas-de-Calais-Picardie	-0.7572***	(0.0989)	0.1814**	(0.0886)
	Alsace-Champagne-Ardenne-Lorraine	-0.4801***	(0.0998)	0.047	(0.0909)
	North-West	-0.7344***	(0.1092)	-0.0233	(0.0869)
	Grand South-West	-0.6544***	(0.0939)	0.1441*	(0.0849)
	Auvergne-Rhône-Alpes	-0.7439***	(0.1038)	0.0688	(0.0867)
	South-East	-0.5178***	(0.1328)	0.174	(0.1189)
Log(WAGE)	logarithm of the wage of the employee	0.0429	(0.0444)	0.1485***	(0.0322)
SINGLE_SITE	firm having only one site	-0.2596***	(0.0662)	-0.1375***	(0.0438)
MULTINATIONAL	firm belongs to a multinational group	-0.0687	(0.0638)	0.1739***	(0.0498)
MARKET	national	-0.0166	(0.0738)	-0.2073***	(0.0516)
	international	-0.0015	(0.0714)	-0.1422**	(0.0566)
CHANG_CEO	change in the management team			0.018	(0.0532)
SHAREHOLDER	change of the majority shareholder			-0.1131*	(0.0654)
Intercept		-4.1132***	(0.6464)	-2.6114***	(0.3849)
ρ		-0.3582	(0.2927)		

Notes: 4,811 observations
Significance levels: *** : p<0.01 ** : p<0.05 * : p<0.1
Standard error in brackets ()
Source: "Condition de Travail" Survey 2013

Table IV.9: Effect of *DISCUSS* on Union membership using Bivariate Probit Regression

		UNION		*DISCUSS*	
Variable	Description	Coef.	Std.Err.	Coef.	Std.Err.
DISCUSS	having the opportunity to discuss organizational or operational issues	1.3342***	(0.4507)		
Log(AGE)	logarithm of the age of the employee	0.7619***	(0.1079)	-0.2648***	(0.0882)
MALE	being male	0.1538***	(0.0577)	0.0369	(0.0487)
SPC	middle managers	0.2469***	(0.0818)	-0.0248	(0.0777)
	clerks	0.2024**	(0.0865)	-0.2021**	(0.0876)
	blue collars	0.343***	(0.0878)	-0.3528***	(0.087)
DIPLOMA	professional diploma	0.0024	(0.0971)	0.2482***	(0.0618)
	high school	-0.0039	(0.1279)	0.3751***	(0.0761)
	university	-0.0605	(0.1201)	0.3643***	(0.0772)
SECTOR	industry	0.0257	(0.0578)	-0.0205	(0.0595)
Log(FIRM_SIZE)	logarithm of the number of employees in the firm	0.0827***	(0.0282)	0.0417***	(0.0157)
FIRM_AGE	firm in business for 5 to 19 years	-0.0346	(0.0802)	0.0235	(0.0776)
	firm in business for 20 to 49 years	0.0235	(0.0811)	0.0652	(0.0772)
	firm in business for more than 50 years	0.0997	(0.0944)	0.0797	(0.0893)
GEO_ZONE	Parisian region	-0.766***	(0.1213)	0.2167**	(0.0961)
	South of the Parisian region	-0.7742***	(0.1093)	0.2526***	(0.0882)
	Nord-pas-de-Calais-Picardie	-0.795***	(0.1076)	0.3181***	(0.096)
	Alsace-Champagne-Ardenne-Lorraine	-0.5422***	(0.0979)	0.2196**	(0.0963)
	North-West	-0.8863***	(0.0941)	0.4893***	(0.0961)
	Grand South-West	-0.71***	(0.0952)	0.3169***	(0.0916)
	Auvergne-Rhône-Alpes	-0.8378***	(0.1007)	0.3915***	(0.0944)
	South-East	-0.5317***	(0.1328)	0.1987	(0.1308)
Log(WAGE)	logarithm of the wage of the employee	0.0049	(0.0571)	0.1327***	(0.029)
SINGLE_SITE	firm having only one site	-0.2564***	(0.0751)	-0.0328	(0.0498)
MULTINATIONAL	firm belongs to a multinational group	-0.0187	(0.0553)	-0.0146	(0.0597)
MARKET	national	-0.0595	(0.061)	-0.0257	(0.0591)
	international	-0.0272	(0.065)	-0.0299	(0.0645)
CHANG_CEO	change in the management team			0.1764***	(0.0568)
SHAREHOLDER	change of the majority shareholder			-0.0102	(0.0833)
Intercept		-4.8016***	(0.6285)	0.3072	(0.4181)
ρ		-0.6413*	(0.3376)		

