



UNIVERSITY OF PISA
DEPARTMENT OF ECONOMICS AND MANAGEMENT
SANT'ANNA SCHOOL OF ADVANCED STUDIES

Master of Science in Economics

Master Thesis

Towards Shared Capitalism: Incentives and new forms of HRM

Candidate: Julia Alexandra Rossi

Supervisor: Luigi Marengo

Academic Year 2013/2014

Contents

Introduction	1
Chapter 1	
<i>Finding the reasons behind firms' heterogeneity: management practices</i>	4
1.1 <i>How to measure management practices: a new evaluation tool</i>	5
1.2 <i>Insider econometrics</i>	11
4.3 <i>Workplace innovation</i>	14
Chapter 2	
<i>Incentive contracts</i>	16
2.1 <i>Incentives in field experiments: the economists demand, firm respond</i>	20
2.2 <i>Implicit and explicit incentives in lab experiments</i>	27
Chapter 3	
<i>Shared Capitalism</i>	33
3.1 <i>Teams and teams incentives</i>	36
3.2 <i>Profit sharing</i>	42
3.3 <i>Employees ownership</i>	44

Chapter 4	
<i>The Technology of HRM</i>	47
4.1 <i>Complementarities</i>	50
4.2 <i>Empirical analysis</i>	53
4.3 <i>HRM and innovation</i>	57
Conclusions	61
References	65

Introduction

Economists are in front of a new challenging and growing research field, namely, management practices and their relation to firms' performance.

Management and in particular, human resources management have, up to recently, been a matter of study and discussion for scholars in business administration and organizational behaviour, as well as for industrial psychologists.

How an organisation manages its employees, how is its hierarchical structure, how it outlines the reward's systems, which ways of decision-making and resolving conflicts are accepted, all these were subjects of many prominent studies of the last century.

Among these, Geert Hofstede (2001) owns the merit of having realized one of the first large firm-level cross-country surveys during the 60's. In "Culture's Consequences" he describes his findings at IBM, showing the importance of cultural differences and how these were reflected in the management of an organisation. Hofstede six-dimensions model became an important tool for the management of the workforce in an international business setting.

From that time research has focused not only on the roots of management practices but also on how they matter for the performance of the firm and, at an aggregate level, for the industry and the country productivity. These issues have shown to become a multidisciplinary field of research driving the interest also of economists that were mostly concerned with the persistency of productivity differentials across businesses.

Chad Syverson (2011), for instance, describes these patterns of productivity dispersion for the four-digit industry in the U.S manufacturing sector. Plants at the 90th percentile of the productivity distribution produce double as much as at the 10th percentile, in average terms. In developing countries the magnitude and the persistency of these productivity variations grow even larger. To better grab the insights of these facts we should think that firm-level productivity differences

account also at the aggregate level. Indeed, aggregate variation in TFP depends on the variation of firms' productivity, the so called within effects, and on selection mechanisms of the market, the between effects, especially in the long-term period. The combination of these two effects will, therefore, have important implications for the growth and wellbeing of a country.

If the evidence of productivity dispersion is already ascertained, what is becoming very appealing is the research for the sources of productivity growth. Recalling Syverson, what determines productivity? Why do firms, within the same business, differ so much in the amount of outputs, given the same level of inputs?

The causes are manifold and can be related to idiosyncratic characteristics of firms, like ownership and quality of the workforce, to management and production practices, as well as to more external factors belonging to the environment in which the firm operates, e.g. competition and regulatory environment.

Here I will focus mostly on issues that operate within the firm, reviewing economists' research on the levers of productivity, in particular on the impact of human resources management practices. Pay-for-performance schemes, teamwork, cross-training, flexible job assignments are only a few examples of important work practices that have shown to be very successful for workers' productivity.

Nonetheless, I will investigate the importance of the complementarities and synergies among these management practices, as these show to be highly correlated to firm's better performance.

The entrance of economists in this new field of study was supported by an improved offer of high quality micro-level data as well as advancements in econometrics, able to address selection and omitted variables biases, and control for endogeneity. Economists take the fundamental notions of maximisation, efficiency, equilibrium, and make use of a new empirical research strategy, also called "insider econometrics" (Ichiniowski and Shaw, 2009), in order to gain

deeper understanding of the processes governing managers' day-to-day activity. "Insider econometrics" research uses micro-level data of managers and employees inside firms that share the same production process and combines it with econometric techniques in order to acquire information on when and why management practices matter. The increased availability of panel data, together with the use of randomized field experiments, are supporting the evidence of an underlying casual relationship between management and firms' productivity.

This stream of research shed a new light on the management of the organisation and it raised the challenging issue of whether management can be considered like a technology, that once introduced into the production function, captures the variations in output that cannot be accounted by the observable inputs.

Hence, besides some limitations in testing for causality, the overall evidence of the research shows a strong correlation between a bundle of managerial practices and TFP, greater market share of the firm and growth, when considering for a dynamic context.

The economist eye that looks inside the black box of the firm can not only observe very interesting processes but it can also provide precious insights and practical guidance to managerial activity that generally lead to better firm performance and growth.

Chapter 1

Finding the reasons behind firms' heterogeneity: Management practices

“Within the firm managers are conductors of an input orchestra. They coordinate the application of labor, capital and intermediate inputs. Just as a poor conductor can lead to a cacophony rather than a symphony, one might expect poor management to lead to discordant production operations.” (Syverson, 2011)

Firms' heterogeneity in terms of performance can be investigated looking at several data from their accounts. Profitability, growth rates, Tobin's Q and survival rates are subjects of study though, with the increased availability of data the major focus is on firms' total factor productivity (TFP). Productivity, or the residual, as it is commonly calculated, can be defined as the explanatory measure for the gap between output and inputs. Most recent studies on the impact of information and communication technologies on firms' productivity have only partly accounted for the productivity differentials and the residual is still considered the “measure of our ignorance”, as Robert Solow called it. Empirical evidence shows that firms' differences in productivity are persistent over time and across countries but, most astonishing, they are also industry resistant and last with homogeneous goods.

Finding the reasons behind firms' heterogeneity in terms of performance has become a major field of investigation and of speculation. There are many factors that can account for the productivity dispersion and they can be internal as external to the firm. Of course the interactions and complementarities between these factors are as well important subjects of study.

One stream of research among economists looks at management practices as major drivers of firms' productivity. Up to now the importance of the impact of management was sort of neglected in the panorama of applied economic research

but as economists increase the amount of data, they can find more hypotheses to test and more possible determinants of productivity.

1.1 How to measure management practices: a new evaluation tool

On this ground, working papers of Van Reenen, Bloom and Sadun represent very comprehensive studies. They conducted three waves of survey in 2004, 2006 and 2009, collecting data on management information for around 8000 firms in 20 different countries. Their research project, www.worldmanagementsurvey.org, is an interdisciplinary work aimed at the study of the causes and consequences of management practices using detailed firm-level management data collected across a variety of medium-sized firms in manufacturing, retail, acute care hospitals and schools, as well as across countries and industries.

Using a new practice evaluation tool, developed by a consultancy firm, they run “double-blind” phone interviews to plant managers, they collected data on management practices for daily and close-up operations and they gathered information on eighteen management practices in four broad areas: operations, monitoring, targets and incentives.

In research paper of 2007, Bloom and Van Reenen explain the management practices evaluation tool and how it was implemented. The four broad categories were investigated through open questions. Specifically, in the “operations” category, questions on management practices focus on the introduction of modern manufacturing techniques, on the documentation of process improvements and the reasoning behind it.

“Monitoring” is analyzed asking about performance tracking and review and how consequence management is implemented.

The “targeting” section deals with target setting, type, assessment and interconnections. Finally, “incentives” were evaluated questioning on human capital management, especially on workers promotions, selection, pay and

bonuses, showing the importance of strategic human resource management for firm performance. Management practices were then mapped into a scoring grid going from one to five, where one stands for worst practice while five for best one. This evaluation tool helps to measure management practices but it raises also questions and doubts about what can be considered best practice because of the different business situations. Whether there exist universal management practices or if they rather depend on contingent situations is still a matter of discussion. Therefore the research focused only on a subset of basic management practices for which there is evidence of a solid association with performance, independently on country, industry and products.

The results of this research project display great differences in management practices across countries. In research papers of 2007, 2010 and 2012 the cross country patterns look very similar with the United States scoring the highest adoption of best practices, followed by Japan and Germany and a block of mid-European countries, while at the bottom of the grid we find the south-European Greece and Portugal and developing countries like China, Brazil and India.



Fig1 Source: World Management Survey website (www.worldmanagementsurvey.org)

Countries different management performance mirrors what are the cross-country productivity differences that have been analysed by Syverson and other authors. Though, this does not tell the whole story. In order to have a deeper insight of these patterns it is important to have also a look at what are the within country distributions. Fig.2 shows the average management scores per firm across the eighteen practices, plotted by country.

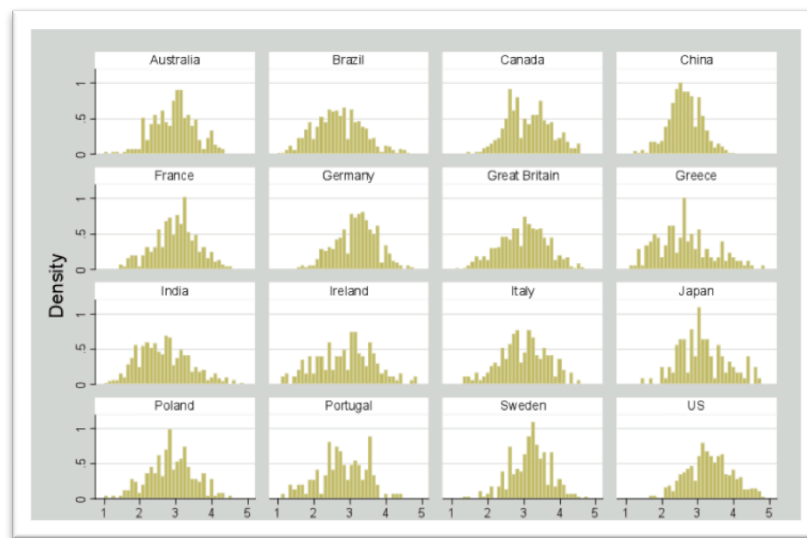


Fig.2 Source: World Management Survey website (www.worldmanagementsurvey.org)

Firms within countries display a great variation in management scores. The U.S show a distribution that is thicker on the right side, with almost no density of firms with management practices below two. This is reflecting its leading position in the inter-country score in Fig.1. Very similar performance is for English, German and Japanese companies. In comparison, countries like Greece and Portugal, India and Brazil, with the lowest cross-country management scores, perform a higher left tail of badly managed firms.

The majority of these low scoring firms have only basic management styles, limited monitoring and targeting procedures and are poorly implementing incentive mechanisms. Finally, more compressed distributions show instead less

variation in managerial vintages and represent younger economies, as in the case of China.

Of course these are average scores so that in fact countries differ by the adoption and specialization in some of these management practices. For instance, U.S companies are more likely to adopt targeting and incentive mechanisms, while European firms are more at ease with monitoring and shop floor operations.

Latest data coming from the World Management Survey Project confirm that of the total firm-level variation in management only 11.7% is explained by country of location with the remaining 88.3% of within country heterogeneity.

In order to have a taste of the kind of studies the project is piling up, I will below illustrate some of the major facts and figures.

In the 2007 working paper the authors surveyed 732 medium-sized manufacturing firms in Europe and the United States combining econometric analysis with more detailed case studies. They took the following production function:

$$y_{it}^c = \alpha_l^c l_{it}^c + \alpha_k^c k_{it}^c + \alpha_n^c n_{it}^c + \beta^c M_i^c + \gamma^{c'} Z_{it}^c + u_{it}^c$$

with Y = deflated sales, L = labour, K = capital and N = intermediate inputs of firm i at time t in country c . Lower case letters represent natural logarithms while Z other controls that affect productivity (workforce and firm characteristics and other industry and country dummies).

To proxy management quality M , each of the eighteen management practices takes z-score measure, average over all of the eighteen questions is taken and z-scored so that the management index has a standard deviation of unity.

Running OLS the evidence is of a significant and positive association between management score and total factor productivity, even when introducing control variables and firm effects to mitigate biases.

