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### Pay, promotions, and performance

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## 2 THEORETICAL BACKGROUND

### *Theory on Motivation and Ability*

This chapter discusses the theoretical background of the four essays in Part 2. First a theoretical framework is introduced in Section 2.1 that explains the structure of this chapter and captures the theories used in Part 2. Section 2.2 focuses on theories of motivation and effort of employees. Theories dealing with ability and mobility are reviewed in Section 2.3. Both sections also discuss the related empirical evidence. The different models in Section 2.2 and 2.3 are used to explore internal job movements, the wage policy of firms and interactions with the external labor market (Baker and Holmstrom, 1995). Section 2.4 focuses on empirical research on internal labor markets (ILMs), which forms an integration of the research on the specific building blocks of personnel economics.<sup>7</sup>

#### 2.1 Theoretical Framework

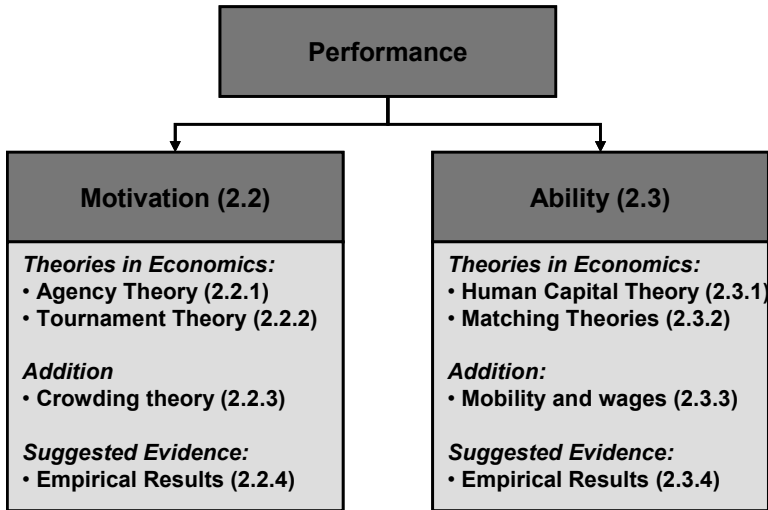
In the introduction, personnel economics was defined as a field that studies incentive devices by means of economic analyses to investigate human resource issues. This implies that personnel economics is a tool to increase the value of human capital: for example, a company hopes to increase the performance of its employees and managers by linking pay to performance. Employee performance is commonly considered to be a product of *motivation* and *ability*, which is used in economic theory (for example, shown by the way economists distinguish the incentive effects and selection effects of incentive compensation (see Section 2.2.1, and empirically established by Lazear, 2000b)) and also in expectancy theory (e.g. Vroom, 1964; Lawler, 1987). This distinction is also used to structure this chapter, as shown in Figure 2.1.<sup>8</sup>

The left panel of Figure 2.1 focuses on motivation. Two economic theories are discussed that provide general insights into the design of compensation systems that lead to higher levels of motivation. Section 2.2.1 discusses agency theory, which focuses on incentive compensation. Section 2.2.2 introduces the tournament model and shows how career opportunities can also be used to motivate employees. An alternative development in the field of psychology leads to applications of what is known as 'crowding theory' in economics, which is presented in Section 2.2.3 as a third theory that gives insight into the design of compensation systems. In Section 2.2.4, the empirical results from testing these theories are discussed.

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<sup>7</sup> Although I will review related papers from sociology and psychology, the focus of this dissertation is on the economics literature. I will not aim at completely reviewing Organizational Behaviour and HRM literature.

<sup>8</sup> For simplicity, I refrain from discussing any possible interdependencies between motivation and ability at this point.



**Figure 2.1: Outline of theoretical framework**

Section 2.3 focuses on the right-hand side of Figure 2.1: a worker’s ability. The most prominent theory that uses ability as a starting point is human capital theory (Section 2.3.1). This theory describes the way employees invest in human capital and how some parts of the learned capabilities can be non-transferable across employers. Matching models (Section 2.3.2) use similar presumptions to derive optimal mobility decisions. Since the models on ability are strongly related to mobility decisions, I will specifically investigate the effect of mobility on wages (Section 2.3.3) and the empirical results of these studies (Section 2.3.4).

In Section 2.4 I will turn my attention to the economics of ILM. Here, I will discuss empirical studies of ILMs, which integrate the different building blocks of personnel economics.

## 2.2 Theories on Motivation

### 2.2.1 Agency theory

Incentives, being one of the essential building blocks of economics (Prendergast, 1999), are widely discussed in the agency literature. An agency relationship can be defined as “...a contract under which one or more persons (the principal(s)) engage another person (the agent) to perform some service on their behalf which involves delegating some decision making authority to the agent” (Jensen and Meckling, 1976).<sup>9</sup> Although Jensen and Meckling are original in labeling and modeling agency theory as such, the fundamental

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<sup>9</sup> Throughout this text the terms “employee” and “worker” will be used interchangeably while referring to agents in the principal-agent model.

idea of the separation of ownership and control of firms and the organizational consequences can be traced back to Berle and Means (1932) and even Adam Smith (1776).

There are three basic assumptions underlying agency theory: namely, that agents are *self-interested*, (*more*) *risk averse* (*than their principal*), and they possess *private information*. These three assumptions introduce the moral hazard type of agency problem: agents can increase their own utility at the expense of the principal, who is the residual claimant. The impossibility of complete contracting causes the 'agency costs', which include monitoring costs, bonding costs and residual losses. Because of these costs, the first-best solution to the contracting problem between a principal and an agent is not attainable. In the basic model, incentive contracting is explored as a method for the principal to monitor and steer the actions of an agent in a direction that is in line with the principal's objective.<sup>10</sup>

The classic agency model was initially applied to financing behavior by Jensen and Meckling (1976), in particular to capital structure decisions, and has been extended to other fields of economics and in multiple dimensions.<sup>11</sup> An explicit discussion is required of two additions to the basic agency model that are relevant to the essays in Part 2.

A first extension to the original agency model concerns performance measurement. In the original model, it was assumed that the measure on which the incentive contract is built is an objective measure of the performance in which the principal is interested. Factors beyond the agent's control, i.e. noise, influence the agent's measured performance and thereby impose risk on the risk averse agent. The tradeoff that needs to take place in the original performance measurement model is a tradeoff between *risk* and *incentives* (e.g. Holmstrom, 1979). Later, Baker (2002) identified two dimensions that capture the essence of the difficulty of finding the right measure: the tradeoff between *risk* and *distortion*. Risk is defined as the variability of the performance measure due to factors beyond the agent's control, comparable with the noise in the basic model. The distortion of the performance measure with the objective of the principal is introduced as an additional difficulty and is caused by the fact that it is not the principal's objective itself that is used as a contractible performance measure, but an alternative measure. If a performance measure is distorted, agents can behave in ways that generate high personal incomes, but do not create much value for the principal. Paying the agent for the wrong behavior will have a wasteful or dysfunctional effect on the value of the firm. For example, it can be difficult to find a measure that captures the performance of a multi-task agent on all value-creating tasks. The multi-task agent redirects effort away from uncompensated tasks towards those tasks that are rewarded (Prendergast, 1999). This "folly of rewarding A while hoping for B" (Kerr, 1975) has been investigated in multiple forms (e.g. Holmstrom and Milgrom, 1991; Baker, 1992, 2002; Feltham and Xie, 1994) and refers to the use of a distorted performance measure.

A second important addition to the classic agency model is the study of careers. Fama (1980) shows the potential effects of career concerns on the current performance of workers. Career concerns imply that the labor market uses the current output of a worker to adjust the belief about the worker's ability. The labor market then bases the worker's future wages on the updated beliefs. This results in high wage offers for superior performers and low wage offers for poor performers. Therefore, Fama argues, career concerns may serve as a substitute for incentive contracts as these concerns themselves

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<sup>10</sup> Prendergast (1999) and Gibbons and Waldman (1999a) provide an overview of the basic principal-agent model.