Notes: 4,811 observations
Significance levels: *** : p<0.01 ** : p<0.05 * : p<0.1
Standard error in brackets ()
Source: "Condition de Travail" Survey 2013

Table IV.10: Effect of *PERF_APP* on Union membership using Bivariate Probit Regression

		UNION		*PERF_APP*	
Variable	Description	Coef.	Std.Err.	Coef.	Std.Err.
PERF_APP	having at least one performance approval interview a year	0.8923***	(0.2419)		
Log(AGE)	logarithm of the age of the employee	0.689***	(0.1015)	0.0005	(0.0799)
MALE	being male	0.1876***	(0.05)	-0.0474	(0.0443)
SPC	middle managers	0.2759***	(0.0716)	-0.0808	(0.0666)
	clerks	0.2523***	(0.0917)	-0.3739***	(0.0776)
	blue collars	0.4167***	(0.0963)	-0.6388***	(0.0779)
DIPLOMA	professional diploma	0.1205*	(0.0685)	0.0332	(0.0597)
	high school	0.1203	(0.0834)	0.16**	(0.0704)
	university	0.0632	(0.0836)	0.1458**	(0.0715)
SECTOR	industry	0.0402	(0.0596)	-0.0922*	(0.0546)
Log(FIRM_SIZE)	logarithm of the number of employees in the firm	0.0594**	(0.0233)	0.1591***	(0.0145)
FIRM_AGE	firm in business for 5 to 19 years	-0.0575	(0.0826)	0.063	(0.07)
	firm in business for 20 to 49 years	0.0352	(0.081)	0.0118	(0.0695)
	firm in business for more than 50 years	0.133	(0.0905)	-0.0399	(0.0811)
GEO_ZONE	Parisian region	-0.7428***	(0.0997)	0.0936	(0.0904)
	South of the Parisian region	-0.7062***	(0.095)	0.0101	(0.084)
	Nord-pas-de-Calais-Picardie	-0.7202***	(0.0994)	0.0999	(0.0904)
	Alsace-Champagne-Ardenne-Lorraine	-0.4499***	(0.0983)	-0.0254	(0.0916)
	North-West	-0.7315***	(0.0991)	0.0193	(0.0869)
	Grand South-West	-0.6298***	(0.0936)	0.0841	(0.0857)
	Auvergne-Rhône-Alpes	-0.7349***	(0.0989)	0.0729	(0.0878)
	South-East	-0.4802***	(0.1325)	0.037	(0.1221)
Log(WAGE)	logarithm of the wage of the employee	0.0373	(0.0392)	0.1168***	(0.028)
SINGLE_SITE	firm having only one site	-0.1406*	(0.0736)	-0.4334***	(0.0439)
MULTINATIONAL	firm belongs to a multinational group	-0.153**	(0.068)	0.4612***	(0.0561)
MARKET	national	-0.1018*	(0.0614)	0.1037*	(0.0532)
	international	-0.0853	(0.0664)	0.1717***	(0.059)
CHANG_CEO	change in the management team			-0.0105	(0.0518)
SHAREHOLDER	change of the majority shareholder			-0.1365**	(0.0661)
Intercept		-4.3709***	(0.4983)	-1.1036***	(0.3777)
ρ		-0.4681**	(0.1488)		

Notes: 4,811 observations
Significance levels: *** : p<0.01 ** : p<0.05 * : p<0.1
Standard error in brackets ()
Source: "Condition de Travail" Survey 2013

Table IV.11: Effect of *INCENT_PAY* on Union membership using Bivariate Probit Regression