The same results hold when the dependent variable is ROCE (return on capital employed), as a measure for firm profitability, when it is Tobin's Q, the percentage of surviving firms, the annual growth rate of sales and firm size.

Dependent variable	Productivity	Profits (ROCE)	5 years-sales growth	Exit
Estimation	OLS	OLS	OLS	Probit
Firm sample	All	All	Quoted	All
Management	23.3***	1.952***	6.738***	-26.2**
Firms	2,927	2,927	2,927	3,161

Fig.3 Source: World Management Survey (www.worldmanagementsurvey.org)

In 2012, Bloom, Genakos, Sadun and Van Reenen show that the coefficient of the regression from a sample of 2927 manufacturing firms reveals that one point higher average management score is associated with 52 log points (69%) higher labor productivity, so that one standard deviation in management (of 0.664) means 45% increase in labor productivity, two percentage higher profitability, 6.7% annual sales growth, and 1.1% reduction in exit rate.

Together with manufacturing firms these regressions include also hospitals and schools. Here the dependent variables are respectively survival rates from emergency heart attack admissions in UK hospitals and students' achievements in secondary UK schools. Again the result are of a decrease of 0.471 points of a standard deviation in the risk-adjusted mortality rate and an increase of 0.196 points of a standard deviation in students' test score for one-point increase in management score.

In “Management as a technology?” (Bloom et al., 2013), performance regressions reveal that management score is associated with 35.5 log points higher labor productivity which reduces to 15.8 and to 3.0 when controlling for other variables and fixed effects but still remains positive and significant.

Moreover, a one-point increase in management quality is positively associated with size, ROCE, Tobin's q, and negatively with the rate of exiting firms.

The fact that management quality and firm performance go hand in hand can be also inferred by the regression of GDP per capita, as a measure reflecting TFP of a country, on management practices across a sample of 17 countries. The result is an R-squared of 0.81. Moreover, if we focus only on OECD countries the result lowers to 0.66 but still evidences the positive correlation.

Besides the insights coming from these results, they are not explaining causality of the management scores on productivity. Indeed, the bias could be upward if, for example, greater financial resources enable the firm to invest in better management practices, instead, if better performance reduces managers' efforts, the effect would be biased downwards.

In order to check for causality a useful and growing method is to test theoretical hypothesis in laboratory and field experiments. In "Does management matter? Evidence from India" (Bloom et al., 2013), the group of authors run a field experiment in 28 plants across 17 textile Indian firms. Plants were randomly assigned to a treatment and a control group. Treatment plants received management consulting in 38, high scoring, management practices like setting targets, monitor performance and adopt incentive mechanisms, and were then compared to the control plants. The effects are telling: on average the treated plant cut defects by half, reduced inventory by 20% and raised output by 10%.

The experimental evidence suggests that there is actually a set of practices that at least in one industry would be profitable, on average, for firms to adopt.

Moreover, additional support to the management as a technology view is given by the analysis across industries of the coefficients of management showing that the management effect is the same across different sectors, while instead the coefficient for labor and capital are not stable across industries.

Up to now what these studies evidence is that there is the need to acquire a deeper understanding on the reasons why in the same industry firms adopt different management practices, if the adoption actually raises productivity and

why it actually does (Ichniowski and Shaw, 2009). What the above findings teach us is that the approach of insider econometrics, and therefore firm experiments, is highly recommended. In particular, when the research explores a subset of practices that deal with workers management, and that in the management evaluation tool, developed by Bloom et al., would be comprised in the category “incentives”. These are mainly concerned with remuneration systems that promote and reward people based on performance and effort, the mechanisms of career advances, and of fixing/firing underperforming employees. Focusing only on the single impact of incentive mechanisms on firms’ performance, data gave the expected results of a positive and strong correlation (Bloom and Van Reenen, 2010a). The distribution of these people management practices across countries reflects the patterns displayed by the average management practices scores illustrated in Fig.1. Leading countries in the adoption of HR practices are U.S, Canada and Germany, while the lowest scoring are Portugal, Brazil and Greece.

1.2 *Insider Econometrics*

The typical approach to study the correlation between management practices and firms’ performance is, therefore, that of insider econometrics. There are several advantages that are worth to mention. First of all the observation is basically the “production unit”, which is either the single worker, a small group of employees, or a production line. This is very helpful since it reduces the omitted variables, allows to isolate the productivity effects and to build a specific measure for productivity.

Depending on the study and on the treatment policy, the appropriate measure for productivity can obviously change. Output per worker is only one possible observation. Other very interesting measures that are considered are worker absenteeism, product quality and production line downtime.

Shortly, I will describe a general picture of the treatment effect research methods of insider econometrics (Ichniowski and Shaw, 2009), used to analyse the response to innovative workers management practices, like in the one I mentioned above on Indian textile firms.

The first step is to construct simple productivity regressions that allow estimating the treatment effect, i.e. the resulting effect if a firm and its workers adopt a new management practice or a group of it. Hence, the treatment effect can be considered as the productivity gain due to the adoption of a new management practice. At this point, the econometrician can be interested in estimating three different types of treatment effect:

- i. “The treatment of the treated effect” (TTE), i.e. the average effect on the treated group;
- ii. “The treatment of the non treated effect” (NTE), i.e. the expected value of the never-treated group;
- iii. “The average treatment effect” (ATE), i.e. the average outcome if individuals are randomly assigned to a treatment group, which would eliminate the selections bias;

In Bloom and Van Reenen (2010b), for instance, the authors take the following equation:

$$y_{it} = c + \alpha_i d_{it} + u_{it}$$

where y is the potential outcome, like productivity, c the common intercept, α represents the effect of the policy, d the treatment status at time t and u the error term. Generally we are especially interested in estimating $E(\alpha_i)$, the ATE, or $E(\alpha_i | d_i = 1)$, the TTE.

Across the literature on firm studies which method is actually adopted depends whether the data are worker-level observations, often coming from personnel records of the firm, where treatment is randomly assigned to the worker. In this case what we are interested for is the estimation of the conditional average

treatment effect (ATE). Instead, if we refer to group-level data, employee teams, production lines, stores and establishments across firms receive treatment of new management practices. Then the interest is in the TTE, the expected effect for the precise firm that adopts the treatment.

If we introduce panel data in our study the error term takes the following form $u_{it} = \eta_i + \tau_t + \varepsilon_{it}$, with η_i worker's specific fixed effect, τ_t the common time period effect and ε_{it} , the transitory worker-specific effect. At this point there are two common options for estimating treatment effects in panel data.

The simplest one is the First Differences method that allows to obtain:

$$\hat{\alpha}^{TTE} = \left[\bar{Y}_{post-t^*}^1 - \bar{Y}_{pre-t^*}^1 \right]$$

i.e. the difference in the conditional means of the treated group before and after the treatment.

This method has several pitfalls as it does not consider control groups and therefore does not take into account unobservable time shocks and other controls. When the researcher owns instead longitudinal data on the treated and the control group, the Difference in Difference estimator allows measuring:

$$\hat{\alpha}^{ATE} = \left[\bar{Y}_{post-t^*}^1 - \bar{Y}_{pre-t^*}^1 \right] - \left[\bar{Y}_{post-t^*}^0 - \bar{Y}_{pre-t^*}^0 \right]$$

which enables the sorting out of time and fixed effects for both groups.

Nonetheless, insider studies are also subject to possible drawbacks, since issues of selection biases, endogeneity and omitted variables are a matter of discussion as well as the correct estimation of the production function. Moreover, it could be objected that each firm, like each worker, is optimizing costs and benefits and that management practices are contingent to the business environment they face. Though, actual evidence shows that the introduction of a specific set of HRM practices actually increases the productivity. Subsequently I will analyse in more

detail studies that adopt the described methods for the investigation of the impact of several human resources practices.

1.3 *Workplace Innovation*

In the paper “What’s driving the new economy: the benefits of workplace innovation”, Black and Lynch (2000) investigate what were the reasons of U.S. increase in productivity in the 90s. In particular, they focused on the role played by workplace innovation in a sample of manufacturing and non-manufacturing U.S. businesses over the years 1993-1996.

They matched plant level practices with plant level productivity, using both cross-sectional and panel data. What they found is that the introduction of innovative and high performance practices, like profit sharing, stock options, higher involvement of workers in decision-making processes, regular group meetings were associated with increased productivity.

Moreover, they found that workplace innovation was positively related also with IT knowledge and use within the firm and higher wages for workers.

Their findings reveal another important aspect of how management matters. Indeed, the adoption of a new practice was mostly effective if it was associated with the implementation of other innovative practices. In their survey they underlined the role of unionization. Firms in which direct participation of workers in business decision-making is mostly encouraged and valued find that workplace innovation is more effective.

Black and Lynch paper gives again the insight that the impact of a bundle of human resource practices will be greater than the sum of its parts because of the synergies acting between them. These insights give support to the view of management as a technology. In the next chapters I will analyse several studies where the introduction of a set of HR policies in a single firm reveals a positive effect on performances and in particular on workers’ productivity.

For the moment, within general HRM practices, I will focus my attention on the effects of incentive pay schemes. In the last thirty years the adoption of performance pay has increased dramatically. In working paper of Lazear and Shaw (2007), the authors describe the adoption path of incentive pay by firms from 1987 to 1999, showing that more than 20% of the employees that work with a form of individual incentive, like performance bonus, has grown from 38 percent to 67 percent. Compensation systems that include group bonuses, like gain sharing, has grown as well from 26 percent to 53 percent.

Chapter 2

Incentive contracts

In order to understand how incentives work within an organization I will shortly describe the classic agency theory based on Holmström model. This, together with the tournament theory, provides a general model and the ground for further discussion and for the analysis of field experiments on the impact of incentives on workers' behaviour (Levinthal, 1988). The theory behind incentives is very complex and it is far from being only a matter of tradeoffs between incentives and insurance. In the case of pay-for-performance, for instance, studies show that individuals are willing to accept to bear higher risks when these efforts are highly rewarded. It exists a great variety of incentive types of contracts and I will focus on financial incentives in particular, first by giving the insights out of this theory and afterwards by showing the results of empirical research.

The standard agency theory tells us that there is a principal that seeks to elicit a certain action from an agent, his employee, so as to maximize his objective function that can be represented by output y . The agent can take action a so as to produce the output $y = a + \varepsilon$ where ε is the noise term that represents any kind of events that are beyond the agent's control. Thus, the cumulative distribution of output conditional to a will be represented by $F(y|a)$.

This problem reveals the underlining conflicting goals of the individuals involved; the principal aims at maximizing his outcome at the lowest costs while the agent wants to maximize his revenues at the lowest efforts. Indeed, incentive issues arise because of divergent goals, in addition to incomplete information, as I will illustrate below.

The principal owns the output but decides to share it with the agent and offers, for example, a linear wage contract $w = s + by$, where the intercept s is the fixed salary and the slope b represents the bonus rate. The agent seeks to maximize his payoff, $u(w) - c(a)$, where $u(w)$ is the concave utility function, hence, assuming

the agent is risk-averse, while $c(a)$ is the convex cost function or the disutility of effort. The principal, instead, wants to maximize $v(y - w)$.

This represents a basic risk-sharing problem and can be solved by backward induction. First of all we find the agent best response a^* to the contract offered by the principal, assuming he accepts the job position. Given agent's best response we have to find the contract that maximizes the principal objective.

The principal wants to maximize the following function:

$$\int v(y - w(y))dF(y|a)$$

subject to the following constraints:

$$1) \int [u(w(y)) - c(a)]dF(y|a) \geq \hat{U}$$

$$2) a^* = \text{Argmax} \int u[w(y)] - c(a)dF(y|a)$$

The first constraint reflects the fact that the principal has to offer an expected utility of at least \hat{U} . The second constraint shows that the agent maximizes his utility function and, assuming F differentiable, a^* can be represented with the first-order condition of his objective function:

$$\int u(w(y))f_a(y|a)dy = c'(a)$$

At this point we can set the Lagrangian and take λ and μ as the multipliers of the participation constraint and the best-response constraint respectively.

The result will be the following, also known as the optimal sharing rule:

$$\frac{v'[y - w(y)]}{u'[w(y)]} = \lambda + \mu \frac{f_a(y|a)}{f(y|a)}$$

On the left-hand side we have the ratio of the marginal utilities for the principal and the agent. Instead, on the right-hand side, we find λ , the Lagrange multiplier for the agent's participation constraint plus a multiplier for the incentive constraint, μ , times the marginal effect of effort on the likelihood of obtaining output y , scaled by the likelihood of obtaining that y . The output for which $\frac{f_a(y|a)}{f(y|a)}$ is large is indicative of higher effort.

