

2009

THE POST-HISTORY OF ENTREPRENEURS: IMPACT OF BUSINESS OWNERSHIP EXPERIENCE ON CAREERS AND WAGES

Miguel Preto

IN+ Centre for Innovation, Technology and Policy Research, Instituto Superior Técnico, Technical University of Lisbon, Portugal, miguel.preto@dem.ist.utl.pt

Rui Baptista

IN+, IST, Technical University of Lisbon, Portugal and Max Planck Institute of Economics, Germany

Francisco Lima

CEG-IST, IST, Technical University of Lisbon, Portugal

Preto, Miguel; Baptista, Rui; and Lima, Francisco (2009) "THE POST-HISTORY OF ENTREPRENEURS: IMPACT OF BUSINESS OWNERSHIP EXPERIENCE ON CAREERS AND WAGES," *Frontiers of Entrepreneurship Research*: Vol. 29: Iss. 5, Article 3.

Available at: <http://digitalknowledge.babson.edu/fer/vol29/iss5/3>

This Paper is brought to you for free and open access by the Entrepreneurship at Babson at Digital Knowledge at Babson. It has been accepted for inclusion in Frontiers of Entrepreneurship Research by an authorized administrator of Digital Knowledge at Babson. For more information, please contact digitalknowledge@babson.edu.

THE POST-HISTORY OF ENTREPRENEURS: IMPACT OF BUSINESS OWNERSHIP EXPERIENCE ON CAREERS AND WAGES

Miguel T. Preto, IN+, IST, Technical University of Lisbon, Portugal

Rui Baptista, IN+, IST, Technical University of Lisbon, Portugal and Max Planck Institute of Economics, Germany

Francisco Lima, CEG-IST, IST, Technical University of Lisbon, Portugal

ABSTRACT

This study uses detailed longitudinal matched employer-employee data to examine the impact of entrepreneurial experience on job assignments, careers, and wages. The results suggest that there are significant differences in career mobility between former business owners and individuals who were always wage employees. While former business owners are, on average, paid less than other workers in the same hierarchical level, they enter firms at higher job levels and progress faster up the hierarchy, earning a labor market premium for entrepreneurial experience. The worker-firm match plays a significant role in generating this result, which contradicts previous empirical works on the subject.

INTRODUCTION

A considerable amount of theoretical and empirical work in economics focuses on individual choices between wage employment and entrepreneurship (or business ownership). Seminal work by Lucas (1978) and Jovanovic (1982) provide the basis for a significant stream of literature linking entrepreneurial ability to firm size dynamics, and the evolution of markets. Another literature stream examines the role played by pecuniary and non-pecuniary rewards in the occupational choice between self-employment and wage employment (see, for instance, Rees and Shah, 1986; and Taylor, 1996).

Conversely, only a few recent studies examine how well individuals who forsake business ownership and return to wage employment fare in the labor market. Research comparing earnings of former business owners who have become wage employees with those of others of similar age and educational background who did not experience self-employment over their careers provides mixed results and generally fails to account systematically both for the matching between worker and firm characteristics, and the specifics of career dynamics within firms.

The present study uses longitudinal matched employer-employee data that include detailed information about individuals' backgrounds, job assignments, and career progress within firms to examine the impact of business ownership experience on job assignments, careers and wages.

The following section provides the background for this study and surveys the empirical literature examining wage incomes and the labor market performance of former business owners. The third section describes the data used in the present study. Section four presents empirical evidence on the role played by business ownership experience in the internal economics of the firm with regard to careers, while section five focuses on wages. Section six concludes by proposing an explanation for the main empirical results.

For the purpose of this study, a broad definition of entrepreneur is used, which deliberately overlaps with that of business owner, not delving into a conceptual distinction between those terms. The same applies for the definition of entrepreneurship, which must be understood in a broad economic sense. The terms 'entrepreneur' and 'business owner' will be used interchangeably in the present work as including those individuals who report themselves as business owners, regardless of whether they have full or partial ownership, and have started, acquired or inherited the business.