		UNION		*INCENT_PAY*	
Variable	Description	Coef.	Std.Err.	Coef.	Std.Err.
INCENT_PAY	firm covered by a profit-sharing agreement or an employee savings plan	0.6019**	(0.2152)		
Log(AGE)	logarithm of the age of the employee	0.7676***	(0.0997)	-0.3357***	(0.0904)
MALE	being male	0.1417***	(0.054)	0.2621***	(0.0501)
SPC	middle managers	0.2774***	(0.0734)	-0.0093	(0.0744)
	clerks	0.155*	(0.0912)	-0.0051	(0.0868)
	blue collars	0.2321***	(0.0895)	-0.0101	(0.0884)
DIPLOMA	professional diploma	0.147**	(0.0702)	-0.0553	(0.0677)
	high school	0.1893**	(0.0827)	-0.0211	(0.08)
	university	0.1098	(0.0843)	0.0438	(0.0804)
SECTOR	industry	-0.0374	(0.0607)	0.413***	(0.0638)
Log(FIRM_SIZE)	logarithm of the number of employees in the firm	0.0517*	(0.0271)	0.4146***	(0.0181)
FIRM_AGE	firm in business for 5 to 19 years	-0.0757	(0.0864)	0.2106***	(0.0752)
	firm in business for 20 to 49 years	0.0111	(0.0845)	0.2132***	(0.0751)
	firm in business for more than 50 years	0.1121	(0.0933)	0.0983	(0.0908)
GEO_ZONE	Parisian region	-0.7957***	(0.0983)	0.2859***	(0.0986)
	South of the Parisian region	-0.7899***	(0.0934)	0.3632***	(0.0919)
	Nord-pas-de-Calais-Picardie	-0.7579***	(0.0987)	0.2313**	(0.1004)
	Alsace-Champagne-Ardenne-Lorraine	-0.5554***	(0.1009)	0.4464***	(0.1021)
	North-West	-0.8316***	(0.099)	0.4805***	(0.0955)
	Grand South-West	-0.7071***	(0.0962)	0.4739***	(0.0937)
	Auvergne-Rhône-Alpes	-0.806***	(0.0993)	0.3558***	(0.0965)
	South-East	-0.533***	(0.1356)	0.2629**	(0.1335)
Log(WAGE)	logarithm of the wage of the employee	0.0557	(0.0388)	0.1414***	(0.032)
SINGLE_SITE	firm having only one site	-0.155*	(0.0788)	-0.7028***	(0.0477)
MULTINATIONAL	firm belongs to a multinational group	-0.0734	(0.0789)	0.4491***	(0.0699)
MARKET	national	-0.1218*	(0.0790)	0.2226***	(0.0587)
	international	-0.0641	(0.0791)	0.2077***	(0.0663)
CHANG_CEO	change in the management team			-0.035	(0.0596)
SHAREHOLDER	change of the majority shareholder			0.1298	(0.0796)
Intercept		-4.5062***	(0.4816)	-1.783***	(0.4276)
ρ		-0.3321**	(0.1454)		

Notes: 4,811 observations
Significance levels: *** : p<0.01 ** : p<0.05 * : p<0.1
Standard error in brackets ()
Source: "Condition de Travail" Survey 2013

General Conclusion

This dissertation contributes to the literature on the labour and social dimensions of work; the organization of work and firms' management decisions conceived to adapt to its environment. This involves the interaction between the employees, the employers, organizations, and the work environment. There are significant changes in the structure of the firm which significantly influence its environment stability and creates the need for solid organization and the determination of factors that influence the decisions at the workplace. The objective of this dissertation is to analyse the dynamics of work organization and to help providing an understanding of the decision-making process at the firm level. It focuses on the less formal interactions that they potentially influence the social interactions of the employees and the firm. This thesis is centered on the analysis of the influences of human management resources on the employees and the organization of work. The research gap helps to analyse the aspects of work that are of a more social and human extent and to treat in a more psychological way different interactions and decisions.

In the first chapter we analyse how informal help shapes the work in the firm, its repercussion on workers and the factors that influence the informal interactions. First, an agency model is applied, it helps to identify the interactions between the exchange of help, effort and wages which is later tested in the empirical part. The application of the principal agent model considers the employer as the principal who imperfectly observes the efforts of the employees viewed

as the agents in the model. The exchange of help does not include monetary transfer between members of the network, it is solely based on the benefit gained from help. Therefore, in the model framework, reciprocity is the main driver of informal help, which is a key incentive that influences a higher level of effort.