Therefore, if generally higher effort is associated with greater results, the principal seeks to find the optimal compensation scheme that acts as an incentive for the agent and aligns to his interests. In the case in which the MLRP (*monotonic likelihood ratio property*) holds and $\frac{f_a(y|a)}{f(y|a)}$ is an increasing function

of the outcome, then the principal, who cannot observe the agent's action, will offer payment schemes that increase agent's effort. Unfortunately, considering the linear work contract $w = s + by$, a steeper slope b creates greater incentives but it increases also the risk the agent has to bear, lowering his marginal utility and driving to inefficiencies. Since individuals are risk-averse and pay for performance offers a rather uncertain income, the solution to the problem usually represents a second-best one.

Moreover, outcome is not only the result of agent's effort; uncertainty and incomplete information are also important factors to be considered. In this kind of problem, uncertainty is not only represented by the noise term but, from the point of view of the principal, it refers also to the inability to know about the actions the agent chooses (moral hazard) and about the characteristics of the agent (self-selection).

If the principal could in fact directly observe labor inputs, a first-best solution to the contract would be possible. Hence the principal, like the agent, are subject to

some degree of risk and uncertainty and usually we observe second-best compensation schemes, which still provide incentives to work but at the expenses of taking some degree of risk.

Therefore, it is very difficult to find the optimal level of incentives, since many variables are not observable and usually contracts are difficult to induce agents' actions to match the social marginal benefits of the firm (Gibbons, 1988).

If we consider further developments of agency theory that analyses multitask problems we have the counterintuitive evidence, verified also by tournament theory, that weaker incentives are in some settings more efficient than stronger ones. As Lazear and Shaw (2007) point out, strong incentives can cause higher efforts but also the risk of sabotage. In order to find an optimal solution to the problem we should reveal all the variables having the label "total firm value" and consider for all the actions available to agents, usually an impossible task. According to this approach the efficient prize level has to be consequently lower. Paraphrasing Baker, creating strong incentives for the wrong actions is useless, and a shirking and cheating behaviour of the employee can still arise.

Firms often respond to this problem by introducing monitoring schemes, though, because of the heterogeneity of agents, its impact is difficult to assess.

An important lesson, related to the issue of incomplete information and information asymmetries, is that performance measurement becomes of paramount importance (Baker, 1992). The principal's objective function may be mostly different from the performance required by the agent. Few organizations, in fact, have clear and verifiable objectives that can be used directly for the design of incentive contracts. Total firm value contains too many variables and it doesn't provide an appropriate guide to agent's action. How to align the value of the firm with the performance of the worker is a central issue in agency theory. Indeed, the size of optimal piece rate and the type of work contract closely depend on the relationship between the measure of performance of the worker and firm's objective function. Baker (1992), for instance, provides useful insights for determining optimal linear incentive contracts. Namely, "when the marginal

product of the agent's actions on the performance measure is highly correlated with the marginal product of these actions on the principal's objective, then the performance measure is a good one and the resulting contract will be efficient. If not, the resulting contract will induce outcomes that significantly diverge from the first-best". The issue of performance measurement is highly significant and can determine the kind of compensation systems. Hence the theory would predict that where there is the possibility to measure the right outcomes, bonus and commission-based contracts tend to dominate. Instead, when no good performance measures exist, we observe straight salary systems.

Given the limits of objective performance measurement and the complexity of worker's contribution to firm's performance, there are some authors that examine the possibility of a subjective performance assessment. The introduction of relational contracts in terms of subjective bonuses, combined with more formal contracts, has shown to have a positive consequence on reducing distortions. Moreover, they are important devices because they increase the agent's compensations as well as the possibility to continue their tenure within the firm. Of course, the more career and reputation concerns the greater will be the impact of these implicit contracts. As outlined in Prendergast (1996), for example, managers close to retirement have more explicit contracts in which rewards are closely tied to performance because the reputation issue is less important.

As the theory points out, the problems companies face with organizational design and personnel policies are manifold. In order to evaluate the effects of incentive contracts on workers' behaviour the theory needs complementary studies, represented by field and laboratory experiments that are able to address the key theoretical questions and advance in the empirical implications of these theories.

2.1 Monetary incentives in field experiments: The economists demand, firms respond

An assessment of the theory is found already in several laboratory experiments but as I already explained, their results might be corroborated by more empirical research in the form of real field experiments. These investigate the actual impact of real incentive contracts and of human resources practices within firms, in general. Economists have examined the incentive effects in particular for simple jobs where measurement is more affordable. These studies vary the incentive pay plans within firms and have the advantage of controlling for endogeneity in the choice of compensation. The majority of these studies evidence a positive impact on workers' behaviour.

The first theoretical subject we consider is the choice of incentive practices that include bonuses and performance pay and how these are related to productivity. The fact that there is an increasing number of firms that pay on the basis of workers' performance can be due to more available personnel data and less costly methods of output measurement. These reasons are very important for firms' optimal choice between "pay for the input" and "pay for the output".

One of the most interesting studies on incentive pay is found in Lazear (2000) who looked at a data set coming from Safelite Glass Corporations, a large American auto-glass company in which workers install automobile windshields. In 1994 the Safelite management decided to substitute workers' fixed hourly wages with a piece rate payment schedule. Safelite possesses a very powerful information system and this allowed a before and after comparison data on about 3000 workers and observations over a period of 19 months.

Lazear evidences that the implemented piece-rate scheme had a strong incentive effect on workers' effort and increased the average levels of output per worker, confirming theoretical predictions. Furthermore it shows an increase in the average level of workers' ability. In fact the data reflect that jobs where the pay is related to output are more attractive for high-quality workers and determine a

shift in the composition of the workforce. This sorting effect shows to be the result mainly of the hiring process and there is less evidence of an impact on lower productivity workers; they just maintain the same effort level and they don't leave the firm. Henceforth, a change to a compensation scheme that is based on pay-for-performance shows to result in an increase and in a higher dispersion of effort and output through incentive and selection effects.

However, the study presents an imperilment for any kind of generalization. Indeed, the piece rates were introduced with a guaranteed minimum salary equal to the hourly wage under the original regime. In this way the employee perceived the new payment system like an opportunity for an improvement in pay, ensuring equal or higher pay. Thus, Lazear's work excludes observations on how risk aversion determines individuals' preferences and final sorting and incentive effects.

Several laboratory experiments confirm in fact the predictive value of the theory regarding risk-aversion. In a laboratory setting the feature of risk aversion is more likely to be measured and we can control for its impact on individuals' preferences over compensation schemes. For example, the result of an experiment run by Cadsby et al. (2007) shows that risk attitudes can play an important role: incentive and sorting effects are weaker for more risk averse individuals and sorting effects account even greater for workers' productivity differentials than in the Lazear study.

However, a much better response on how risk-aversion matters for the determination of optimal incentive instruments is given in the case of incentives in the form of stock options. Oyer and Shaefer (2004) study offers information on the incidence of granted stock options across the U.S. economy, based on data of 1999. Stock options subject the worker to a considerable amount of risk because it links his revenues to the value of the firm.

The authors used data on stock option plans for middle managers in a sample of 200 firms. They calibrated an agency model to data and found that the risk premium associated with these grants is several orders of magnitude larger than

the employee's cost of increased effort. Middle-managers options provide incentives to increase efforts only under specific circumstances, like in the case in which employees' actions have a strong impact on firm value but at a very little cost and in the case in which employees' action is not perfectly traceable. Therefore, in their opinion, the incentive model cannot account for the primary justification of option plans. On the contrary, sorting and retention effects are positively related to the adoption of these instruments. In particular in the case of optimistic employees who are willing to accept reductions in cash compensations for option-based pay packages.

Options may also help firms to retain employees because they increase the employees' cost of leaving the firm or because the options help to index wages to the labor market conditions. In fact the more volatile the industry the higher would be renegotiations costs of spot wages and the incentives for employees to accept outside options. Therefore options are intended to track wage variations. Attraction and retention benefits are also confirmed by the higher diffusion of options granting among smaller firms, with more volatile returns or with negative cash flows.

Shearer (2004) proposed another well-known field experiment that studies monetary incentives in a Canadian tree-planting firm.

The firm under analysis usually applies a piece rate form of compensation. Workers are paid on the basis of the planted trees and piece rates change according to the planting conditions. The goal of the experiment was to measure the change in worker's effort when changing to a fixed wage compensation system. A group of nine planters was randomly selected to take part to the experiment. Workers were randomly assigned to three different block sites and each block was divided into two "compensation regions": one with a fixed wage, the other one with a piece rate payment. Workers were observed under both compensation systems over a total period of observation of 120 planting days.

The author calculated the incentive effect on individual i in block j as the weighted average percentage increase:

$$H_j = \sum_{i=1}^{I_j} \frac{n_{ij}}{N_j} \frac{\{E[Y|pr] - E[Y|fw]\}}{E[Y|fw]}$$

where I_j is the number of individuals working in the block, N_j the total number of observations in block j and n_{ij} is the number of observations of individual i in block j .

The study reveals that when the workers were assigned to a compensation scheme with piece rates, they increased their average productivity of 21%, compared to the case in which they were working under fixed wages. Moreover, the author registered an increased variance of output and higher workers' earnings.

The relevance of this paper relies also on the formulated structural model that helps to generalize the incentive effect beyond the experimental circumstances. Indeed, the data provide the structural parameters, which govern when worker's effort changes as conditions change. The estimation of these parameters can then provide generalizations of incentives effects outside the experimental circumstances showing the potential of small-scale experiments within firms.

Practice can therefore provide very significant insights for the theory, though some limitations still remain. Specifically, the study covers a short period of time and it doesn't offer information about the labor market. Moreover, it doesn't identify monitoring practices and hence we have no clues on how these could affect the incentives mechanisms.

In Lazear and Shearer field experiments the objective of the firm and the productivity of workers were very simple to measure and the relation between incentives and firm's performance is straightforward, leaving no doubts on the effects and causality relation between management practice and performance. These results are in line with the standard theory assumption that greater incentives lead to higher efforts and productivity. Though, as we already have analysed in the theoretical background, in several interesting experiments,

workers' response to incentive may deviate from expectations driving to moral hazard and sabotage.

On this latter issue, Nagin et al. (2002) conducted a field experiment on employees of a non-profit organization that earn a piece rate wage, based on the number of donations they can stipulate with phone-calls. Since the payment system created an incentive also for moral hazard, the firm engaged in an experiment designed to see for the effects of monitoring processes (call-backs) and punishment measures. If the "suspicious bad call" (SBC) was actually false, it was deducted from pay. The data show that when monitoring is low, moral hazard increases and in the cross-employee distribution, at 90th percentile, workers are cheating 15 times more as the median employee. The lesson we draw from these results is that firms can reduce their monitoring costs by restricting them on those individuals that are more likely to cheat.

Nagin research paper drives my discussion also to another important matter within these innovating payment systems, namely, the trade-off between quantity and quality. On one side monetary incentives drive to more productivity in terms of output per worker (quantity), on the other side the threat of a quality fall has to be considered as an additional cost when implementing piece rates. Finding the optimal compensation system means finding "the appropriate compensation formula that will induce workers to put forth the right amount of effort towards quantity and quality", as pointed out in Lazaer (1995). Moreover the author underlines as well that "with a sufficient expected penalty it is possible to have a piece rate that increases quantity while maintaining and even improving quality". Similar to the findings of Nagin et al., Freeman and Kleiner (2005) field experiment in a shoe manufacturing firm shows that in fact when the firm shifted from piece rates to time rates, it registered an increase in quality levels and profits at the expense of a productivity decrease. The reason is that hourly wages reduced the costs related to quality measurement and monitoring by enough to offset a fall in productivity.

Mixing results come from field experiments in which pay for performance is applied to teachers on the basis of their students learning outcomes.

Glewee and Kremer (2003) provide group incentives, based on students' test scores, to primary school teachers in Kenya. They find that test scores went up in the short run but the students did not retain the gains after the end of the incentive program. Quality is reduced because teachers specialize only on the rewarded tasks.