BACKGROUND

Business Ownership Experience and Theories of Job Assignment, Wage, and Promotion Dynamics

While entrepreneurship's links with risk/uncertainty and innovation have lately taken the spotlight, entrepreneurial activities have also been connected with coordination and supervision tasks at least since the work of Say (1803/1971). For Marshall (1890/1930), within the firm, the owner/entrepreneur bears all the responsibility and exercises all control. He directs production, and he is both the manager and employer. Kaldor (1934) stresses that, in addition to uncertainty-bearing, the "entrepreneurial function" includes supervision and coordination. Supervision is necessary in the case of cooperative production in order to ensure that contracts already entered into should, in fact, be carried out. Coordination, on the other hand, is that part which determines what sort of contracts should be entered into.

It may be argued therefore that the exercise of business ownership should provide former entrepreneurs with experience in organizing, supervising and coordinating activities in firms. This experience may be valued by hiring firms as a positive signal when hiring and promoting to the higher levels of their hierarchy.

Assignment models of the distribution of earnings across firms and industries begin with Tinbergen (1951) and Roy (1951). Sattinger (1993) reviews models explaining the distribution of earnings as a result of the market economy's solution to the problem of assigning workers to jobs. Such models arise from a variety of related issues, including occupational choice; self-selection bias; human capital and skill prices; wage differentials and the organization of hierarchies.

Human capital theory (Becker, 1962; 1964/1975) states that individuals can acquire abilities through education and on-the-job training. These positively impact individual productivity and, consequently, earnings. While some forms of human capital are general and should impact individual productivity in a wide range of jobs, others are specialized (Topel, 1991; Becker and Murphy, 1992), and are associated with specific industries, firms, or tasks. The assignment of workers to jobs in the economy should then occur as a result of the knowledge firms and workers have of the output from each specific worker-job match. However, such knowledge is usually imperfect (Spence, 1975).

One mechanism for job assignment is learning. While workers acquire general human capital through schooling and firm- and task-specific human capital through experience and on-the-job training, firms learn about workers' true abilities and productivity through observation. Workers may be sorted into jobs through mechanisms of screening and signaling (Stiglitz, 1975; Spence, 1973), or a matching process of workers to jobs occurs over time (Jovanovic, 1979; 1984).

Baker et al. (1994a) provide evidence that firms use the job assignments of workers as a signal of ability (see also Waldman, 1984; Bernhardt, 1995). It can then be argued that firms should seek those with organization and supervisory/coordination experience when filling up vacancies in managerial levels of the hierarchy which typically require these abilities. If business ownership is perceived as providing such abilities, then it is possible that entrepreneurial experience may be interpreted as a signal in the employment of supervisors/managers.

The assignment of workers to jobs across firms and industries is also influenced by the scale of operations of firms. More resources, in the form of capital, labor, and supervising and coordinating responsibility, are allocated to workers with greater supervisory/coordination abilities, since these resources will have a greater effect on output when allocated to those workers. This means that workers with greater specific human capital associated with the organization and oversight of resources will be assigned more resources to administer and, through these resources, will have a greater impact on a firm's output. For a fixed number of such workers, the larger the scale of operations of the firm, the larger will be the amount of resources allocated to them and the larger their impact on output (Mayer, 1960; Williamson 1967; Rosen, 1981; Spurr, 1987).

Human capital and signaling theories hold that wages in firms reward experience acquired in the labor market due to the accumulation of skills (Mincer 1974; Becker, 1964/1975) and its signaling value (Spence, 1973). Individuals can acquire specific skills through on-the-job training, thus increasing their productivity. Under perfect information, or with efficient screening/signaling, the pecuniary value of labor market experience should translate into higher earnings (Mincer 1974) because experienced and educated workers are expected to be more productive and are consequently rewarded with higher earnings. If entrepreneurial experience provides individuals with specific skills in supervisory/coordination tasks, such experience may allow them to have a significant impact on firm productivity as wage employees.

Gibbons and Waldman (1999) provide a general framework integrating job assignment, human-capital acquisition, and learning capturing several empirical findings concerning wage and promotion dynamics inside firms. In particular, their model provides a rationale for some important features of the internal economics of the firm (Baker et al., 1994a; 1994b): first, job assignments (i.e. hierarchical levels) are a stronger determinant of wage levels than human capital or any other observed characteristic of workers; second, there is a significant overlap between wages in adjacent hierarchical levels; and third, wage increases are serially correlated, and promotions are associated with large wage increases, but wage increases at promotion are small relative to the difference between average wages across levels of the job ladder.