<sup>11</sup> For example, Prendergast (1999) offers a survey of new models that have been developed that involve efficiency wages and dynamic models on deferred compensation.

form an incentive for agents to optimize the labor market's belief in a worker's ability. More recent agency models have shown that the optimal compensation contract combines implicit incentives from career concerns with explicit incentives from the compensation contract (Gibbons and Murphy, 1992). A different theory related to career concerns is tournament theory.

### 2.2.2 *Tournament theory*

In theory, an organizational hierarchy can serve as an incentive instrument. A model which was developed by Lazear and Rosen (1981) that explicitly focuses on internal job flows as an incentive tool is *tournament theory*. This model compares life in a company to a sporting match, for example a golf tournament. Each round in the tournament represents a competition for a position at a higher job level. All contestants are ranked based on their performance. The winner(s) will go on to the next round.<sup>12</sup>

Four features are essential in the basic tournament theory. First, the wage slots are fixed in advance. Second, promotions are not awarded to workers because they are good, but because they are better than the other contestants (relative performance evaluation). Third, the level of effort depends on the size of the salary increase caused by the promotion (the prize). Thus, it is not the absolute level of the high wage level that is important, but the wage increase after promotion (Lazear, 1995). A fourth feature of the basic model is that the number of contestants is known in advance and thus outside competitors are not included. In the light of this model, the hierarchy of an organization is an instrument to motivate employees to try to climb higher up the organizational ladder. The ultimate reward and carrot in tournament theory is the possibility of becoming the CEO. The wage and non-pecuniary rewards that come with the job of CEO serve as an incentive device for all other employees in the organization.

The incentive effect of promotion opportunities is based on the reward that comes with that promotion, as well as on the extent to which employee effort influences the probability of the promotion. Determinants of the effect of effort on the likelihood of a promotion are the number of contestants (in an extended form including outsiders) and the number of job openings at a higher level. The model predicts that a decrease in the probability that effort leads to a reward (for example, if more contestants enter the tournament) needs to be compensated by an increase in the reward for the winner. The reward that comes with the promotion is not only the direct wage increase, but includes the prospective rewards of also being able to participate in future tournaments, i.e. promotion rounds. To incorporate the effect of future rounds into the model, Rosen (1986) extends the basic model of Lazear and Rosen with multiple rounds in which employees are eliminated from further participation in the tournament after losing a round. In this model, the expected (option) value of further wage increases for participating in subsequent rounds decreases and is zero in the final round. The decreasing option value of wage increases in further rounds has to be compensated by disproportional increases of the guaranteed wage for the winner in the last rounds of the tournament. This predicts a convex wage-structure with the highest wage increase related to getting to the top position of CEO.<sup>13</sup>

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<sup>12</sup> The idea that a prize structure can motivate people is not new. As early as 1902 Francis Galton posed questions regarding the optimal incentive structure and the division of prizes, given the number of competitors (in: Moldovanu and Sela, 2001).

<sup>13</sup> In the basic model, Lazear and Rosen assume differences in marginal cost of effort between agents. A different extension to the basic model is to include heterogeneity in the level of ability (e.g. O'Keefe et al. (1984)).

Tournament theory shows that promotions can be a substitute for incentive compensation. A key distinction between both types of motivational instruments is the way performance is or can be measured. A promotion is awarded based on relative performance, not absolute performance. Absolute performance is typically, though not necessarily, used as a basis for performance pay. Lazear (1989) shows how relative rewards potentially undermine teamwork. A second distinction is that, in the case of tournament theory, no formal (incentive) contract exists guaranteeing a promotion after certain conditions are met.

### 2.2.3 Crowding theory

Recently, psychological theories of motivation (see Locke and Henne, 1986) have been incorporated into economic theory (e.g. Frey, 1997a; Frey and Jegen, 2001; Osterloh and Frey, 2000; Bénabou and Tirole, 2003). In particular, the distinction between intrinsic and extrinsic motivation (Calder and Staw, 1975) made by psychologists has become of interest to economists. *Extrinsic motivation* is motivation gained by externally influenced need satisfaction and reflects on behavior induced by external interventions, such as monetary rewards, praise by your boss, or status (Frey, 1997a). Agency theorists have mainly been measuring the effect of various contract types on extrinsic motivation. To date, economists have long neglected the potential effects of the incentive contract on intrinsic motivation. *Intrinsic motivation* implies that employees are prepared to undertake a task for immediate need satisfaction or for its own sake under certain conditions (Calder and Staw, 1975; Deci and Ryan, 1985), and that some tasks will even be performed without monetary payments. The only apparent reward is the task itself (Deci, 1971). On the contrary, standard economic theory assumes that agents are self-interested and that there is a cost (disutility) of effort rather than a reward. Although agency theorists consider intrinsic motivation irrelevant for their purposes (Frey, 1997a), even founders of agency theory have stressed the importance of the psychological impact of incentive compensation on behavior (Jensen, 1994).

Although a potential direct relationship between external rewards and intrinsic motivation has long been neglected in the standard agency model, it was described in cognitive evaluation theory already in the early 1970s (Deci, 1975). This psychological theory describes how external interventions, such as monetary incentives, (may) have a controlling and an informing aspect. These two aspects have opposing effects on intrinsic motivation. The controlling feature reflects the feeling of being put under external pressure, and thereby establishes a negative effect on intrinsic motivation. Conversely, the informing aspect can influence the worker's perceived competence and strengthens the feeling of being in control (Eisenberger et al., 1999), leading to a positive association between the intervention and intrinsic motivation. Hence, the ultimate effect of external interventions on intrinsic motivation can be positive or negative. Therefore, the effect on total motivation, the sum of extrinsic and intrinsic motivation, remains undetermined as well.

Cognitive evaluation theory was integrated in economics by the development of crowding theory in the mid-1990s (e.g. Frey, 1997a). External interventions are labeled to 'crowd-in' intrinsic motivation whenever the motivational effect of these interventions stretches beyond the effect on extrinsic motivation and reinforces intrinsic motivation as well. A decrease in intrinsic motivation is labeled 'crowding-out'. In crowding theory as first modeled by Frey (1997a) using a simple utility framework, the external intervention is expected to change the preferences of the individual. Bénabou and Tirole (2003)<sup>14</sup>

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<sup>14</sup> In this study, both Frey (1997a) and Bénabou and Tirole (2003) are referred to as crowding theories, though Bénabou and Tirole do not explicitly use the term "crowding model". A difference between the two models is that Bénabou and Tirole explicitly note an information asymmetry between the principal and the agent, which is not

developed an economic model of intrinsic and extrinsic motivation in which the standard economic assumption of fixed preferences is maintained (Frey and Jegen, 2001). They focus on the effect of performance incentives on the perception of the tasks at hand or the agent's own ability. While these studies differ in assumptions (fixed or non-fixed preferences), the results on crowding-in and crowding-out are the same.<sup>15</sup>

The study by Bénabou and Tirole (2003) illustrates how economists have accepted the relevance of intrinsic motivation. Their study also shows the contribution that economists can make to this type of theories: economists can add formal analysis, as Bénabou and Tirole (2003) have done, which clearly shows the variables in the tradeoff and their interactions. The result is a model that indicates the way an efficient outcome can be achieved given certain conditions and assumptions. However, the concept of intrinsic motivation has only been included in agency theory (2.2.1), but not in tournament theory (2.2.2), although crowding theory does not distinguish between types of external intervention, whether a promotion or incentive compensation. A link between promotions and intrinsic motivation can be found in research that has modeled the motivational aspects of non-monetary incentives, such as job challenge (Radhakrishnan and Ronen, 1999), and how these can be used as an alternative for monetary incentives, given that workers prefer a challenge (Atkinson, 1958). The model of Radhakrishnan and Ronen (1999) puts Atkinson's proposition of job challenges in a principal-agent setting with incentive compensation. The proposed positive relationship between job challenge and intrinsic motivation is also relevant for promotions, since a promotion is accompanied by (challenging) new tasks.