Therefore incentives should go hand in hand with appropriate monitoring practices and fines in order to improve quality at the least expenses of workers' productivity.

A series of case studies run by Fernie and Metcalf (1998) stress the importance of monitoring devices in the adoption of pay for performance. Their research focused on the contractual arrangements in call centres of four different organizations operating in the service sector. It is a very interesting study among the panorama of empirical research on incentives because most field experiments look at production processes within the manufacturing industry. They found that although the occupations were similar, the payment systems were varying substantially. Their primary explanation for these differences in payment lies in the relative costs and benefits of monitoring inputs with respect to measuring outputs. Companies that focus more on the measurement of output will be more likely to choose pay for performance compensations. In the case in which inputs have greater importance and the management is more concerned in monitoring the quality of calls and the agent behaviour, then hourly wages will dominate. These results show that our analysis should not limit the explanation for the choice in types of compensation to measurement costs and means, as outlined by the theory. On the contrary, we should develop a more complete understanding on what the firm puts the most value and is willing to invest for.

The importance of monitoring for the design of more efficient compensation plans is also checked in another important experiment that is concerned with the introduction of incentive pay schemes on managers.

Bandiera, Barankay and Rasul (2011) recently ran series of experiments from 2002 to 2005 in a UK fruit-picking farm, where all managers were observed under two types of payment treatment. Each manager decides how much effort to exert and how to allocate it among workers. Incentive payment was introduced in the form of an initial paid flat rate plus a subsequent payment related to the productivity of the managed workers. The average worker's productivity increased by 21% and was more dispersed among workers. This was for a large part the result of a selection effect: the most able workers were more likely to be employed by the general manager, who is responsible for the workers' daily assignment to the fields. Moreover, field managers targeted their efforts towards more able workers driving to a "targeting effect". The firm induced managers to focus more on higher ability workers from whom they obtained the greatest marginal effect. Nevertheless it induced also managers to adopt closer monitoring, limiting the negative effects of shirking behaviour.

2.2 Implicit and explicit incentives in lab experiments

Field experiments have the advantage to investigate the human motivation directly in the economic context. In the above experiments we want to understand how individual incentives should be designed in order to drive workers' motivation and action towards better performance so as to align individuals and company's interests. Still, this represents a very limited and narrow view. The production process has a social dimension that cannot be overlooked and more complex individuals' psychological traits are at work. For these reasons there are other aspects to be considered when we analyse human behaviour in response to incentives and laboratory experiments offer a complementary way to undertake research in this area.

In "Psychological Foundations of Incentives", Fehr and Falk (2002) consider social preferences as an important aspect of human behaviour.

Social preferences are described as the care individuals have for material resources allocated to others, in particular to a reference agent. In the principal-agent model the principal would represent this reference person.

The authors define three main social preferences: the preference for reciprocity, the desire for social approval and the enjoyment and desire to work on specific tasks.

Many studies and laboratory experiments confirm the important role played by these motives and show that they guide individuals' behaviour and interact with the economic incentives.

For what concerns reciprocity, the authors illustrate an experiment (Fehr et al., 1997) on an employment contract that shows that when the principal is making a job offer that is more remunerative for the agents, on average workers respond with a higher effort level.

In this manner the principal elicits a reciprocal response from the worker and induces a voluntary cooperation. In a following experiment Fehr and Gächter (2001) looked at the interaction of voluntary cooperation with monetary incentives. Given the same model they introduced two different treatments. One treatment applies a fine in the form of a wage deduction in the case of shirking behaviour. The other treatment provides instead a positive incentive in the form of a bonus payment. The bonus will not be paid if shirking is verified. Therefore the two treatments, the positively and the negatively framed, have the same expected loss in the case of shirking behaviour.

However, the results from the experiment show that in the case of the negatively framed incentive in average workers reduce the level of voluntary cooperation and perform a much lower level of effort than in the case of no explicit incentives. Relatively to the baseline model, the negative incentive induces also lower effort and reduced surplus, but increases the principal profits. When the treatment is the application of a positive incentive, instead, effort and voluntary cooperation are increasing. Hence, the framing of the incentive is highly significant because of its psychological implications and because it shapes

worker's perceptions. Whether the agent perceives the incentive as hostile or kind is determinant for his response in terms of effort.

Fehr et al. (2001) extend these experiments by monitoring the responses related to different types of performance payment, in particular to bonus rates and to linear piece rates, in order to solve the problem of multiple tasks. If we consider only selfish subjects the piece rate contract will be always chosen but agents' effort will be not optimally distributed among tasks since agents will always put effort on the performance related to the piece rate. On the contrary, under a bonus payment system, if the principals are reciprocal then they can induce agents to allocate the effort efficiently across tasks and to provide non-minimal effort levels.

These results show that when contracts are left vague and they don't tie the parties' monetary payoffs to measures of performance they produce implicit material incentives, i.e. not based on contractual terms, provided that the parties have reciprocal preferences.

Fehr and Falk's conclusions are that, generally, contracts based on positively framed incentives produce implicit incentives and are more effective.

Another important motive that drives individuals' behaviour and interacts with the material incentives is individuals' desire for social approval.

Rege and Telle (2001) and Gächter and Fehr (1999) provide experiments where individuals' contributions to a public good are observed in the case of anonymity and in the case in which the other participants know each contribution. Contributions raise twice as much in the second case confirming that individuals avoid social disapproval from their group members.

Fehr and Gächter (2001) and Carpenter (2001) provide similar experiments but they add a material incentive, namely the punishment of free riders. This material incentive not only reduces free riders' income but it also subjects them to social disapproval.

If the punishment opportunity is introduced the experiments show that almost full cooperation can be achieved. Henceforth we can state that economic incentives and approval incentives may reinforce each other.

The argument is more complex if we consider that multiple equilibria can arise because the behaviour of one individual is tied to the behaviour of others and therefore his approval incentive changes if the average contribution to the public good is high or low. If we have for example a stable high-compliance equilibrium individuals will naturally converge to it.

Gneezy and Rustichini (2000) propose a few experiments where they demonstrate that material incentives can sometimes weaken the approval incentives. In one of their experiments, the introduction of a fine to parents that arrive late for picking up their children at the kindergarten instead of being an incentive for arriving on time it induces parents to arrive late because the fine cancels the moral and social disapproval from the school principal.

In another experiment they propose a monetary incentive for children voluntary work. The introduction of monetary rewards in fact reduces the approval rewards children benefit when they collect donations for research societies on diseases and for charities.

The authors believe that monetary incentives for adopting moral behaviour or for converging to a social norm actually reduces individuals' commitment and can also drive to the opposite effect. Moral behaviour is in fact considered likewise because it is not induced by any material incentive.

The last social preference that Fehr and Falk discuss in their review is represented by the intrinsic motivation that drives individual behaviour and acts like an incentive. Economists want to test how intrinsic motivation interacts with other types of explicit incentives. Deci (1971) proposed an experiment in which individuals were divided in a control and a treatment group and they were observed during three phases in which they had to make puzzles. Only in phase 2 they were paid for their activity.

The observer exited the room during all phases for a short period and observed from outside. Intrinsic motivation was measured when the individuals continued to perform the activity irrespectively from the observer and the pay.

This experiment evidences another salient psychological trait. During the last phase the treatment group reduces the most its engagement in the puzzle activity. This may be because the payment in phase 2 has a crowding out effect of the intrinsic motivation. Indeed explicit incentives can, under given conditions, reduce the task specific intrinsic motivation.

Finally, the withdrawal of the reward in phase 3 has also a disappointment effect. In economic terms, as soon individuals experience an extrinsic incentive, if the incentive is removed their marginal disutility of effort will be higher and the intrinsic motivation is undermined.

From the series of field and laboratory experiments I have described we learn that incentives matter and generally they induce employees to improve their efforts. There exist material and more explicit incentives types, like pay for performance, and there exist implicit incentives, which have significant implications for the actual behaviour of workers.

The final result will be given by the interaction of these incentives. Nevertheless we can make some important conclusions: piece rates incentive workers to improve their output and select the more able workers into production; the more agents are risk-averse the more it will be efficient to introduce weaker incentives; considering multitask agency theory, incentives should be introduced together with monitoring and punishment arrangements in order to hinder the wrong actions, avoid distortions and address the agents' efforts to the desired outcomes. Nonetheless, the empirical research represents mostly easy-to-measure aspects of employee performance and the majority of experiments deals with the introduction of piece rates into compensation systems. The workplace is a much more complex environment and the success of a contract depends on several variables. The laboratory experiments showed in fact the impact of implicit incentives and how they enhance workers' performance in the form of voluntary

cooperation, compliance with a social norm, and greater motivation. Material incentives can either stimulate these implicit incentives or have a crowding out effect.

However, individual monetary incentives are not the only types of contracts. Camerer and Weber (2007) give us a measure of the range of possibilities for the firm in the design of optimal incentives contracts. The authors offer a very comprehensive review of the available empirical research, including field and laboratory experiments, and highlight the importance of the social dimension of the workplace. Production has in most work settings a collective nature. A given outcome necessitates the interaction of several skills as well as the complementarities of heterogeneous types of knowledge and human capital. Therefore it becomes very appealing to investigate compensation structures like gain sharing, profit sharing, group incentives and stock ownership.

The literature on empirical research on the latter forms of contracts offers divergent results on the actual incentive effects for workers' performance. However, the latest nationally representative survey for US establishments reveals that 52% of firms use teamwork, while the corresponding survey for British establishments shows that in 47% of firms more than 90% of the workforce is organized in teams (Bandiera et al. 2013). In my opinion team incentives and shared types of compensation represent very challenging subjects to discuss and I will further investigate it in the following chapter. I will show that these new types of HRM practices are already well established among the Anglo-Saxon countries and that they are gaining momentum also in the European economy. They are promising to be growing among worldwide corporations and they will concern the more and more workers. For these reasons it becomes very interesting to understand how these practices work and how they can determine the competitiveness of a company.

Chapter 3

Shared Capitalism

Pay for performance practices, in the form of individual piece rates and bonuses, are successful tools in the hands of companies' management and are extensively used. Nevertheless they represent only a small fraction within the possible personnel management practices that lead to better firms' performance and growth.

Team-based payment systems are gaining strength as well, and several surveys, which I will analyse, show that an increased number of firms introduced incentives like team bonuses.

In workplaces where individuals' productivity is linked to the work of other individuals, individual incentives are less desirable. If on one hand they drive the individual to higher efforts, on the other it induces also to a more individualistic, less communicative and cooperative type of production. Moreover, if we consider individuals' social preference for social approval, a piece rate regime may have an effect of withholding efforts. As expressed in Fehr and Falk (2002), a worker's greater effort would harm his colleagues who would subject him to social disapproval and consider his behaviour as free riding. Since firms' production represents a very complex process that involves inter-workers synergies and a high degree of social connections, individual incentives apply better to very low-skill and simple production processes.

On the contrary, when we talk about group incentives we do not only refer to bonuses given to organized teams based on their collective performance, but we can also consider the overall firm's production. Therefore, group incentives do not only include gain sharing but also profit sharing, stock ownership, and other compensation schemes where the pay or the wealth of workers is directly tied to the firm's overall performance.

Bloom and Van Reenen document the rise of these types of payment practices across industries in the last 30 years and confirm that about half of the employees in private US and UK companies participate in collective payment schemes.

Incentive compensation systems that give workers the opportunity to reap the benefits of collective production are categorized under the label of shared capitalism practices.

In Freeman et al. (2010) shared capitalism refers to “a diverse set of compensation practices through which the worker pay or wealth depends on the performance of the firm or work group.”

The building block model for incentives already provides an insight into the benefits of this innovative management system. In complex production processes information is incomplete and it is difficult to measure the marginal product of each worker. Hence when we consider the overall output of the firm, the quantity and the quality produced, incentives are more effective when applied on a collective scale.

Of course group incentives may also be ineffective, create distortions and even reduce productivity. For instance when they stimulate workers to free ride and when workers have a weak impact on productivity changes. Moreover, when worker's revenues are linked to the productivity of other workers, or even to the performance of their employer, risk increases, displacing the effectiveness of the incentive. This is the case of employee stock ownership and the previously cited paper of Oyer and Shaefer (2004) is an illustrative work that describes the related negative aspects of risk aversion.

Side effects a part, many big corporations are adopting shared capitalism practices, usually in the form of financial share plans. They represent high involvement management tools and research findings show higher labor productivity in the presence of such plans.