In the empirical investigation, the total exchanged help is measured by the combination of both the informal and formal help. Formal help depends on the structure of the firm while informal help can not be predicted in advance. Informal and formal help are closely related which implies that to measure the informal help, a regression analysis is run of the total help over the formal communication. The predicted residuals of the regression are the informal help exchanged in the work environment since they are not dictated by the formal structure of the firm.

Three types of determinants influence the informal help at the workplace which include the characteristics of workers, the characteristics of the workstation and the characteristics of the environment of the firm. The environment of the firm particularly when it generates instability and uncertainty may also impact on the informal help at the workplace. In the analysis of the relationship between help and effort, the impact of informal help on effort is direct, higher levels of effort are observed for the individuals who tend to offer help to other. The relationship between the informal help and wages is dependent on the relationship between the ex-post and the informal help.

Endogenous switching regression estimates imply that the employee's wage rate increases for recipients of informal help who are not reciprocating and it considerably decreases their levels of effort, this suggests free-riding behaviours. On the contrary, employees who tend to offer help without receiving any see their wage rates decrease when giving informal help compared to the levels of effort they provide which highly increases with informal help, thus resulting in generation of wage penalty. For individuals mutually exchange informal help, their wage slightly increases and their effort slightly decreases. These results insist on the importance of the reciprocity of informal help in the determination of the

outcome of participating in informal help networks. Generally, the participation to informal help networks generates stronger motivation.

In the second chapter, further research is conducted to assess the psychosocial risks that affect workers and cripple their activities, lives and welfare in general. In previous researches, theoretical models have been developed to explain the mechanisms leading to occupational stress. In the French context, the Gollac College of experts produced a lengthy report on the detection, collecting of information and measure of psychosocial risks. These researches attest of the widely shared ambition to reduce psychosocial risks at work. We follow Gollac guideline to produce a composite index that allows the evaluation of the overall level of psychosocial risks resumed in one indicator. The difficulty in the measurement of psychosocial risks lies in the psychological and subjective nature of the matter, and that the different indicators could describe very similar or very different situations. Therefore, first, it is important to distinguish between the different aspects of psychosocial risks, and second, to create a measure that takes into account the potential correlation between the indicators. We divide the risk indicators into six dimensions (work demands, emotional demands, autonomy and leeway, social and work relations, conflicts of values, and economic insecurity), and we produce a weighted index that measures the intensity of the psychosocial risks, the index is based on factor analysis in order to eliminate the interactions between indicators.

The second point of this chapter is to to analyse whether performance appraisals decreases the employees psychosocial risks. To answer this question, we consider firms from the private sector and, using propensity score matching, we assess the differences in the level of psychological risk depending on the presence or not of performance appraisal. The study concludes that overall performance appraisals tend to decrease psychosocial risks among employees. This effect concerns the dimensions of work relations, conflicts of values and economic

insecurity. These dimensions are not directly related to the pressure created by the job but rather intervene in more social and personal circles. These findings are given by considering the employees' point of view on psychosocial risks, by considering the firms perspective we find similar results confirming the role of performance appraisal in reducing psychosocial risks.

The third chapter further focuses on the analysis of workers risk attitude and financial participation. The key interest of analysis is the fact that financial participation, an important managerial tool, has a random outcome and is affected by employees' risk attitude. Thus the implementation of financial participation schemes in a firm relies on its workers' attitudes towards risk, and firms that implement financial participation will prefer hiring workers with low levels of risk aversion. The empirical approach of this chapter uses French data on household wealth and an objective measure of risk aversion. A classification tree method is implemented for the financial participation where the variables impacting it include the attitudes towards risks the household wealth and other characteristics of individuals. The results provided by this method are backed up by logistic regression.

The findings confirm that the implementation if the financial risk participation schemes in the firms is highly dependent on the workers attitudes to risk. The lower risk averse a person is the more willing to adopt financial participation. Furthermore, the household's net wealth play an important role in the decision of participating in financial participation. In fact, for individuals with net wealth within a certain range, risk attitudes intervene in the decision of accepting financial participation, above that range individuals are most likely to take financial participation without considering the potential risks, and below that range individuals tend not to accept financial participation due to higher risks involved. Other aspects influence financial participation like gender whereby women are more risk adverse than the men.