#### 2.2.4 *Empirical results on motivational theories*

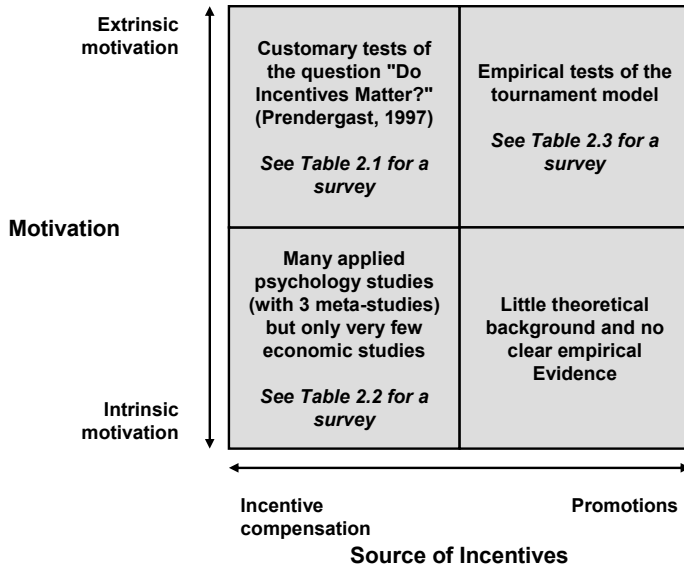
The economic insights provided by the two economic theories, agency theory and tournament theory, have been food for empirical investigations. Figure 2.2 provides the framework that is used in this study to organize the discussion of empirical results. It groups the studies on the basis of two dimensions that were introduced in previous sections: type of incentives, and type of motivation. Concerning the first of these dimensions, agency theory (2.2.1) refers to incentive compensation, while promotions, including the associated non-monetary rewards, are the incentives in tournament theory (2.2.2). The second dimension is the type of motivation, which can be divided into extrinsic and intrinsic motivation, as introduced in Section 2.2.3. The discussion of the empirical results is concentrated on non-experimental empirical studies, when they are sufficiently available, since the studies in this dissertation exclusively take a field-research approach.<sup>16</sup> Nonetheless, reference will be made to experimental studies, especially when field-research is lacking.

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included by Frey (1997a). Bénabou and Tirole (2003) model how the principal provides signals that change the agents' perception of the nature of the task.

<sup>15</sup> The successful transfer of cognitive evaluation theory from psychology to economics (where it is known as crowding theory) makes it reasonable to examine if other psychological theories can also be transferred to economics. Ambrose and Kulik (1999) presented an extensive survey of (psychological) motivation research in the 1990s. Besides cognitive evaluation theory, they report research on motives and needs, expectancy theory, equity and reciprocity theory, goal setting, work design, reinforcement theory and burgeoning themes such as creativity, groups and culture. I will not empirically investigate all these theories, but equity and reciprocity theory will be discussed in Chapter 3.

<sup>16</sup> Psychology in particular has a rich history of experiments on the relationships between rewards, motivation and performance. For example, Jenkins et al. (1998) conducted a meta-study with an overview of (psychological) experiments.



**Figure 2.2: Outline of the empirical results on motivation**

*2.2.4.1 Empirical results on incentive compensation and extrinsic motivation*

Piece-rate systems date back to ancient Rome and the Chaldeans in Mesopotamia in 400 B.C. (Flanders, 1970). Throughout the ages, pay for performance has been used to reward both low-level employees as well as top executives. The upper-left quadrant of the matrix refers to the empirical literature on incentive compensation, which tries to answer the question how incentives can influence behavior, in particular productivity. A specific subfield, on which empiricists from various fields such as finance, industrial organization and organizational behavior have focused, deals with executive compensation (see Murphy, 1999). CEO pay has been demonstrated to be performance-dependent, especially in the U.S. (Murphy, 1999; Hall and Liebman, 1998).

Incentive contracts for lower-level employees have not been subject to much empirical study (Prendergast, 1999). The relationship between incentives and effort or extrinsic motivation is hard to investigate, since measuring effort is difficult (Prendergast, 1999).<sup>17</sup> Therefore, research has focused on the relationship between incentives and performance. Wagner et al. (1988) provide a quite thorough overview of early empirical research on this topic, referring to papers that date back to the beginning of the twentieth century (e.g. the Hawthorne field experiments). Examples of initial field studies are Roy (1952) and Brown (1962). Roy (1952) summarizes a personal observation of the ratchet effect, reporting how workers were not performing to their full potential while they were on piece-rate pay. Brown (1962) recorded how the abandoning of a piece-rate system benefited a metal company.

<sup>17</sup> Foster and Rosenzweig (1994) do in fact estimate the original relationship between incentives and effort. This study uses the assumption that workers' effort leads to weight loss and therefore uses weight changes as a proxy for effort.



More recently, Prendergast (1999) has reviewed empirical economic research under the heading “Do incentives matter?”. Table 2.1 reviews eleven studies on this topic,<sup>18</sup> mainly built on Prendergast (1999). Six of these studies do not base their conclusions on individual output levels, but on aggregated output (see Table 2.1). The five remaining studies in Table 2.1 are based on individual data.

The studies in Table 2.1 offer several interesting insights. First, employees do indeed respond to incentives in the predicted way; the studies observe a performance increase after incentive pay has been introduced. This result is robust over time (Wagner et al. (1988) use data as old as 1975), place (results are found in the U.S., but also in China (McMillan et al., 1989)), and industry (the results are found in, among other sectors, agriculture, manufacturing and sales).<sup>19</sup> Banker et al. (2000) and Lazear (2000b) distinguish two sources of performance increase: a productivity effect, and a selection effect. The first refers to an increase in motivation, the second to self-selection based on the attractiveness of the contract to individual employees. Lazear (2000b) quantifies the effects to be of equal size, thus both accomplish half of the performance increase.

Another insight, resulting from the study by Paarsch and Shearer (1999), considers rent sharing between employers and employees. Their data make it possible to calculate the cost of effort and thus to quantify rents. An optimal strategy for the principal as predicted by a static agency-model would be to completely capture these rents, which in their case would increase profits by 17 percent. Paarsch and Shearer (1999) suggest that such a strategy is not optimal in a dynamic environment since employees will not be encouraged to reveal their level of productivity truthfully. Their study concludes that the rents are shared between workers and employers.

Freeman and Kleiner (2005) provide an extra insight. They follow a shoe manufacturer in the late 1980s and early 1990s. The firm first adopted a piece-rate system, which did indeed increase productivity. But the flipside was an increase in direct wage costs and other costs that the piece-rate system brought about. Increased competition made the company decide to switch to time rates, which in fact lowered productivity but increased profitability. The study shows the importance of not solely focusing on high productivity, but continuously keeping an integrated value perspective.

An important ambiguity surrounding this type of research is the difficulty to ensure that the observed performance increase does not reflect what is known as the ‘Hawthorne effect’. The Hawthorne electric plant was a center of research in the period 1927-1932. Mayo (1933) and Roethlisberger and Dickson (1939) describe how attention to the work environment by managers can increase productivity in general. The researchers changed different work conditions, all leading to a productivity increase. But changing back to the original conditions also led to a productivity increase. The Hawthorne effect is a sort of placebo effect that is expected to fade away over time and that is caused by immediate change in whatever direction. The study by Lazear (2000b) tests for the occurrence of this effect and finds that the observed production increase is persistent over a long period of time and therefore not a result of the Hawthorne effect.

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<sup>18</sup> Besides the studies reviewed in Prendergast (1999), there are more recent empirical studies on this topic that refer to Lazear (2000b), which is at the heart of research on pay and performance. The study by Wagner et al. (1988) is also included in this overview.

<sup>19</sup> Cultural differences, which may affect the responses to incentives are not explored in this dissertation.