Freeman et al. offer a very representative review on shared capitalism practices and they show that they are in general positively associated with company's performance. Based on a NBER survey and on the General Social Survey of

2002 and 2006, the authors investigate the adoption of shared capitalism by US companies and they obtain data on a sample of 40,000 workers in fourteen different companies, across 323 worksites.

The results of their study show that shared capitalism practices are widespread through the US economy and they have a strong effect on workers' behaviour. More specifically, the authors find the following positive workplace outcomes: lower turnover and absenteeism, greater worker loyalty to the firm; increased workers' willingness to work hard for the firm and a higher frequency of suggestions coming from the workers in order to improve efficiency in the production process.

The main HRM arrangements that are analysed by the authors are employee stock ownership, profit sharing, gain sharing and stock options.

Running OLS, in average terms, these practices have a positive association with productivity, innovativeness and workers' wellbeing. Shared capitalism aims and promotes a higher level of workers' involvement into production and boosts to higher performance.

The research paper made by Freeman et al. offers a very representative study on the shared capitalism practices in the American economy, but how about Europe? There are several studies that describe the situation among European countries. Based on the Pepper IV Report of 2009 and on other surveys, like the European Working Condition Survey of 2005, findings show that employee financial participation practices are widespread also among large European companies and they have been growing in the last 20-30 years.

In the rest of my work, I will examine these management methods plus lower scale team incentives, showing their drawbacks and their potential. My interest will be mainly concentrated on how shared capitalism is connected to companies' better performance, in the variability of its actual success and in the synergies between these HRM practices.

3.1 Teams and Team Incentives

The introduction of teams belongs to the new set of human resource management strategies. These high-involvement practices prove to be linked to increased firm's performance and workers' effort. Companies use teamwork in order to induce more workers' commitment. Indeed teamwork delegates greater responsibilities to the workers and involves them directly in decision-making processes.

The management decision to introduce teamwork comes in response to more complex production processes where the interaction of different skills and the contribution of diverse types of knowledge are highly valued. The same happens within companies in the industry for new technologies where the production needs very specialised knowledge. Employees are acting in concert and the coordination of their skills is of paramount importance for the best overall outcome.

The theory already predicts the positive impact of teams. Indeed, by increasing employees' discretion and with a more decentralized structure of decision-making and responsibilities, the problem of information asymmetry is weakened. Moreover, implicit incentives are activated when greater decision power is distributed to the single worker. As Fehr and Falk demonstrated in their article, employees feel rewarded and increase the intrinsic motivation to work, they feel the necessity to reciprocate and increase voluntary cooperation. The authors showed also that individuals look for social approval and within a team the approval incentive might be strengthened, as workers' performance becomes directly observable by other team members.

Nevertheless, the empirical evidence about the actual effectiveness of teams shows divergent results. On one side teams do improve employees' commitment, their productivity and enhance also the quality of the final product. On the other side the reorganization of production in teams implies high implementation costs,

which are not immediately compensated by the productivity gains of the new strategy, and the risk to incentive workers to free-riding behaviour.

Jones et al. (2010) propose a research where they examine changes in the HRM practices in a Finnish food-processing plant between 1999-2005. The authors focused on the productivity consequences of the introduction of teams, profit sharing plans, and performance related payment systems across four different production lines, holding the technology and the production methods unaltered.

The key performance measure is the “efficiency score”, calculated by actual production divided over a production standard. This measure looks therefore at the production capacity of the line with respect to fixed standards.

The results appear to diverge depending on the production lines. In mechanized work processes, for instance, the opportunity to increase employees’ performance is greater than in more manual processes, like the line for meat reception. In the latter the new HRM strategy has no positive gains.

Moreover, very interesting is that the greatest result took place when the firm introduced to teams also pay for performance practices, which led to a performance improvement between 9 and 20%.

In the experiment team performance payment was in fact implemented after teams had been operational for three years. In most of the production lines the performance improvements are realized only after team rewards had been introduced. Consequently we can affirm that companies don’t produce significant gains in productivity if the adoption of teams is not paired with performance-related compensation schemes. This suggests that employees are less committed to innovating work processes unless they receive a reward for it.

Additionally, teams act like autonomous entities within the company and they are likely to produce complete outputs, hence monetary incentives may be designed on the basis of their group production. Incentives for teams are therefore complementary instruments to the introduction of teamwork.

These results are also consistent with the complementarity argument; the most significant gains for the firm arrive when several human resource management practices are matched together.

Hamilton, Nickerson and Owan (2003) propose a similar experiment for a garment factory in California. This experiment highlights how the introduction of teamwork coupled with group incentives can affect the average productivity.

Employees involved in the sewing activity were observed under individual and group related payment schemes. The impact of teams on average productivity was estimated with OLS and the results of the experiment show a substantial and upward change under the group piece rate system in 14 of the 23 observed teams. The panel data estimates suggest that in addition to the incentive effect there is also an important contribution coming from the selection effect. Teams are in fact attracting higher-ability workers and have a positive effect in reducing turnover. Indeed workers are less likely to leave the company, because of the non-pecuniary benefits they now receive at their workplace.

These findings also confirm the hypothesis that the interaction between different skills and workers' collaboration increase shared knowledge and has an upward pressure on the production capacity. Indeed heterogeneity in workers' ability might have an important role because of the knowledge transfer among team members. High-quality employees have a greater bargaining power that allows enforcing a high-productivity norm within the team. At the same time low-ability workers are benefiting from the mutual learning and knowledge sharing.

The combination of these effects appear to offset the possible free-riding, predicted by the moral hazard model, that constitutes the primary concern when the activity is organized into teams and payment is linked to the group output. Group members are in fact incentivised to rather decrease their efforts because of the costs related to any additional contribution and because they receive only a share of the accrued benefits from any extra effort. Hence, from a purely financial point of view, the employee will rationally undertake extra efforts only if the costs are less than the extra bonus he can expect. However, as

demonstrated from the experimental findings of Hamilton et al. and generally in the available literature, the design of a team based production and payment system allows and eases the peer-monitoring activity so that at least productivity cannot decrease. Group rewards have a positive impact on the performance and the free-riding behaviour is defused thanks to the interaction of approval incentives and horizontal monitoring mechanisms.

The NBER and GSS surveys analysed by Freeman et al. (2010) confirm these results and show also that shared capitalist compensations are significantly and positively related to anti-shirking behaviour. Where payment is related to the team performance it is more likely that workers take actions, reporting and monitoring poor performance by fellow employees. Moreover, the surveys show that co-monitoring activity is motivated not only by self-interest and by the concern to receive lower bonuses but also by the fact that workers are benefiting from voluntary cooperation and are interested in reinforcing high standard work norms.

Another important experiment on teams and team incentives is proposed by Boning et al. (2007) that analyse a very rich panel data on one specific production line operating within U.S steel minimills, “the rolling mills”, where steel is transformed into bar products. Their research paper represents a very interesting study on the implementation of group incentives and problem-solving teams in the manufacturing sector.

The authors were interested in the examination of the impact of these innovative HRM practices on productivity and searched to find out why these practices haven't been adopted more broadly through the economy.

Similar to the studies I have been analysing, in this paper the authors are focusing on the important contribution to productivity given by the so called “within effect”, how workers' knowledge and mutual learning can raise the output of the production line.

In their model output is the result of workers' effort in performing effectively and efficiently their tasks, but it is also the result of exerting problem-solving

activities. For example, finding remedies to production flaws or implementing new ideas to improve productivity. These are usually costless activities, which don't need further investments but they are just exploiting workers' more direct and complete understanding of the production process.

The group incentive pay of the model is represented by $I = \beta pf(e_1, e_2) + \gamma$ with β and γ respectively the incentive and the base pay. p shows the revenues less the marginal cost per unit of output. Instead, T reflects the presence of a formal problem-solving team structure.

As the principal-agent model suggests, the principal aims at maximizing his expected profits:

$$\pi(e_1, e_2) = E[(1 - \beta)pf(e_1, e_2) - k - sT - \gamma]$$

The agent, in turn wants to maximize the following utility function:

$$u(W, e_1, e_2) = -\exp[-r(W - c(e_1, e_2))]$$

r is a risk-aversion parameter, W is income and the function c is the disutility of effort.

For the estimations of the productivity effects of teams and incentives, the authors consider the following dependent variable, also called the Yield rate measure:

$$Y_{it} = \alpha_0 + \alpha_1 I_{it} + \alpha_2 I_{it} T_{it} + \alpha_3 C_{it} I_{it} T_{it} + \theta X_{it} + u_{it}$$

with α_1 the effect of incentives adoption, α_2 the impact from the joint adoption of incentives and problem-solving teams while α_3 represents the impact on output from the interaction between complexity, teams and incentives. Variable X reflects instead the set of control variables that can influence the final outcome.

Henceforth the experiment includes the productivity regressions, first for the incentives and for the incentives plus teams. The results show that incentives alone and incentives together with problem-solving teams do raise performance. Further regressions measure the coefficient for the interaction term α_3 . This is positive and highly significant, also when controlling for fixed effects, showing the important result that in complex production lines, when teams are added to the adoption of incentives, the coefficient is even greater.

Teams provide the competitive advantage when adopted together with group incentives, especially for these lines that are inherently very complex, while they do not make the difference for productivity differentials in the case of low complexity lines.

Connected to these results there is evidence that when complexity increases in the minimill production, the likelihood to adopt teams more than doubles.

These findings are important because they corroborate the theoretical predictions on the positive effect of optimal incentive payment systems. Moreover, they add the important conclusion that the returns to group incentives are enhanced when combined to team-based job design, like problem-solving teams. Through these you give greater opportunity to workers to react to incentives, by letting them more decision power, more flexibility, and discretion on alternative and creative methods of production.

Boning et al. provide also the explanation why these HRM practices are not adopted in all businesses. The authors believe that because of the different business environments, there are some settings where the returns from these practices cannot compensate the implementation costs they carry. In their experiment they highlighted that problem-solving teams are more profitable when they are introduced in very complex production lines. In plants where processes are not so complex and produce simpler commodities, standard production operating strategies are preferred.

Of course, whether companies will find it profitable to adopt teamwork and therefore group incentives will depend also on other issues, which consider

business idiosyncrasies, the workers' characteristics, their cognitive orientation and cultural background. Through the experiments I have illustrated in this section, researches controlled for these variables and the positive results on companies' performance from the regressions appear to be only slightly reduced.

3.2 Profit sharing

Profit-sharing payment plans belong to the set of new HRM practices and shared capitalism strategies that act as incentive programs in order to prompt workers efforts for a greater firm's productivity. According to the data from US and European organizations, profit sharing is the most common shared capitalist mode of pay followed by gain sharing, firm ownership plans and stock options.

Profit sharing represents also an opportunity to give a homogeneous incentive to all production lines' workers, without endangering any cooperation between them. Formal profit-sharing plans mean that companies should set a target for profits. When this target is met then a part of the amount above the target is equally divided among employees. This amount can be paid in cash bonuses but it can take also other forms, like contributions for retirement or companies' stock ownership.

This type of compensation can be a device companies decide to introduce when they want to keep the cost of labor flexible to their financial conditions and don't want to commit ex ante to a certain amount of incentive. However, this is not the only reason why companies think profit sharing can positively affect the firm productivity. Profit sharing appears to have a selection effect, attracting and retaining higher quality human capital, and an incentive effect; workers are motivated to increase their efforts and to cooperate for the best production outcomes.

In a very recent study on profit-sharing schemes in Canadian workplaces, Long and Fang (2013) analyse data from the Workplace and Employee Survey (WES) conducted from 1999 to 2006. The two authors elaborated two panels of

longitudinal data, one of a three-year period the other for a five-year period subsequent to profit-sharing adoption reported by year 2001.

Long and Fang's aim is to look for workplace productivity followed by the implementation of a profit-sharing type of compensation. Their research wants to be representative for the Canadian economy and hence includes data of workplaces from larger companies and diverse industrial sectors.

From OLS multiple regressions and, after controlling for a wide set of variables, findings highlight a significant and positive growth in workplaces' productivity in both panels.