Chapter four of the dissertation is dedicated to the analysis of the dissension between human resource management practices and trade unions representations. The main hypothesis is that human resource management practices are driving away the employees from unions representation by filling their function and providing better work conditions and thus reducing the need for unions. This chapter approach to the issue is through the analysis of the influence of different human management practices on the participation of the employees in the trade union activities. We use the French working conditions survey conducted in 2010 and consider six main human resource management practices. We evaluate the impact of these practices on union adherence using bivariate probit models.

The findings show that the decline in trade union representation can not be imputed to the development of human resource management practices and the use of these practices is not driving away workers from unionism. On the contrary, most of the human resource management practices positively influences active participation of employees in the trade unions in the firm. Employees who benefit from human resource management practices are those who get the more inclined to participate to the trade unions activities. The literature is not unanimous on the subject of unions substitution, and our results reinforces the idea that human resource management practices are not ousting unions and that it is even best for firm balance to have both coexist simultaneously.

It is important that the employees should be treated as assets in the work environment as they influence the productivity and the success of a firm. This dissertation role is to develop insight on the appropriate practices that the employees and the employers should employ to achieve balance in the firm. Furthermore, this thesis helps identify that the well-being of the employees influences the productivity of the employees to great extents.

The first challenge of this dissertation is an empirical one. The fact that part

of it is based on secondary data on the French statistics. The datasets are cross sectional data from French surveys, this implies that the highlighted relationships and interactions between the different factors are bound to a certain cultural and institutional context, and the fact that we use cross sectional data also do not take into account the evolutionary nature of these phenomena. These limitations restricts the scope of our analysis. It would be interesting to use longitudinal or panel data and extend the analysis to wider samples with international focus (European, OECD ...). Another point concerning the data is that it is not recently accumulated and thus the insight is not based on recent research. The approaches to address this challenges is through updating certain research and further the use of primary data like the survey studies which offer up to date information.

Some of the other challenges and perspectives that stem from this dissertation could be summed up in the following remarks. In chapter one, we do not focus on the analysis of the position of the firm toward informal help. In further investigations we could include the question of weather the firm management is aware of informal help and does exploit it to its profit. We could also extend the analysis of the impact of informal help over wages and productive effort to other outcomes. In chapter two, our interest is aimed at the impact of performance appraisal on psychosocial risks as a practice that allows discussion and confrontation between workers and management, but other management practices could and certainly do influence employees life in general. Future research would explore a wider range of management practice, such as solid ways communication, the help provided. We also could orient the analysis on a particular population of employees, a more vulnerable population. In chapter three, future a model should be introduced to identify the mechanisms by which risk aversion affect financial participation, and to evaluate whether firms take into account risk aversion in their hiring system. In chapter four, a technical aspect of the study is not treated, it is that we do not consider an aggregate index for the

evaluation of management practices as a whole, and analyse its global effect on unionism.

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Titre: Quatre Essais en Microéconométrie de la Décision

Mots clés: aide informelle, risques psychosociaux, entretiens d'évaluation, épargne salariale, pratiques managériales, syndicat professionnel