**Table 2.1: Empirical results on the relationship between incentive compensation and performance<sup>20</sup>**

Authors	Period	Country	Type of staff	Sample size	Number of observations	Individual data	Industry/Sector	Reported Results
Wagner et al. (1988)	1975 to 1984	U.S.	Non-managerial	1 firm	114	no	Iron foundry (automotive)	The introduction of non-managerial incentive payments leads to a significant increase in productivity (power-curve).
McMillan et al. (1989)	1978 to 1984	China	Farmers	Not available	7-year data, not further specified	no	Agriculture	Economic reforms changed the incentives for farmers in such a way that factor productivity increased by 32 percent.
Groves et al. (1994)	1980 to 1989	China	All staff	437 firms	3047	no	Manufacturing	Increase in enterprise autonomy and workers' incentives (bonus systems) leads to higher productivity.
Banker et al. (1996a) <sup>21</sup>	1986 to 1991	U.S.	Sales employees	15 retail stores	990	no	Retail	The introduction of a performance-based compensation plan causes a persistent increase in sales.
Fernie and Metcalf (1999)	1988 to 1995	U.K.	Jockeys	89	413	yes	Entertainment (horse racing)	The payment system is coincident with the predictions of agency theory and ensures higher performance.
Paarsch and Shearer (2000) <sup>22</sup>	1994	Canada	Tree planters	155 planters	4578	yes	Agriculture	Two main conclusions: (1) Effort is related to the piece-rate. The elasticity of effort is estimated to be 2.14 with a lower bound of 0.77. (2) The firm offers rents to workers in order to induce planters to reveal their level of ability. Extracting the rents (in a static model) would increase profits by 17.25 percent.
Lazear (2000b)	1994 to 1995	U.S.	Mechanics	2755 installers	29837	yes	Automobile glass	The shift to piece-rates caused overall productivity to increase by 44 percent, while wages increased by 10 percent. Half of the productivity increase was caused by a selection effect, and half by an increase in effort. In addition, more variance in productivity is observed (i.e. ambitious workers have an incentive to differentiate).
Banker et al. (2000)	1989-1991	U.S.	Sales employees	3776 sales persons	14651	yes	Retail	A persistent increase in sales is caused by both a selection effect and an increase in effort.
Oetinger (2001)	1996	U.S.	Stadium vendors	127 vendors	3580	yes	Retail	Effort choices appear to be influenced by the piece-rate offered to the vendors.
Belfield and Marsden (2003)	1990-1998	U.K.	Not available	1323 workplaces	1323	no	Not available	Performance-related pay enhances organizational performance (as perceived by managers).
Freeman and Kleiner (2005)	1986-1997	U.S.	Non-managerial	1 firm	Max. of 250	no	Shoe industry	Although piece-rates increased productivity, time rates turned out to be more profitable for this company (e.g. lower wage costs).

<sup>20</sup> Partly based on Prendergast (1999).

<sup>21</sup> See also Banker et al. (1996b).

<sup>22</sup> See also Paarsch and Shearer (1999).

**Table 2.2: Empirical results compared with crowding theory<sup>23</sup>**

Authors	Period	Country	Type of staff	Sample size	Intrinsic motive	External intervention	Designed as test?	Reported results	Conclusion with respect to crowding theory
Barkema (1995)	1985	The Netherlands	Top-managers	116	Work effort	Type of supervision	no	An increase in monitoring will decrease the number of hours worked, if the agent and principal have more frequent and personal contact (i.e. the principal is the CEO instead of the parent company).	Relationship between the proxy for motivation, hours worked, and crowding theory is vague.
Bewley (1995)	1992 to 1994	U.S.	Workers (no specific industry)	372	Work effort	Payments	no	Discusses unconventional thoughts about fairness and the reluctance to cut wages in a recession.	No conclusion that is related to crowding theory.
Frey (1997c)	1965 to 1978	Switzerland	Civilians	78	Civic duty/ Tax morale	Constitutional regulations	yes	Cantons with a high degree of direct political control have a higher tax morale.	Heterogeneity between cantons can (partly) drive the results.
Frey and Goette (1999)	1997	Switzerland	Volunteers	691	Volunteer work supply	Payments	yes	Rewards have a positive effect on the number of hours worked, but the coefficient of the reward dummy is estimated to be negative, implying that a threshold exists. Results are in line with crowding theory.	Starting point is no money offered; implicit contract changes.
Frey and Oberholzer-Gee (1997)	1993	Switzerland	Civilians	305	Civic duty	Compensation payments	yes	The willingness to accept a noxious (nuclear waste) repository within the community decreased when compensation was offered.	Starting point is no money offered; implicit contract changes.
Gneezy and Rustichini (2000a)	Not available	Israel	High-School students	180	Volunteer work motivation	Payments	yes	Monetary rewards produce a reduction in performance, but once they are introduced, more monetary incentives produces higher performance.	Alternative explanations are being offered; explicitly crowding theory is set aside and incomplete contracts is mentioned as the most convincing interpretation.
Gneezy and Rustichini (2000b)	1998	Israel	Civilians	337	Norm adherence	Fines	yes	Fines for lateness in a day-care center made the number of late-coming parents increase.	Incomplete contracts: perceived contract changes similar to the studies where initially no money is offered.
Kunreuther and Easterling (1990)	1987	U.S.	Civilians	470	Civic duty	Tax rebates	no	Rebates do not influence the decision to vote in favor of a potentially hazardous facility.	Relationship between the test and crowding theory is vague.

<sup>23</sup> Partly based on Frey and Jegen (2001).

#### 2.2.4.2 Empirical results on incentive compensation and intrinsic motivation

A discussion of empirical research on the relationship between rewards<sup>24</sup> and intrinsic motivation is incomplete without considering the psychological literature, which is the origin of theories on this relationship. More than hundred experimental studies have been conducted to test what is called cognitive evaluation theory. A comprehensive review of this literature can be found in four recent meta-studies (Cameron and Pierce (1994), Eisenberger and Cameron (1996), Deci et al. (1999), and Cameron et al. (2001)).<sup>25</sup> The first two meta-studies (Cameron and Pierce, 1994; Eisenberger and Cameron, 1996) conclude that the negative effects of rewards – crowding-out – are limited. Deci et al. (1999) criticize the methodology and selection technique used in these two studies and attempt numerous improvements. Their study reveals pervasive negative effects of rewards on intrinsic motivation. Cameron et al. (2001) deal with this criticism by doing their own study again but stick to their original conclusion. Thus, although empirical research on this topic dates back to the early 1970s and the most recent meta-study includes 145 experimental studies, an unambiguous conclusion has not yet been reached.

Since cognitive evaluation theory made its appearance in economics and was labeled crowding theory, economists have also started to make empirical analyses of the crowding effect, though on a more modest scale. Frey and Jegen (2001) present a survey of a total of 16 “major empirical economic studies identifying crowding effects”. In Table 2.2 I summarize eight of them.<sup>26</sup> The columns discussing the intrinsic motive, the external intervention, and whether the study is designed as a test for crowding theory are a direct copy of Frey and Jegen (2001). Frey and Jegen present all these studies as evidence for crowding theory, but here their conclusion is questioned. In the last two columns the results of the eight studies are summarized, and how these results relate to crowding theory is briefly explained.

A first observation is that six out of the eight studies discuss settings with civilians (e.g. the willingness to accept nuclear repositories in the community) or volunteer workers, but do not discuss standard employer-employee relationships, the exceptions being Barkema (1995) and Bewley (1995). It is therefore not evident that the results will also apply in an agency setting: for example, when incentive compensation is introduced. Secondly, many studies also compare the situation of ‘no pecuniary compensation offered’ with situations of starting to offer money (e.g. Frey and Goette, 1999; and Frey and Oberholzer-Gee, 1997). This is a distinct setting and can be explained by an alternative theory too: attribution theory (Gneezy and Rustichini, 2000a). This theory describes how interpersonal judgments of different situations (no pecuniary compensation versus pecuniary compensation) can lead to similar observations, without crowding (e.g. Bem, 1967).<sup>27</sup> This implies that results in these distinct settings, although consistent with crowding theory, can be explained by

<sup>24</sup> Crowding theory does not distinguish between incentive compensation and fixed compensation, but rather investigates the relationship between rewards in general and motivation.