This study has, though, a major interesting result. It does in fact include in the regressions the presence of teamwork for the establishments where profit sharing is adopted. The data analysis reveals an even greater increase in productivity where these two practices interact. These results suggest that profit sharing can have a positive effect on productivity but that teamwork supports and enhances this effect. Based on the experiments I have described, this result is not surprising; employees working in a team are likely to overcome the possibility of shirking behaviour linked to profit sharing plans. In addition teamwork induces and activates other implicit incentives that are positively related to better performance.

One more time we have the evidence that high-involvement and shared capital HRM practices perform better results when they are introduced together and when they can interact.

Long and Fang analysed also the establishments that introduced teamwork but that did not adopt profit sharing. In this case productivity was showing a substantial decrease over the study period, which is consistent with the hypothesis of Jones et al.; HRM innovative practices are more effective and produce the desired incentives if they are associated with appropriate reward systems so as to ensure that the workers are aligning their interests with the company's goals.

3.3 Employees Ownership

Employers can provide other very successful incentives to their workers by utilising financial tools for a direct and active participation of the employees in the interests of the firm. Through these practices, employees can become themselves owners of the company in which they work, adopting rights and responsibilities, which tie them closer to their workplace.

The Shared Capitalism Research Project, described in the paper by Freeman et al. (2010), defines the American attitude towards these practices while the Pepper IV Report of 2009 give us a clear understanding which practices of employee financial participation are more diffused among European companies.

According to these studies there are several forms of employee ownership and they vary according to country and to customs. In the US, for example, The Employee Stock Ownership Plan (ESOP) is one of the building block tools for collective financial participation and is now very diffused also among other Anglo-Saxon countries, like United Kingdom and Ireland. With this plan companies make contributions to a workers' trust, the so called ESOT, which buys worker shares of the company. The trust can be financed also by other financial institutions, like a bank, by shareholders that want to sell their shares, or by a loan from the employer company. This practice of collective share ownership encourages employees to invest in their company giving them an additional benefit to their basic wages, and therefore an incentive to be more productive. Moreover it represents a very interesting instrument for companies' capitalisation and for business succession. ESOP has become in fact a very appealing practice also in the EU, especially among unlisted SMEs, as it facilitates the transfer of ownership and of retiring shareholders' shares.

Other financial participation schemes allow companies to adopt compensation plans where employees can buy shares in the firm and vote those shares privately or they can buy shares of their firm directly in the stock market. Workers can then benefit from retirement pre-tax contributions from these payments, like in

the US with the 401k plan or from discounts on the share price, like in the United Kingdom.

Such compensation plans are very popular among companies as they are providing the incentive to workers to act and think like owners and therefore give them an incentive to take the actions that are in the firm's interest, adopt a higher degree of commitment and increase their effort at work.

Companies can grant also stock options to their workers. Employees receive the right to buy stock options at a set price during a specific time period following the granting of the option. They can hence get the gain coming from a rise in the share price without the risk of losing part of the investment. This practice was adopted mostly by start-ups, smaller firms with more volatile stock returns or negative cash flows.

However this practice leads to doubtful results. First in the actual incentive effect it is supposed to provide to workers, secondly because it carries a high-degree of risk and agents may not perceive it as offsetting the expected gains. Oyer and Shaefer (2004) experiment on stock option grants for middle-level executives, which I analysed in Chapter 2, gives for example the result that this practice acts as an incentive only in specific circumstances and that its adoption can be mainly due for its selection effects, providing to the company attraction and retention of higher qualified workers.

Hence, employee financial participation, in the form of profit-sharing plans or share ownership, is a modern tool in the hands of the management but it represents also a powerful and innovative mechanism for countries to support their economies and meet the necessities of the labor market.

Employee financial participation can benefit both companies and workers. It permits to organisations to be more flexible and to adapt better to the economic environment. Their human capital, instead, is encouraged to be more involved in the production and decision processes which incentivises to be more productive, as workers feel they can better reap the benefits of their companies' success.

Possible problems of moral hazard, related to share capital payment methods, can be offset when complementary HRM practices are implemented. The introduction of teamwork appears to be the most effective one, as it activates implicit incentives and approval incentives, inducing workers to peer monitoring. According to the research papers and studies I have been analysing, the shared capitalism way seems to be the one, which is successful. Obviously companies differ in their needs and not all business environments are well suited for team-based production, employees' ownership or profit sharing. It is the task of the management to provide the right balance among the diverse stakes and at the same time boost the company's performance. It is not an impossible task and we have seen that many companies that introduced these innovative HRM practices have gained the desired results. However the implementation of a single practice alone has not led to the same success as when more practices are adopted together. Moreover, when introduced into the production process, these innovative tools lead to several behaviours, also undesired ones, because of the related explicit and implicit incentives they promote.

For all these reasons, shared capitalism is the successful way when a complementary approach is adopted. The interplay among all the various practices is the key for its effectiveness. Which of these practices, how they are introduced and to which extent, all this belongs to the decision of the management. This has to be made in accordance to the business in which the company operates, to the human capital and to other influencing variables like the political and economic environment.

In the following chapter I will analyse very interesting studies on the complementarity approach for the introduction of high-involvement HRM practices. The evidence is telling and supporting the above described results.

Chapter 4

The Technology of HRM

In the last century we have witnessed the evolution of personnel and organisational governance. Taylorism organised the assembly line in very simple routines for a very standardised type of production. Individuals represented just another input in the production function and the machines incorporated most of the technological know-how.

In order to respond to the changes of the market and because of a greater integration and competition among countries, firms had to respond and reorganise their production processes, with also new forms of HRM.

New management perspectives have seen the rise in the last decades. The well-known example of the Toyota's Lean Manufacturing System represented a radical change for companies' management. In this system knowledge and decision power were redistributed to the frontline employees, work was reorganised around teams, and a greater emphasis was given to the quality of the production.

This innovative approach to work organisation was not limited to Japanese companies and high-performance work systems have spread worldwide with similar features.

Today we speak about Shared Capitalism as an innovative system of practices and incentives, which help companies to adapt to a new economic and institutional environment, preserve competitiveness and boost productivity.

The experimental literature and the theory support the expectation that this high-involvement work practices, present in a lean type of production and together with financial participation programs, are the key for improved performance. However, the experiments I have been analysing in the previous chapters support the view that the innovative HRM practices and incentives are subject to complementarities. If we introduce these practices together, in fact, the overall

result will be much greater than the sum of the marginal benefits coming from each single practice. For example, if we introduce team incentives we have necessarily also to adopt some measures that enhance team cooperation and communication, that create team identity and that sustain high-effort norms. These can be obtained by giving teams decision power or by delegating them problem-solving activities, which in turn have to be matched by a complementary training activity. Another useful solution would be establishing a system of values within the organization that creates group identity and trust based relationships.

Build in a coherent system, these measures have an incentive effect and hinder the possibility of moral hazard.

The view that bundles of HRM practices are chosen in order to raise TFP, suggests that management can act like a technology; there are sets of good practices that, when adopted, actually increase the productivity of the firm.

If this is the case then it becomes challenging to understand why all companies do not adopt the same practices. Indeed, we still have to answer to the question why there is so much heterogeneity in the productivity of companies, within the same country but also within the same industrial sector.

Many theories that investigate the diffusion of technological innovations recognise that the implementation of new technologies is rather a slow process and learning curves are generally S-shaped.

The introduction of a new technology or of a new system of management practices means that companies have to undertake considerable implementation costs that are usually not immediately offset by the returns. Hence, managers may not face the right incentives in terms of costs/benefits in order to introduce the innovation.

Moreover, the diffusion of a particular technology is closely dependent on the idiosyncrasies of the potential adopters: the technology in use, the organizational structures, information and learning processes, and network externalities. Firms differ in their resources as well as in the opportunities they have to innovate and

to imitate. Henceforth, there are many aspects that can account for the retardation factor of diffusion and for the differences in the resulting productivity.

Evolutionary theory deeply describes diffusion dynamics and highlights the importance of path-dependency and endogeneity in the adoption of an innovation. Indeed an organization will very likely improve its practices based on its actual experience and knowledge, through learning by doing or by problem-solving activity.

Consequently, if the production activity is locked in an inferior practice and the management has not the incentive to make a breakthrough investment, the company will maintain the inferior routine. The major implication of such behaviour will be multiple equilibria. There is no one single solution to the maximisation problem and you cannot predict in which equilibrium the system will end, since it will depend on the technological starting point. This can be valid for systems of production, of corporate governance or personnel governance.

The major source for this path-dependency will be the complex interactions between many complementary practices and features of the business, and these will determine local optima. Indeed complementarities decide for the marginal returns of a new practice and if the management of a company ignores the various interdependencies it will fail to realise the full potential of the innovation. The company that wants to introduce a new HRM practice has to consider the synergies with the actual system of production and develop if necessary the corresponding activities which actually enable the innovation.

Complementary practices are, therefore, an important source for competitive advantage and they can constitute a system that insulates the company from the risk of imitation.

According to the neoclassical theory the institutional and technological environment in which the firm operates is exogenously given so that competitive behaviour will lead to the establishment of an optimal system of arrangements. However, this view does not explain why there still exist productivity gaps and

why apparently inefficient systems survive. Instead, if we adopt the approach of evolutionary theory and acknowledge the important implications of complementarity and fit among all the organizational elements we would recognize the existence of local optima.

In the previous chapters I have been analysing HRM arrangements, focusing in particular on high participation work practices. The evidence from several experiments shows clearly that these practices are very successful but we are far from affirming that they have to be universally adopted. The majority of the field experiments are confined to the Anglo-Saxon context and little research has been carried out in different operating environments.

Subsequently I will describe complementarities from a theoretical and experimental point of view. Data sets and field experiments are supporting the theory and confirm the conclusions of the studies I have been earlier describing.

4.1 Complementarities

Edgeworth idea of complementary activities was that if we increase the level of some actions then we will also increase the marginal revenues coming from the complementary ones.

In Milgrom and Roberts (1995), lattice theory and supermodular functions support the theoretical background for complementarities.

Given a lattice (X, \geq) and a subset of it, the sublattice S . S is closed and contains the elements x and y , the meet operation $x \wedge y$, i.e. the lower constraint, and the join operation, $x \vee y$, i.e. the upper constraint. These are defining the boundaries of the subset, according to the original order \geq .

The main implication is that if we want to increase the value of one variable we can also increase the value of the others. In other words, the increase of one activity does not mean we have to decrease other ones.

Given a real-valued function f over the lattice X , f is supermodular and its arguments are complements if and only if, for any x and y in X ,

$f(x) - f(x \wedge y) \leq f(x \vee y) - f(y)$. By increasing variable x , I raise also the returns of a change in variable y , i.e. if I increase any of the two arguments then the marginal returns will be higher than the sum of the marginal benefits of increasing the single components. The objective function of a firm is therefore supermodular in the set of its decisions.

Milgrom and Roberts offer a very interesting model where the supermodular function for the company is represented by profits. These are defined by $\pi = qP(q,r) - C(q,i)$. Hence profits depend on the quantity produced q , by the new product innovations r and by the number of process improvements i . The properties of supermodular functions predict increasing marginal profits in r and i , and consequently in q . An increase in one of the arguments will increase the attractiveness of the other.

Moreover the authors specify other supermodular functions associated with the costs of undertaking product innovations. For instance, the costs related to the design and adjustment of the production system, the costs for efficiency, and the costs for flexibility in production. All these are supermodular functions as their arguments are mutually enforcing and increasing one of them does reduce the overall costs of the decision.

The theory underneath complementarity suggests that within companies there are many variables, which have to move in a coordinated way according to the changes of the operating environment. These variables can mutually enhance each other, either because they share the same objective or because one hinders the negative effects created by the other.

Indeed the second derivative of our production function will not be negative in the case of complementary practices and technological innovation performs dynamic increasing returns to scale.

In the language of game theory, the unilateral change of one variable will lead to lower benefits with respect to the case in which decisions are centrally coordinated, so that a Nash equilibrium can be reached. In practice, in a company with a decentralised decision system, problems of non-coordination games may

arise and if the management fails to acknowledge the complementarities involved, the company will not reap the potential benefits and incur also in losses.

In the classical example of the manufacturing production, the shift from the traditional mass production, the Ford system, to lean production, the Toyota system, represented a radical change in the automobile industry; it was the rise of a new technological paradigm. Though, the implementation of a new system of production could not be limited by the change of only some variables.