Résumé: Cette thèse apporte un éclairage quand à certains aspects de la nature des interactions entre employeurs et employés au sein de l'entreprise, entreprend d'analyser les décisions de chaque agent économique et de mettre en valeur le rôle des ressources humaines. Elle traite différentes problématiques liées à l'environnement de travail dans les entreprises, et est constituée de quatre travaux de microéconométrie appliquée. Le premier chapitre traite de la dynamique de l'échange d'aide entre les salariés, en particulier les réseaux d'aide informelle, qui est la part d'aide non anticipée par l'entreprise. Il analyse ses déterminants et son effet sur les salaires et l'effort productif des salariés. Les résultats montrent que offrir de l'aide intensifie le niveau d'effort, et en recevoir a un impact positif sur le salaire. Cela met en évidence le rôle de la réciprocité dans l'échange d'aide informelle mais aussi l'existence de comportements de free-riding. Le deuxième chapitre s'intéresse à l'évaluation des risques psychosociaux chez les salariés, et à l'impact des entretiens individuels d'évaluation sur ceux-ci. Son objectif est de démêler les effets ambigus des entretiens d'évaluation sur les risques psychosociaux des salariés. Les résultats montrent que le niveau de risques psychosociaux diminue lorsque les employés sont soumis à des entretiens d'évaluation. Cet effet est observé dans certaines dimensions de ces risques, qui sont de l'ordre des relations sociales, de l'éthique et de la sécurité économique. De plus ce résultat est confirmé lorsqu'on prend en compte le point de vue de l'entreprise sur les risques psychosociaux. Le chapitre trois aborde le thème de l'épargne salariale et a pour objectif de déterminer le rôle de l'aversion au risque des individus dans leur décision de s'engager dans un plan d'épargne salariale. En effet, l'épargne salariale comporte un certain risque pour les salariés. Il est démontré que le premier facteur qui entre en jeu dans dans la décision de souscrire à une épargne salariale est la richesse du ménage. En effet, nous constatons qu'au-delà d'un certain seuil de richesse l'aversion au risque des salariés n'intervient pas dans l'acceptation de la participation financière. Ensuite, et pour les individus dont la richesse se situe dans un niveau intermédiaire, l'attitude face au risque intervient dans la décision d'accepter ou non d'adhérer à une épargne salariale. Plus un individu est averse au risque, moins il est susceptible d'accepter une épargne salariale. Ceci serait favorable à l'entreprise qui engagerait les individus les moins averses au risque. Enfin, le chapitre quatre considère les pratiques managériales axées sur les ressources humaines dans leurs ensemble, et tente de répondre à la question de savoir si les pratiques managériales tendent à se substituer à la représentation syndicale auprès des salariés. Les résultats montrent que ces pratiques managériales ne sont pas directement impliqué dans l'abandon des syndicats par les salariés. Au contraire, les salariés bénéficiant de certaines de ces pratiques ont tendance à soutenir ou à adhérer à un syndicat.

Title: Four Essays in Microeconometrics of Decision

Keywords: informal help, psychosocial risks, performance appraisal, financial participation, management practices, trade unions

Abstract: This thesis sheds light on the nature of the interactions between employers and employees within the company, it analyses the decisions of each agent and highlights the role of human resources. It tackles different issues related to the working environment in the firm. It consists of four essays on applied microeconometric. The first chapter investigates the dynamics of the help exchange between employees, particularly the informal help network, which is the unanticipated part of help by the firm. It analyses its determinants and effects on the wages and the productive effort of employees. The results show that providing help increases the level of effort, and receiving it has a positive impact on wages. This highlights the rôle of reciprocity in the exchange of informal help and suggests the existence of free-riding behaviours. The second chapter focuses on the evaluation of psychosocial risks among employees, and the impact of performance appraisal interviews on them. It aims at clearing up the ambiguous effects of performance appraisal on psychosocial risks. The results show that the level of psychosocial risk decreases when employees undertake performance appraisal interview. This effect is observed on particular dimensions of psychosocial risks, namely social relations, ethics and economic security. Moreover this result is confirmed when taking into account the point of view of the firm. Chapter Three addresses the issue of financial participation and seeks to determine the role of workers' risk aversion on their decision to engage in a financial participation plan, such as profit sharing or employee stock ownership plan, since profit sharing involves a certain risk for employees. We find that the first factor that intervenes in the decision to subscribe to financial participation plan is the household wealth. Indeed, we find that beyond a certain threshold of wealth, workers' risk aversion does not interfere in the decision to accept financial participation. For individuals whose wealth is at an intermediate level, the attitude towards risk play a role in the decision to accept or not a financial participation plan. The more risk-averse an individual is, the less likely he is to accept financial participation. This would be beneficial to the firm that would hire the least risk averse individuals. Finally, chapter Four considers human resources management practices as a whole, and tries to answer the question of whether human resource management practices are driving workers away from unionism. The results show that human resources management practices are not directly involved in the abandonment of unions by employees, but rather the opposite phenomenon is observed. Employees who benefit from some of these practices tend to be more involved with a trade union.

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