<sup>25</sup> Frey and Jegen (2001) state that other meta-studies (e.g. Rummel and Feinberg, 1988) use smaller samples and are clearly flawed.

<sup>26</sup> The four studies labeled as “laboratory experiments” as well as the study by Cardenas et al. (2000), which is in fact an experiment are not included in Table 2.2. Furthermore, I was unable to locate the dissertation by Upton (1973). Kelman’s (1992) study is qualitative and is excluded as well. Austin and Gittel (2002) discuss anomalies of performance systems, but these, although very interesting, are based on anecdotes and interviews with no clear link to crowding theory. Thus, Table 2.2 includes 8 empirical studies.

<sup>27</sup> Persons who are performing a task without external rewards conclude that their motivation must be intrinsic. Introducing external rewards will make the person see this reward as the motive, thus replacing the original intrinsic motive (Gneezy and Rustichini, 2000a). The results would thus be comparable with crowding theory and distinguishing the two theories in these situations would be nearly impossible.

other theories as well. Thirdly, some studies only report very circumstantial evidence of crowding theory (Bewley, 1995; Kunreuther and Easterling, 1990): Bewley (1995) discusses the reluctance of employers to resort to pay cuts in an economic downturn, while Kunreuther and Easterling (1990) discuss decisions regarding the approval of a hazardous facility. Gneezy and Rustichini (2000a) explicitly note that, even though the crowding model “is insightful”, theories of incomplete contracts offer an interpretation that “seems to us the most convincing”. All in all, in my view, evidence in favor of crowding theory is limited. Chapter 3 will return to the subject of crowding theory.

#### 2.2.4.3 Empirical results on promotions and extrinsic motivation

Tournament theory has been subjected to limited empirical research. One of the first empirical investigations was an experiment by Bull et al. (1987). This was followed by tests that were conducted in surroundings where clear productivity and reward data are available: sporting events. Most sporting events are a tournament by definition and are thus likely to have the attributes described in tournament theory: award of prizes to relative outperforming teams or individuals, the option value of participating in additional rounds after winning a round, and a convex prize structure. A sporting tournament offers the possibility to test whether more effort will be exerted if the difference in rewards between winning and losing increases. Ehrenberg and Bognanno (1990a & 1990b) pioneered in this field by analyzing the effects of tournament theory in golf. They show that effort is dependent on the prize level and structure: a more convex structure with a larger reward for the winner increases effort and leads to lowering the golf scores. Becker and Huselid (1992) show similar results by analyzing NASCAR and IMSA racing drivers. An increase in prizes will lead to faster and riskier driving. Bloom (1999) has studied major league baseball data and shows that tournaments can have a negative effect on cooperation and teamwork (as theoretically predicted by Lazear (1989). Taylor and Trogdon (2002) analyze the National Basketball Association (NBA) and show that even incentives to lose can be created that work in line with tournament theory (bottom-ranked teams get to draft first for the upcoming season). A survey of the empirical research on tournaments is presented in Table 2.3.

As well as in the area of sporting events, tournament theory has been tested using data on executive compensation. Compared with sporting tournaments, the performance of the contestants, i.e. executives, is more difficult to measure in this case. In general, firm performance is used as a proxy for the performance of the executives. A first general finding is that cash compensation differentials are an increasing function of the organizational hierarchy resulting in a convex wage structure (e.g. Lambert et al., 1993).<sup>28</sup> Cappelli and Cascio (1991) report that jobs at the top of the promotion rank include an additional wage premium. A second finding is that, consistent with predictions of tournament theory, a positive relationship exists between the number of contestants and the size of the prize. This observation is made by Main et al. (1993), Conyon et al. (2001) and Eriksson (1999) but not substantiated by O’Reilly et al. (1988). Also, Bognanno (2001) finds a positive effect of the number of competitors on CEO pay levels (i.e. the prize), but a negative effect for the square of the number of competitors.<sup>29</sup> Third, Main et al. (1993) and Eriksson (1999) observe a positive relationship between wage dispersion and performance, similar to the findings in the sporting events, but unlike observations by Conyon et al. (2001).

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<sup>28</sup> Many personnel economics studies investigating a single company find a comparable wage structure (see Section 2.4).

<sup>29</sup> The tournament model predicts that the relationship between the number of competitors and the prize should be increasingly positive, i.e. a positive effect for the squared term.

**Table 2.3: Empirical results tournament theory**

Authors	Period	Country	Type of staff	Sample size	Number of observations	Industry/ Sector	Reported Results
Ehrenberg and Bognanno (1990a)	1984	U.S.	Professional sportsmen	Top 160 winners	3449	Golf (Men's PGA tour)	Performance is positively related to total prize and the marginal return to effort in the last round.
Ehrenberg and Bognanno (1990b)	1987	Europe	Professional sportsmen	Top 130 winners	1386	Golf (European Men's PGA tour)	Same results as Ehrenberg and Bognanno (1990a), but players seem even more responsive to incentives.
Becker and Huselid (1992)	1989 to 1990	U.S.	Professional sportsmen	39 races	1139	Car races (NASCAR & IMSA)	Variation in spread in prize money increases performance but to some extent also encourages risky behavior.
Bloom (1999)	1985 to 1993	U.S. and Canada	Professional sportsmen	29 teams	1644	Major league baseball	Greater dispersion in pay, undermining teamwork, leads to lower team and individual performance.
Taylor and Trogdon (2002)	1983 to 1990	U.S.	Professional sportsmen	3 seasons	5904	Basketball (NBA)	Incentives to lose exist, so that teams get first pick in next year draft.
O'Reilly et al. (1988)	1984	U.S.	Executives	105 companies	84	Not specified	Prize is negatively related to the number of contestants in the tournament.
Cappelli and Cascio (1991)	Not specified	U.S.	Executives	1 firm	1242	Utility	Convex wage structure with an additional wage premium for jobs at the top of the promotion range.
Main et al. (1993)	1980 to 1984	U.S.	Executives	> 200 companies	777	Not specified	Prize increases with the number of contestants in the tournament.
Lambert et al. (1993)	1982 to 1984	U.S.	Executives	303 companies	Not specified	Not specified	Convex wage structure with an extraordinary large level of CEO compensation relative to the next lower level.
Eriksson (1999)	1992 to 1995	Denmark	Executives	210 companies	~ 2600	Not specified	Convex wage structure and prizes increase with the number of contestants in the tournament.
Bognanno (2001)	1981 to 1988	U.S.	Executives	260 companies	73062	Not specified	Convex wage structure and prizes increase with the number of contestants but CEO pay decreases with the square of the number of competitors.
Canyon et al. (2001)	1997 to 1998	U.K.	Executives	100 companies	1115	Not specified	Convex wage structure and prizes increase with the number of contestants in the tournament (3.5% for each extra executive).
Knoeber and Thurman (1994)	1981 to 1985	U.S.	Growers of broiler chickens	75 companies (growers)	1174	Broiler production	Tournaments will have less able players adopting more risky strategies.
Coupé et al. (2004)	1977 to 1997	U.S.	Assistants and professors	~ 100 departments	2152	University (economics departments)	Convex wage structure and wage gaps have an incentive effect.

The empirical investigations, using either sporting events or executive data, show relevant insights, but have their disadvantages. Sporting events provide individual performance data, but a hierarchy is absent. For executives, measuring the performance of individual participants is difficult (see Baker, 2002). Tests of tournament theory in economic settings with both a hierarchy and data on individual performance are scarce. A study that satisfies both conditions investigates tournament theory in economic departments at U.S. universities (Coupé et al., 2004). Again, individual productivity is found to be an increasing function of wage gaps, but a distinction between tournament theory and alternative models (i.e. standards or marginal productivity theory) cannot be made. Knoeber and Thurman (1994) examine broiler chicken companies and show how performance responds to higher prizes. They find that less able players will adopt riskier strategies (see Becker and Huselid, 1992), thereby showing that the incentive effect potentially differs for workers who have different abilities. Overall, a large body of empirical support for tournament theory in a setting with both a hierarchy and individual performance data is absent, but most tests find characteristics (e.g. convex wage structures and a positive relationship between the prizes and the number of contestants) in line with tournament theory. Still, the fact that alternative models can explain similar outcomes and the lack of evidence that promotions do provide incentives offers opportunities for further research, which will be addressed in Chapter 4.