Milgrom and Roberts take the example of GM, which was once one of the most successful automobile producers. In the 80s GM made an investment in new capital equipment and robotics, associated with the lean production method, but failed to make any change in its governance policies and in the production and decision routines. As a consequence, during the 90s the company registered negative profits and lost its competitiveness in the automobile industry where once it was a leader.

In their paper the authors oppose the GM case with a very successful example of a company that implemented a consistent system of production and management, Lincoln Electric. This is a leading and expanding global company in the manufacturing industry from over 60 years. Its success is attributed to its system of checks and balances, which include employment policies, production processes and strategies.

The incentives system of Lincoln Electric is build on the correlation between piece-rates, employee ownership, bonuses, internal mobility, and extensive training.

The drawbacks of a piece-rate type of payment are prevented by the application of a bonus system, which is based on an assessment for quality and cooperation. Employees take part to financial participation programs, which provide the opportunity to have a share in the company's revenues, in order to better reap the fruits of their higher efforts. In turn, these practices sustain the commitment of

the company to permanent employment, enhancing employees' trust and commitment.

These and more other practices demonstrated to be complementary and were supporting for the long-term competitiveness of Lincoln Electric.

4.2 Empirical Analysis

Pil and MacDuffie (1996) propose a very interesting study on complementarities and focus narrowly on the adoption of the set of high-involvement work practices. Their study offers an empirical analysis of a longitudinal data set for automobile assembly plants worldwide.

The authors' aim is to test several hypotheses, which support the theory of complementarity for HRM practices and which are consistent with the evolutionary approach. The first hypothesis the authors investigate is if the adoption of high-involvement practices is correlated to prior usage of complementary HR practices and technologies, like flexible automation.

The other hypotheses instead assume the correlation of HRM practices with companies' poor performance, less experience of the employees with the current system, and organizational and institutional disruptions.

Strategic management should consider the important role of complementarities because, as the theory predicts, they are likely to reduce the costs of implementing innovative procedures.

For the first hypothesis the OLS regression analysis displays a significant correlation between the early adopted HR practices and the later high performance work practices. The technology in use instead does not appear to have a significant impact. This can be given by the fact that new technological arrangements were seen rather as a substitute to high-involvement HRM practices. One more time, this result suggests the idea that we can consider the system of HRM like a technology in which the firm can decide to invest.

The authors found no significant association between bad performances, measured in vehicle defects and workers' productivity, and consequent adoption of new HR practices.

Moreover, the authors tested if longer workers tenure within the company, and therefore longer experience with a system of practices, would not decrease the probability of introducing a new set of practices. Workers might be more resistant to change also because they have to bear part of its costs. Contrary to expectation the two variables were instead positively correlated. Workers with longer experience in their company were more at ease in familiarising with new practices, perhaps because trust and cooperation are stronger.

With respect to disruptions, the study searched for a correlation between past layoffs and adoption of innovative practices. The regression showed no impact. Though, this can be because layoffs can be perceived as a disruptive event that instead fosters cooperation and change.

Finally, the study analyses the effect of major organisational and institutional changes on the probability of introducing the innovative management practices. The data show that where major disruption took place, like plant expansions or new product lines, there was a positive association with high-involvement arrangements. This finding highlights that the company that faces major challenges owns also a greater opportunity to undertake "competence-destroying change", as the authors call it in their paper, because the costs for undertaking the transitions are minimised.

Although the study performs great variances in the results, the most significant association with the adoption of high-involvement practices was represented by the complementary HR practices, which the company had already implemented in its activities.

Therefore we can affirm that companies appear to prefer clusters of related arrangements in the management of personnel.

Ichniowski, Shaw and Prennushi (1997) offer another cornerstone study for the complementarity approach in HRM practices. In their 1995 paper they analysed a

database on the steel industry, which contained information of 26 steel plants on productivity, work practices and production technology.

While other studies were focusing more on the productivity effects by single practices, this paper is very interesting because it provides the results from the adoption of a coherent set of management practices. These practices concerned recruiting, payment systems, mobility, workers' security, training, communication and also labor relations.

Productivity was specified as the amount resulting from the density γ and the volume of the steel ($w_{it} * g_{it} * s_{it} * h_{it}$), per month and for each line. The actual quantity produced Q_{it} will then depend on the delays in the product line.

More formally, productivity will be represented by the equation $Q_{it} = [\gamma(w_{it} * g_{it} * s_{it} * h_{it})](1 - d_{it})$. In turn delays are the result of vintages, quality of the steel input, equipment, maintenance and HRM. In practice, the dependent variable in the regressions is represented by uptime and is measured by the following equation:

$$(1 - d_{it}) = \alpha_{it} + \beta' X_{it} + \gamma' HRM_{it} + \varepsilon_{it}$$

where X_{it} includes the remaining control variables, for each plant at any given time.

Before looking at the results in terms of productivity, the study revealed a very strong correlation among HRM variables and showed that generally high-involvement practices exist only when other innovative practices are already present. For instance, one of the foremost results of the study is the positive correlation of line incentives with teamwork, greater communication and information stream between workforce and management, greater value in the recruitment process, job flexibility and employment security.

Therefore the authors decided to undertake the productivity regressions on a few most common coherent systems of HRM, with a set of fine-grained controls.

The authors selected four main systems of possible HRM practices, going from a system of traditional methods to the most innovative ones, and estimated the productivity impact.

The findings show clearly that HRM practices have a significant impact on the productivity of the line, and they define a hierarchical pattern. Indeed, when a company moves from the more traditional system to the most innovative one, productivity raises of around 7%.

Moreover, as the theory predicts, while the impact of bundles of complementary variables is positive and significant, the effects on productivity for individual HRM practices appear to be much lower.

Finally, the study tests the impact on the quality of the product by taking as a dependent variable the percentage of total line production that met defined standards. The results are noteworthy. Indeed they imply that when the production is supported by a system of advanced HRM practices, the percentage of high-quality products increases significantly.

These findings clearly highlight that systems of high-involvement HRM practices are successful and when implemented they increase the employees' performance. The evidence, though, is that adoption is not straightforward, even in the case of a very homogenous steel line production, like in the latter study. Great variances, indeed, exist within same countries, same industries and same products.

Implementation costs play an important role and companies not always face the same incentives for a systemic change in their operations, especially if they have a short-run revenues approach. However, irrespectively of relative prices, the company will decide for its managerial structure and procedures because of the actual practices in use or because of other features, which belong to the industrial context in which the company operates.

4.3 HRM and Innovation

New forms of HRM practices and the synergies among them are important sources for companies' productivity. In the introduction of my work I highlighted the issue of wide productivity differentials, which resist also when we focus on the industrial sectors and on homogeneous goods, see, for example, the Ichniowski et al. (1997) analysis between steel production lines. The experiments I have previously illustrated clearly evidence that there are systems of high-involvement HRM practices that act like incentive packages and determine higher productivity rates. The competitive advantage of a company is also dependent on its ability to innovate and to provide the right responses to changes in the dynamics of the market.

However, while there is a wide theoretical and experimental agreement on the positive relation between new high-involvement HRM systems and companies performance, less has been said about the relation to innovation.

Patents and appropriability, operating sector, ICT, these and more represented preferred issues to investigate in relation to innovation. Hence, if we consider managerial features and forms of personnel management acting like a technology, it will be interesting to answer also to the following question: does the adoption of such HRM systems also matter for the likelihood of innovation?

I will try to answer by providing the results of two studies, which have filled this research gap. Unfortunately the data are limited in time and space, and we are not able to compare the results from similar businesses or countries. Nevertheless, the following examples provide relevant information and are consistent with the evolutionary and organizational theory, as well as the experimental findings I have been early describing.

The first study I present is the work of Laursen and Foss (2003). Based on a data set of about 1900 Danish manufacturing and non-manufacturing firms, the authors centred their study on the impact of two main HRM systems of practices, which emerged from their analysis, on the probability of introducing innovation.

The first system of practices includes performance-related payment, teamwork, quality circles, delegation of responsibilities, and planned job rotation. The second system, instead, is based on employment training, both externally and internally.

Both sets of HRM practices appear to be strongly significant for the likelihood of product innovation. Formally the probability of innovative performance is given by $a = (\beta_1 x, \beta_2 z)$, where x is the adoption of HRM practices, while z reflects other variables like firm size, operating sector, external linkages to research institutions and other standard variables, which are commonly considered as important determinants for innovation.

The study, therefore, supports the hypothesis that organisational innovation, in the form of a new type of HRM systems, and technical innovation are strictly linked.

Laursen and Foss complete their analysis by mapping the HRM packages to industrial sectors, according to Pavitt taxonomy. The results show that the first system of HRM practices is more linked to scale-intensive sectors, like manufacturing firms. Here product quality improvements and cost cutting technologies are highly valued. According to Pavitt (1984) in these business sectors the opportunities for innovation are endogenous to the firm and are given by internal learning processes (learning by doing, learning by using and learning by interacting). The industrial dynamics for innovation appear to be consistent with the personnel governance methods of the first system.

On the contrary, intensive use of employment training shows to be positively associated to wholesale and service intensive sectors. In these business activities innovation can be conveyed from outside the company, through suppliers for example or through knowledge institutions. Consequently, training programs have to be part of the company's routines.

According to the evidence we can state that the actual system of HRM practices is related to the way of organising the activity of search and experimentation within industries. As Pavitt acknowledged, the business in which a company

operates determines very specific dynamics of innovation activity, and personnel governance could be considered part of these dynamics.

The second study I will analyse concerns British and French private companies. Lorenz et al. (2004) aimed at identifying possible links between a system of employees' active participation and representation and the capacity of a company to create new products and services.

The sample gives the opportunity to compare the adoption rate of high-involvement work practices in diverse regulatory settings. Indeed the labour legislation in the two countries differs in many aspects. The most outstanding is the reliance of French companies on collective bargaining, union and non-union employees' forms of representation. UK on the contrary has a less regulated labour market, with more flexibility in hiring and firing procedures.

Through cluster analysis the authors identified four main groups of HRM arrangements for the French and the UK context. Two of these groups represent high participation work practices, which include workgroups, job rotation, suggestion schemes and other forms of knowledge sharing. The two systems differ in that the first one includes also performance related payment and a greater use of quality circles.

Following a hierarchical order the last two clusters represent a hybrid and a traditional form of personnel management.

These four clusters were not set a priori but emerged directly from the statistical analysis for both settings with variation in the percentage of firms belonging to each group.

The subsequent logit regression highlights first of all that complementarities among HRM practices are better suited for innovative performance than the use of stand-alone practices. Secondly forms of employee participation and representation are complementary to high-involvement HRM system and are representing a precondition for the realisation of innovation.

This latter finding shows to be more significant for the UK context. Here, because of the quasi absence of legal requirements for collective negotiations

around working conditions and less employment security, if the employer decides to introduce mechanisms of decentralised decision making the effects in terms of innovation will be substantial. Practices of employees participation elicit in fact greater commitment and cooperation from the worker, reduces the possibility of distributional conflicts and induces the firm to invest more in firm-specific skills and employee training.

In turn, these are knowledge development practices that will be successfully used in the design and development of new products.

French companies perform a similar positive association between innovation and high-involvement practices, though, because the institutionalisation of participation mechanisms, the coefficients are weaker than in the UK context.

These findings support therefore the theoretical predictions and the existing empirical evidence that high participation work practices enhance workers commitment and are likely to establish a relationship of trust with the management. Workers participate to knowledge sharing and development processes, acquire more firm-specific skills and finally increase the opportunities for innovation.

Conclusions

The main purpose of my analysis was to respond to the following questions: What determines productivity differentials between countries, industries and production goods? To what extent does strategic human resource management matter for the performance of the company? Can we affirm that there exists a set of best HRM practices that determine higher productivity levels and support the competitiveness of the company?

Bloom, Van Reenen and Sadun research papers suggest that strategic human resource management decisions play a fundamental role for business productivity.

Following their findings and pursuing the road of human resource management I developed an extensive review of the actual theoretical and experimental literature on incentives and innovative forms of HRM practices.

These are high-involvement and high-performance work practices. They can be shortly described as the instruments that give workers the opportunity to participate and have a leading role in decision making routines, that give workers the necessary skills and aim to constantly improve it, and that provide the necessary rewards, in the sense of payment and promotion schemes.

These practices include: performance related payments, teams, quality circles, financial participation, training, job rotation, and suggestion schemes, just to list a few of them.

Facts and figures show that in the US and within Europe performance related payment systems have rapidly increased in the last decades. The evidence shows positive results for businesses, in particular for their productivity and innovation. Through laboratory and field experiments the general picture evidences that in manufacturing, retailing, services, and also in the public sectors of health and education, innovative HRM practices are a source for successful business activity.

First of all I focused on performance related payments in the form of individual incentives. From the empirical analysis we can draw the following important conclusions: piece rates usually improve the productivity of the workforce because of the incentive and the selection effect; risk aversion and shirking behaviour represent possible impediments for the success of the incentive; the management should implement consistent systems of complementary practices in order to actually reap the benefits of the incentive.

Indeed, together with the financial incentive the company should adopt monitoring mechanisms to hinder the drawback of moral hazard. Instead, in order to allay risk-averse behaviour, the company should adopt appropriate organisational structures so as to directly involve workers in the decision-making processes.

On the contrary, when the pay and the wealth of the employees are directly linked to the performance of the team, the production line, or also of the firm, then we talk about group incentives. These are preferred practices when the marginal product of the worker is harder to observe.

These types of incentives appear to be related to other high participation work practices, which together can be labelled as Shared Capitalism practices.

Therefore Shared Capitalism includes financial participation programs like profit sharing, stock ownership, gain sharing, and stock options. In addition they are coherent also with other HRM arrangements like teamwork, decentralised responsibility and decision-making, and extensive use of training activity.

These practices, acting in concert, show to boost the company's productivity, the wellbeing of the employees, and the quality and innovativeness of production.

With this innovative type of management, workers are induced to work harder because of the monetary incentives but also for the related implicit incentives. For instance, they benefit from the social approval of their colleagues and from the greater responsibility and decision power over the production operations. These related benefits increase workers motivation to work and to adopt reciprocal behaviour in the form of voluntary cooperation.

This latter aspect shows to be very important for the well functioning of the group incentives because it offsets any kind of free riding behaviour.

Indeed, contrary to the theoretical predictions, the experimental literature showed that group incentives and shared capitalism arrangements are actually related to anti-shirking behaviour.

Whatever the type of performance related payment scheme, the literature certainly evidences that high involvement work practices are successful across industrial sectors. Though, most studies show also that they cannot be implemented individually.

In order to be effective, they have to be included in a consistent system of HRM practices; incentives can have the expected results only together with a supporting bundle of practices belonging to recruitment, training, monitoring procedures and to other formal and informal organisational structures.

In general we can affirm that stand-alone personnel management practices are not effective and that complementarities play a key role in understanding their actual relation with the performance of the company.

Indeed, high involvement HRM practices are a system of complementary arrangements which when adopted act like a technology: they can improve the production capacity of the company and support innovation advances.

Although the positive results across experimental studies, companies still vary in the adoption of these practices and high productivity differentials persist also at the four-digit level.

Hence principal-agent theory does not suffice anymore for the explanation of the adoption of one HRM strategy instead on another. Evolutionary theory and Organisational economics better suit to the argument, since they acknowledge the significant relation between complementary aspects and companies' performance.

According to these theories companies will decide for their HRM strategy based on their organisational form and on the practices in use. These internal operations

will in turn interact with external dynamics belonging to the market and the economic environment.

The existence of these interdependencies and because of path-dependency and cumulative change, will decide for a given set of HRM practices, even if this is inferior with respect to other systems.

From these insights we can conclude that companies will usually end into local optima. The bundle of HRM practices of each firm will determine a very rugged fitness landscape in which the opportunities to change for a better technology are limited and established by complementary and interdependent organisational aspects.

References

- Aoki M., *Information, Corporate Governance, and Institutional Diversity. Competitiveness in Japan, the USA, and the Transitional Economies*. Oxford University Press, 1995
- Baker G. P., *Incentive Contracts and Performance Measurement*. The Journal of Political Economy, 1992, Vol. 100, No. 3, pp. 598-614
- Bandiera O., Barankay I., Rasul I., *Field experiments with firms*. STICERD, Economic Organization and Public Policy Discussion Papers No. 028, 2011
- Bandiera O., Barankay I., Rasul I., *Team Incentives: Evidence from a Firm Level Experiment*. Journal of the European Economic Association, 2013, Vol. 11, No. 5, pp. 1079-1114
- Black S. E., Lynch L. M., *What's driving the new economy: the benefits of workplace innovation*. NBER Working papers series, No. 7479, 2000
- Bloom N., Eifert B., Mahajan A., McKenzie D., Roberts J., *Does management matter? Evidence from India*. Quarterly Journal of Economics, 2013, Vol. 128, No. 1, pp.1-51
- Bloom N., Genakos C., Sadun R., Van Reenen J., *Management Practices Across Firms and Countries*. Academy of Management Perspectives, 2012
- Bloom N., Sadun R., Van Reenen J., *Management as a Technology*, 2013. www.worldmanagementsurvey.org
- Bloom N., Van Reenen J., *Measuring and Explaining Management Practices Across Firms and Countries*. The Quarterly Journal of Economics, 2007, Vol. 122, No. 4, pp. 1341-1408
- Bloom N., Van Reenen J., *Human resource management and productivity*. CEP Discussion Papers No. 982, 2010a
- Bloom N., Van Reenen J., *Why Do Management Practices Differ Across Firms and Countries?* Journal of Economic Perspectives, 2010b, Vol. 24, No. 1, pp. 203-224
- Boning B., Ichniowski C., Shaw K., *Opportunity Counts: Teams and the Effectiveness of Production Incentives*. Journal of Labor Economics. 2007, Vol. 25, No. 4
- Cadsby C. B., Song F., Tapon F., *Sorting and incentive effects of pay for performance: an experimental investigation*. Academy of Management Journal, 2007, Vol. 50, No. 2, pp. 387-405
- Camerer C. F., Weber R. A., *Experimental Organizational Economics (2007). Handbook of Organizational Economics*, eds. R. Gibbons and J. Roberts, Princeton University Press

- Carpenter J. P., *Punishing free riders: How group size affects mutual monitoring and the provision of public goods*. Mimeo, Middlebury College, 2001
- Deci E. L., *The effects of externally mediated rewards on intrinsic motivation*. Journal of Personality and Social Psychology, 1971, Vol. 18, pp. 105-115
- Dosi G., Nelson R. R., *Technical Change and Industrial Dynamics as Evolutionary Processes*. Published in Hall B. H., Rosenberg N., *Handbook of the Economics of Innovation Vol. 1*. Elsevier, 2010
- Dosi G., Marengo L., *On the Evolutionary and Behavioural Theories of Organizations: A Tentative Roadmap*. Organization Science, 2007, Vol. 18, No. 3, pp. 491-502
- Fehr E. and Falk A., *Psychological Foundations of Incentives*. European Economic Review, 2002, Vol. 46 pp. 687-724
- Fehr E., Gächter S., *Cooperation and punishment in public goods experiments*. American Economic Review, 2000, Vol. 90, No. 4, pp. 980-994
- Fehr E., Gächter S., *Do incentive contracts crowd out voluntary cooperation?* Institute for Empirical Research in Economics, University of Zürich. Working paper No. 34, 2001
- Fehr E., Gächter S., Kirchsteiger G., *Reciprocity as a contract enforcement device- experimental evidence*. Econometrica, 1997, Vol. 65, pp. 833-860
- Fehr E., Klein A., Schmidt K. M., *Fairness, incentives and contractual incompleteness*. Munich Discussion Papers No. 2001-7
- Fernie S., Metcalf D., *(Not) Hanging on the Telephone: Payment Systems in the new sweatshops*. CEP Discussion Paper No. 390, 1998
- Freeman R. B., Blasi J. R., Kruse D. L., *Shared Capitalism at Work: Employee Ownership, Profit and Gain Sharing, and Broad-based Stock Options*. NBER, 2010
- Freeman R. B., Kleiner M. M., *The Last American Shoe Manufacturers: Decreasing Productivity and Increasing Profits in the Shift from Piece Rates to Continuous Flow Production*. Industrial Relations, 2005, Vol. 44, No. 2, pp. 307 – 330
- Gächter S., Fehr E., *Collective action as a social exchange*. Journal of Economic Behaviour and Organization, 1999, Vol. 39, pp. 341-369
- Gibbons R., *Incentives in Organizations*. Journal of Economic Perspectives, 1988, Vol. 12, No. 4, pp. 115-132
- Glewee P., Ilias N., Kremer M., *Teacher Incentives*. NBER Working Paper No. 9671, 2003

Gneezy U., Rustichini A., *A fine is a price*. Journal of Legal Studies No. 29, pp 1-17

Gneezy U., Rustichini A., *Pay enough or don't pay at all*. Quarterly Journal of Economics, 2000, Vol. 115, No. 2, pp. 791-810

Hamilton B. H., Nickerson J. A., Owan H., *Team Incentives and Worker Heterogeneity: An Empirical Analysis of the Impact of Teams on Productivity and Participation*. Journal of Political Economy, 2003, Vol. 111, No. 3

Hofstede G., *Culture's Consequences Comparing Values, Behaviors, Institutions and Organizations Across Nations*. Sage Publications, 2001, 2nd Edition

Ichniowski C., Shaw K. L., *Insider Econometrics: Empirical Studies of how management matters*. NBER working paper series No. 15618, 2009

Ichniowski C., Shaw K. L., Prennushi G., *The Effects of Human Resource Management Practices on Productivity: A Study of Steel Finishing Lines*. The American Economic Review, 1997, Vol. 87, No. 3, pp. 291-313

Jones D. C., Kalmi P., Kauhanen A., *Teams, incentive pay, and productive efficiency: evidence from a food processing plant*. Industrial and Labor Relations Review, 2010, Vol. 63, No. 4

Koski H., Marengo L., Mäkinen L., *Firm size, managerial practices and innovativeness: some evidence from Finnish manufacturing*. International Journal of Technology Management, 2012, Vol. 59

Laursen K., Foss N. J., *New human resource management practices, complementarities and the impact on innovation performance*. Cambridge Journal of Economics, 2003, Vol. 27, pp. 243-263

Lazear E. P., *Personnel Economics*, MIT Press, 1995

Lazear E. P., *Performance Pay and Productivity*. The American Economic Review, 2000, Vol. 9, No. 5, pp. 1346-136

Lazear E. P., Shaw K. L., *Personnel Economics: The economist's view of human resources*. NBER working paper No. 13653, 2007

Levinthal D., *A survey of agency models of organizations*. Journal of Economic Behaviour and Organization, 1988, Vol. 9, No. 2, pp. 153-185

Long R. J., Fang T., *Profit-Sharing and Workplace Productivity: Does Teamwork Play a Role?*. IZA Discussion Paper No. 7869. December 2013

Lorenz E., Michie J., Wilkinson F., *HRM complementarities and innovative performance in French and British industries*. Published in J. L. Christensen and B-A. Lundvall. *Product Innovation, Interactive Learning and Economic Performance*. Elsevier, 2004, pp. 181-210

- Milgrom P, Roberts J., *Complementarities and fit. Strategy, structure, and organizational change in manufacturing*. Journal of Accounting and Economics, 1995, Vol. 19, pp. 179-208
- Nagin D. S., Rebitzer J., Sanders S., and Taylor L., *Monitoring, Motivation and Management: The Determinants of Opportunistic Behaviour in a Field Experiment*. American Economic Review, 2002, Vol. 92, pp. 850-872.
- Oyer P., Shaefer S., *Why do some firms give stock options to all employees? An empirical examination of alternative theories*. NBER Working Paper No. 10222, 2004
- Pavitt K., *Sectoral patterns of technical change: Towards a taxonomy and a theory*. Elsevier Science Publishers B.V., 1984
- Pil F. K., Macduffie J. P., *The Adoption of High-Involvement Work Practices*. Industrial Relations, 1996, Vol. 35
- Prendergast C., *What happens within firms? A survey of empirical evidence on compensation policies*. NBER Working Papers Series, No. 5802, 1996
- Rege M., Telle K., *An experimental investigation of social norms*. Working Paper, Case Western Reserve University, 2001
- Shearer B., *Piece Rates, Fixed Wages and Incentives: Evidence from a Field Experiment*. Review of Economic Studies, 2004, Vol. 71, No. 2, pp. 513-534
- Syverson C., *What determines productivity?* Journal of Economic Literature, 2011, Vol. 49, No. 2, pp. 326-365