#### *2.2.4.4 Empirical results on promotions and intrinsic motivation*

While empirical analyses of tournament theory, the relationship between promotions and extrinsic motivation, are scarce, empirical studies of the relationship between promotions and intrinsic motivation appear to be non-existent. Previously, I noticed that the models that investigate the relationship between job-challenge and motivation are closely related to the relationship that is central in this section. Experimental psychology has investigated the incentive effect of job challenge. Campion and McClelland (1991 & 1993) consider costs and benefits of job enlargement and show the beneficial motivational aspect of an increase in job challenge. To my knowledge, empirical research on this topic using 'natural' data is absent. Chapters 3 and 4 focus on this relationship.

## 2.3 Theory on Ability and Mobility

The right-hand side of Figure 2.1 focuses on the ability of employees. Theories on ability are highly related to both internal and external job movements, exemplified by the self-selection that takes place after the introduction of incentive compensation (see Section 2.2.4.1). Job mobility has been a topic of interest for both theorists and practitioners in different disciplines. Sociologists started to show interest in the topic in the mid-1950s, formalizing mobility in the mover-stayer model (e.g. Blumen et al., 1955). Their argument revolves around the notion that some individuals are inherently more likely to change jobs than others (Munasinghe and Sigman, 2004). This so-called 'hobo-syndrome' is the result of the characteristics of individual workers: it is in the nature of some individuals to wander and change jobs frequently. The economic implication derived from the mover-stayer model is that frequent movers earn lower wages, since they are assumed to be less productive workers.

However, the mover-stayer model was unable to account for many empirical facts (e.g. wage increases after job mobility) and thus the search continued for more insightful models. Different theoretical models have been developed focusing on within- and between-firm job movements. This section discusses two relevant economic theories: namely, the human capital model, and matching models.

### 2.3.1 Human capital theory

To a great extent, human capital theory can be attributed to economists from the 1950s such as Nobel-prize winner Gary Becker. In his 1992 Nobel lecture, Becker states:

*“Until the 1950s economists generally assumed that labor power was given and not augmentable. The sophisticated analyses of investments in education and other training by Adam Smith, Alfred Marshall, and Milton Friedman were not integrated into discussions of productivity. Then T. W. Schultz and others began to pioneer the exploration of the implications of human capital investments for economic growth and related economic questions”* (Becker, 1997).

A high proportion of empirical studies in labor economics is based on human capital theory such as research on return to education and on-the-job training (e.g. Mincer, 1974).

Human capital encompasses all the capabilities that people possess. These capabilities are not static: investments can be made in order to increase human capital such as schooling, on-the-job training and medical care (Becker, 1962). An important dichotomy is the distinction between general and firm-specific human capital, which can already be found in Becker’s (1962) influential article. *General human capital* refers to human capital that is equally valued by all firms and is completely transferable from one firm to the other. Alternatively, *firm-specific human capital* refers to knowledge that is valued only by the current employer and will be lost if the employee transfers to another firm.<sup>30</sup> This distinction will affect on-the-job training decisions and also turnover decisions. Investments in human capital by workers, such as training and education, are assumed to be made based on a tradeoff between their benefits (monetary and non-monetary gains) and costs (monetary expenses as well as the value of time spent on training). Becker (1964) derives two main insights. First, the returns and costs of investments in firm-specific human capital will be shared between employers and workers (see Hashimoto, 1981). After the training is completed, workers will receive a wage above the level they would earn elsewhere since the productivity in other firms has not changed. (Voluntary) turnover will thus be reduced since workers will then lose the return on their investments. Second, employers will be unwilling to invest in the training of general human capital in a competitive labor market, since they will be unable to capture the returns.

These basic insights have been extended in multiple directions.<sup>31</sup> Carmichael (1983) links human capital theories to career tracks within organizations. He concludes that wages attached to jobs and jobs assigned by seniority can derive an efficient outcome of careers and wage structure. Task-assignment models are another extension and explain the distribution of wages within firms as an outcome to the problem of assigning jobs to employees (Sattinger, 1993). In some models the signaling effect of a promotion is especially important (e.g. Waldman, 1984; Bernhardt and Scoones, 1993; Bernhardt, 1995). A promotion signals the employee’s ability to other firms and will make potential employers bid up the wage of the promoted employee (i.e. wage increase upon promotion). Furthermore, promotion criteria can become inefficient in the sense that

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<sup>30</sup> Other types of human capital, e.g. industry specific human capital, will not be reviewed in this dissertation.

<sup>31</sup> Gibbons and Waldman (1999a) present a thorough survey of human capital theory and its extensions in other areas besides career tracks within organizations.



employees who would perform marginally better in a more senior job are not promoted because of the imposed wage-increase (Gibbons, 1997).

In general, human capital theory introduces an argument for the existence of ILMs (see Section 2.4), and shows how firm-specific human capital explains long tenure. A different view on tenure and mobility is introduced in the 'matching models'.

### 2.3.2 *Matching theories*

A different set of models in economics that focuses on workers' ability is based on the combination of search and matching aspects. The search model (e.g. Stigler, 1961; Burdett, 1978; Jovanovic, 1979b) uses the assumption of heterogeneous abilities across workers. Workers 'shop' around and search for the best-matched jobs, i.e. those with the highest wage. Job mobility in a search model implies a positive relationship between experience and wages since more experienced workers have had more time to search the labor market for companies that fit them best. Early models (e.g. Stigler, 1961) portray workers as optimizing the tradeoff between time and resources spent on searching for job opportunities and the uncertain returns to job search in terms of wages attached to the job selected (Mortensen, 1986). Burdett (1978) models how, besides the search behavior of unemployed people, employed workers too will search for better paying jobs, i.e. on-the-job search.

Related to search models are experience models (e.g. Jovanovic, 1979a), which focus on the lack of information ex-ante about the match quality between an employee and a job. The worker's output is observed by both the worker and the employer and is seen as a noisy signal of the quality of the match. Over time, more information is revealed and prior expectations about the match quality are updated. This information leads to either job continuance or employee turnover. In human capital theory, a good match potentially leads to a promotion (see Waldman, 1984).

Both matching models – search and experience models – concentrate on separations and explain, for example, why workers tend to have a high rate of turnover in the first year of their career. The implications of the two models are different. On the one hand, the search model predicts that the probability of a job separation declines when *general labor market experience* increases (Burdett, 1978). More experience (and thus more opportunity to gather and evaluate outside wage offers) will lead to higher wages and thereby a falling probability that the subsequent wage offer is high enough to lead to a switch (Gibbons and Waldman, 1999a). On the other hand, the experience model predicts that the probability of separation declines with *on-the-job tenure*. Bad matches, whose information is revealed in an early stage of the work relationship, will lead to early job separation. The chance that new learning about the match quality will lead to a switch declines as a function of tenure (Jovanovic and Mincer, 1981).

Human capital theory and matching theory have many characteristics in common.<sup>32</sup> All models assume worker heterogeneity in terms of ability. Basically, match quality can be seen as a type of specific human capital since the match quality is firm-specific (Farber, 1999). Introducing human capital theory in the search model shows that a job separation only occurs if the new job is a superior match that also compensates for the loss in firm-specific human capital. By doing so, the chance of job separation in the experience model also decreases with on-the-job tenure since an increase in tenure implies more firm-specific capital (see experience model).

### 2.3.3 *The wage effects of mobility*

Besides the relationship between tenure/experience and job separation, human capital theory and the matching theories also make important predictions about the relationship between job separation and wages. As stated previously, the mover-stayer model predicts that movers are inherently less productive and thus earn lower wages. In this model, job separations by themselves do not affect wages, but are rather characteristics of the individuals' nature. Thus, the wage level varies between individuals according to their type.

The other models (matching models and the human capital model) use an opposite perspective; these models assume that a voluntary switch will only be made if this leads to a wage-increase. The search model uses the ex-ante known match quality to predict job separations. A better-matched job will lead to a job separation and a wage increase. The effect of a job separation on wages is limited to the initial wage increase. Wage levels vary *across* jobs, but, after the initial effect is controlled for, job separations are predicted to not affect wage levels *within* a job.

The last model, the experience model, stands alone in the prediction that job separations affect the wage level within a job. Workers and employers learn about the match quality over time. This model predicts that multiple job separations are potentially the result of unsuccessful matches. Therefore, after controlling for time-invariant individual effects (see the mover-stayer model) and the time-invariant job-match characteristics as proposed by the search models, the experience model leaves the possibility open that persistent mobility negatively affects wages within a job (Light and McGarry, 1998).

### 2.3.4 *Empirical results on ability and mobility theories*

The above-discussed theoretical models and their specific extensions have been subjected to empirical tests measuring the relationship between mobility and wages. In general, three types of tests that estimate the relationship between wages and mobility can be identified.<sup>33</sup>

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<sup>32</sup> These similarities have stimulated theorists to build integrated models. Mortensen (1988) notes that the combination of human capital models and matching models can explain most of the empirically-observed wage-tenure relationships. Chang and Wang (1996) integrate both types by including the experience model (i.e. information asymmetry of future employers), while investigating investments in human capital. Gibbons and Waldman (1999b) develop an integrated model, which combines human capital theory (specifically, general human capital), job assignment, and learning models (regarding the abilities of the employees, i.e. experience models), further extended in Gibbons and Waldman (2003). The relevant conclusions of the Gibbons and Waldman model (and its extensions) are that: promotions imply a wage increase; demotions, although rare, imply a wage decrease; wages are serially correlated over time; and wage increases predict promotions (Lima and Pereira, 2003).

<sup>33</sup> Related literature analyzes the hazard of job mobility (e.g. Farber, 1994). I will not discuss this literature in detail.

The first and most common set of tests focuses on estimating the returns to tenure following Mincer earnings regressions (Heckman et al., 2003). Several methodological problems make accurate estimations difficult. In particular, the results of OLS regressions are potentially biased due to unobserved heterogeneity and endogeneity, since workers are expected to switch firms voluntarily only if the switch leads to a wage increase. Altonji and Shakotko (1987) and Topel (1991) developed different techniques to deal with this problem (instrumental variable technique and two-step first difference model). Altonji and Shakotko (1987) find minor returns to job tenure (6.6 percent wage increase after accumulating 10 years of tenure). These results differ substantially from Topel (1991) who estimates a 10-year return to job tenure of approximately 25 percent. Altonji and Williams (2005) reassess both studies and find a return to tenure of 11 percent, explaining the difference by measurement problems. All recent studies discussed below adopt techniques to control for endogeneity problems.

Returns to tenure have been estimated for the U.S. using different data sets (e.g. Jacobsen and Levin, 2002) and also for other different countries: for example, Switzerland, (Luchsinger et al., 2003), the U.K. (Dustmann and Pereira, 2003), Germany, (Dustmann and Pereira, 2003; Dustmann and Meghir, 2005), and Denmark (Bingley and Westergård-Nielsen, 2003; Bagger, 2004). The common outcome of these estimates is lower returns to tenure than initially found in the U.S. Dustmann and Pereira (2003) and Bagger (2004) estimate the returns to tenure to be close to zero for the U.K., Germany and Denmark.<sup>34</sup>

A specific segment of these studies focuses on measuring the returns to tenure in the academic job market. Most studies in this setting find a negative relationship between wages and seniority (e.g. Hoffman, 1976; Ransom, 1993; Bratsberg et al., 2003; Price and Razzolini, 2003). However, Hallock (1995) argues that this negative wage-tenure relationship is not robust, since his study finds a concave seniority profile with positive returns for the first 15 years of tenure. However, Hallock (1995) finds that outside hires earn higher wages than academics fulfilling the same position from the inside. The outcome of all studies combined is in sharp contrast to the positive relationship that is usually found for non-academic job markets.

A second stream of the empirical literature concentrates on direct wage changes through job mobility between companies. These studies find a positive wage increase of roughly 10 percent, robust across countries. Campbell (2001) estimates the wage premium of mobility to be approximately 10 percent in the U.K., calculated over a three-year period. Xenogiani (2003) finds a larger wage premium for men than for women living in the U.K. Abbott and Beach (1994) find an average wage gain of 8-9 percent for Canadian women who changed jobs. If this change occurred for non-personal reasons, i.e. if the quit was based on job-related reasons, the wage premium would be 11-13 percent. In the U.S., Keith and McWilliams (1999) establish different mobility patterns by gender; men are inherently more mobile than women. However, this did not lead to a difference in the wage premiums that are obtained from job search. A premium of 8-11 percent was established for job change.

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<sup>34</sup> The literature has been extended to include other possible explanatory variables. For example, Connolly and Gottschalk (2001) differentiate between levels of education and Bratsberg and Terrell (1998) distinguish between black and white men. Parent (2000) differentiates between industry-specific and firm-specific human capital (tenure) and shows that industry-specific skills are the driving force behind wage growth. Additionally, Kambourov and Manovskii (2002) find that occupational tenure has substantial effects on the wage level, even more so than industry or firm tenure. Parent (1999) shows that employers reward formal training provided by previous employers as much as the training they provide themselves, even if this training is partly firm-specific. In a different study, Parent (2002) explicitly tests predictions of both human capital theory and job matching and finds more support for predictions made by the former.

These two sorts of empirical tests are closely related to each other: the 'returns to tenure studies' identify what the change in wage would be if a person had an extra year of tenure, whereas the 'job mobility studies' estimate the change in wage upon changing firms. Although finding positive effects for both tests sounds paradoxical, the results are understandable. The first set of tests calculates returns to tenure, relative to general labor market experience and shows that, in general, an employer values tenure. The second set indicates that finding a better-matched job can result in a wage increase that surpasses the returns to tenure leading to turnover. Bingley and Westergård-Nielsen (2006) show how employees are responsive to wage prospects both within and outside the current firm.

A third type of empirical tests investigates the effect of historical mobility (i.e. the number of previous jobs) on current wages (e.g. Light and McGarry, 1998; Munasinghe and Sigman, 2004). Both studies pertain to the U.S. and find, after controlling for the match quality of a certain job that many different jobs at a young age lead to a lower wage. In general, this finding would support the mover-stayer model. However, Light and McGarry (1998) explicitly note that the number of previous jobs has a continuous effect on the wage level at the new employer, i.e. the negative effect is time-varying even *within* jobs. They conclude this to be supportive of the experience model: employers learn about the worker's ability over time. In Chapter 6, I will discuss the methodology of Light and McGarry in more detail and explore the effect of historical mobility on wages.

## 2.4 Empirical Research on ILMs

The previous Sections 2.2 and 2.3 discussed the building-block models of personnel economics and presented the empirical results of testing these models. Personnel economists use the different models to explore what goes on inside organizations: the ILM (see also Section 1.1). As shown in the Introduction to this study, an ILM is defined by Doeringer and Piore (1971) as an administrative unit in a firm within which the pricing and allocation of labor is governed by a set of administrative rules and procedures. Often, specific characteristics of the ILM are emphasized when defining this concept. For example, Lazear and Oyer (2004) state that "Internal labor markets are those where workers are hired into entry level jobs and higher levels are filled from within." Still, the ILM is an integrated entity, where theories on tournaments, internal sorting, job mobility, and wage policies are all used to bring understanding to how organizations formalize HR policies.

The empirical roots for analyzing the ILM can be found in the studies by Doeringer and Piore (1971) and Medoff and Abraham (1980). To my knowledge a continuation of this work was long in coming until the single-firm analyses by Lazear (1992) and BGH (1994a & 1994b). After these three studies, the field developed with more single-firm analyses that found strong evidence of the existence of ILMs within specific firms. To what extent these results can be generalized to other firms is an important question that has not yet been answered, since most empirical studies are descriptive and portray the development of a single ILM over time (Eriksson and Werwatz, 2003).

In order to facilitate the comparison of results, Baker and Holmstrom (1995) and Gibbons (1997) formulated questions on key stylized facts. Baker and Holmstrom (1995) developed three main questions with a total of 10 sub-questions, directly linked to Doeringer and Piore (1971), around which the literature of ILMs has expanded, namely:

- I. Are job movements exceptional?
- II. Are wages attached to jobs?
- III. Are workers shielded from external market forces?

Gibbons (1997) formulated an additional set of ten questions with an overlap of three questions with the set of sub-questions by Baker and Holmstrom (1995).

Table 2.4 presents a survey of case studies and their results concerning the core questions of both Gibbons (1997) and Baker and Holmstrom (1995). All stylized facts of ILMs have been established at least once, but most case studies did not find evidence of all stylized facts at the same time (Gibbs and Hendricks, 2004). Comparing the results of the different case studies has not been done to the fullest extent before. One of the problems with comparing the results is that most studies do not report results on all questions. Therefore, it is not possible to conclude whether the stylized fact was absent or was left out of the analysis. Two questions in particular show rather varied results: “Do specific ports of entry and exit exist?” (four studies establish the stylized fact, four studies show mixed results, and two studies do not support the fact) and “Do demotions occur?” (three studies establish the stylized fact, one study shows mixed results, and six studies do not find demotions). This diversity requests further investigation.

Recently, the analysis of ILMs based on large samples of firms has made a start (e.g. Lazear and Oyer, 2004 and Eriksson and Werwatz, 2003). Such analyses can potentially answer the questions on a multi-firm basis, though in less detail than single-firm analyses. Using Norwegian data, Hunnes et al. (2003) find limited evidence of ports of entry. The preference for hiring internally is highest at middle-management positions. Nonetheless, many jobs are filled from the outside as well. Lazear and Oyer (2004) report that in Sweden outsiders are hired at all levels and find little support for ports of entry in the standard sense. They do, however, find a large portion of employees who enter an organization at a particular level and get promoted further on in their career, which alludes to an ILM. The mixed results are in line with the mixed answers to the question “Do specific ports of entry and exit exist?” as presented in Table 2.4. A next logical step would be to find determinants that can help us understand the diversity in results. This will be the contribution of Chapter 5.

This theoretical chapter has identified several interesting questions worth investigating further. Part 2 focuses on the research questions that are stated in the Introduction. Chapters 3 and 4 use a single research site (cf. Table 2.4) and focus on the relationship between wage structure and the motivation of employees (cf. Section 2.2 and Table 2.3). Chapter 5 takes a multi-firm approach towards ILM in line with Lazear and Oyer (2004) and Eriksson and Werwatz (2003). In Chapter 6 I explore the boundaries of the ILM and analyze the relationship between ability and mobility (cf. Section 2.4).

**Table 2.4: Empirical investigations of ILMs: Single-firm analysis<sup>35</sup>**

	1a Do specific ports of entry (and exit) exist?	1b Is there a stable hierarchy with clearly identified career ladders?	1c Are lateral moves common?	1d Do demotions occur?	1e Is there a fast track?	2a Is there a wage variation within job levels?	2b Do wage ranges of job levels overlap?	2c Are promotions essential for sustained wage growth?	2d Do wage increases forecast promotions?	3a Is there a cohort effect?
Medoff and Abraham (1980)	n.a.	n.a.	n.a.	n.a.	n.a.	●	n.a.	○	n.a.	n.a.
Lazear (1992)	◐	●	○	n.a.	●	n.a.	n.a.	●	n.a.	n.a.
BGH (1994a & 1994b)	◐	●	◐	○	●	●	●	●	●	●
Gibbs (1995)	n.a.	n.a.	n.a.	○	n.a.	●	●	●	●	n.a.
Lazear (1999)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	●	n.a.	●
Ariga et al. (1999)	◐	n.a.	n.a.	n.a.	●	n.a.	n.a.	n.a.	n.a.	n.a.
Chiappori et al. (1999)	n.a.	n.a.	n.a.	n.a.	●	n.a.	n.a.	n.a.	n.a.	n.a.
Seltzer and Merrett (2000)	●	●	●	●	●	○	●	●	○	◐
Treble et al. (2001)	◐	●	n.a.	○	●	●	●	●	n.a.	n.a.
Flabbi and Ichino (2001)	n.a.	n.a.	n.a.	n.a.	n.a.	●	n.a.	n.a.	n.a.	n.a.
Gibbs and Hendricks (2004)	n.a.	n.a.	●	○	●	n.a.	n.a.	●	●	●
Howlett (2001)	●	●	●	○	○	●	●	●	n.a.	n.a.
Hamilton and MacKinnon (2001)	○	●	n.a.	●	◐	○	n.a.	●	n.a.	●
Grund (2005)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	●	n.a.	n.a.	n.a.
Lin (2005)	●	●	n.a.	◐	n.a.	●	●	n.a.	n.a.	n.a.
Dohmen et al. (2004)	○	●	●	●	●	●	●	●	●	●
Kwon (2006)	●	●	●	○	n.a.	●	●	●	n.a.	●

*Legend of results:*

●: Stylized fact is (most likely) present.

○: Evidence in support of stylized fact is (completely) absent.

◐: Some evidence in support of stylized fact has been found.

n.a.: not applied.

<sup>35</sup> Baker and Holmstrom (1995) have presented 10 core questions (1a – 3a), while Gibbons (1997) formulated a second set of ten questions (Q1 – Q10). The overlap of his questions with the previous list was as follows: Q1 = 1e; Q4 = 3a; Q6 = 2d). The list of studies largely builds on Lin (2005) and Gibbs and Hendricks (2004).

	Q2. Are nominal wage cuts rare?	Q3. Are changes in wage residuals serially correlated?	Q5. Are wage increases on promotion large compared to normal increases but small compared to the diff. in avg. wage between the 2 levels?	Q7. Do promotions come from and go to all deciles of the wage distributions for the lower and upper levels?	Q8. Are wage increases smaller for those who begin in higher quartiles of the wage distribution for that level?	Q9. Do wages increase and are promotions more likely with higher performance evaluations in cross-section & time-series?	Q10. Is the effect of seniority on wages independent of the presence of controls for performance evaluations?
Medoff and Abraham (1980)	n.a.	n.a.	○	n.a.	●	●	●
Lazear (1992)	n.a.	n.a.	●	n.a.	n.a.	n.a.	n.a.
BGH (1994a & 1994b)	●	●	●	●	●	n.a.	n.a.
Gibbs (1995)	n.a.	●	●	n.a.	n.a.	●	n.a.
Lazear (1999)	n.a.	n.a.	●	n.a.	n.a.	n.a.	●
Ariga et al. (1999)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Chiappori et al. (1999)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Seltzer and Merrett (2000) <sup>36</sup>	●	n.a.	●	n.a.	n.a.	●	n.a.
Treble et al. (2001)	n.a.	n.a.	●	●	◐	n.a.	n.a.
Flabbi and Ichino (2001)	n.a.	n.a.	n.a.	n.a.	n.a.	●	●
Gibbs and Hendricks (2004)	●	●	●	●	●	●	●
Howlett (2001)	○	n.a.	●	●	n.a.	n.a.	n.a.
Hamilton and MacKinnon (2001) <sup>37</sup>	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Grund (2005)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Lin (2005)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Dohmen et al. (2004) <sup>38</sup>	●	●	●	●	●	●	●
Kwon (2006)	●	n.a.	●	●	n.a.	●	●

Legend of results:

●: Stylized fact is (most likely) present.

◐: Some evidence in support of stylized fact has been found.

○: Evidence in support of stylized fact is (completely) absent.

n.a.: not applied.

<sup>36</sup> See also Merrett and Seltzer (2000), Seltzer (2000) and Seltzer and Simons (2001).

<sup>37</sup> See also Hamilton and MacKinnon (1996a & 1996b).

<sup>38</sup> Dohmen (2004) uses the same data. Results can be found in both studies.