In an extension to their model, Gibbons and Waldman (2006), show that the existence of task-specific human capital allows for the explanation of another characteristic of the internal economics of the firm: the existence of cohort effects. The basic explanation for the cohort effect (Gibbons and Waldman, 2004; 2006) is that human capital accumulation is task-specific and its effect on productivity diminishes the further up a worker climbs in the job ladder. Some of a worker's acquired human capital goes unused when a worker is promoted and is assigned a new set of tasks. Hence, workers entering into lower levels in the job ladder accumulate human capital that is specific to the execution of tasks performed in those lower levels – being unlikely to acquire human capital specific to the supervisory/coordination activities required at higher levels. This means that their career progress will be slower than that of individuals who possess such human capital.

Business Ownership Experience and Wage Earnings

Empirical work on the impact of business ownership experience on careers in firms is, to our knowledge, non-existent. Some recent work has examined the impact of such experience on individuals' wages, while other studies have compared earnings in self-employment with those in paid employment. In general these studies argue that business ownership experience should exert a negative influence on earnings, as wage employees benefit from on-the-job training while former business owners do not (Williams, 2000). Business owners may not acquire the kind of firm-specific or industry-specific human capital that represents a positive signal in wage employment. No reference is made to the role played by task-specific human capital.

In their path-breaking study, Evans and Leighton (1989) find no clear evidence that the return to experience in business ownership is different than the return to experience in wage work. When examining the possibility of a labor market 'stigma' for individuals with previous self-employment experience, Hamilton (2000) finds that a brief experience as a business owner yields a positive effect on subsequent wages as an employee, but that such effect wears away when long spells of entrepreneurial experience are considered.

Only recently empirical analyses have paid attention primarily to the effects of entrepreneurial experience on individuals' earnings after they exit business ownership and switch into wage employment. Typically, empirical works on this subject find effects of business ownership experience on future employment earnings that are of small magnitude and weakly significant.

Generally, even when positive, the effect of self-employment experience on future wages is found to be smaller than the effect of past experience as a wage employee. Sometimes it is even negative (Williams, 2000; Bruce and Schuetze, 2004; Hyytinen and Rouvinen, 2008). However, these studies fail to account for the characteristics of the companies employing the former business owners. In particular, no evidence of where in the job assignment structure of firms do former business owners end up is provided.

In general, the empirical evidence concerning the wage returns to business ownership experience is mixed and suffers from important limitations. In particular, firm-specific determinants of wages are rarely considered due to data unavailability, leading to possible bias in the results. Moreover, the studies do not address features of the internal economics of firms such as job assignments and promotions, thus providing an incomplete picture of the role played by business ownership experience on wage and career dynamics. The present study contributes to the literature by addressing these issues.

DATA

This study uses the *Quadros de Pessoal* (QP) micro-data, a longitudinal matched employer-employee data set including extensive information on the mobility of Portuguese workers and business owners gathered yearly by the Portuguese Ministry of Labor from all private establishments with at least one wage-earner. The survey collects detailed information on each individual employee and it also collects basic information about the firm for the period 1986-2003.

Sample

Our sample comprises all young male individuals present in 1995 who appear as employees in at least one year from 1986 to 2003. We trace backwards the individuals' experiences in the labor

market between 1986 and 1995, including their complete work history in their current firms, and then observe hourly wages and other variables over the period 1995-2003. The analysis is restricted to males, who account for 61 percent of all individuals present in the data set in 1995 who were aged between 16 and 25 in 1986, corresponding to 40 percent of the original sample. By excluding individuals over 25 years old, the analysis focuses on young individuals who have finished their formal education and have already entered the labor market. Furthermore, it mitigates the issue of initial conditions arising from comparing individuals with very dissimilar work experiences and ages.

Former Business Owners and Wage Employees

Table 1 presents the descriptive statistics for the complete sample, comparing former business owners with those individuals who were always wage employees. Generally, former business owners are better educated on average than individuals who were always on wage employment. Focusing exclusively on the higher level of education, only a very small percentage of individuals have this degree (3.2 percent) and the proportion of former business owners with tertiary education is twice the same proportion for individuals who were always wage employees (6.4 percent vs. 3.2 percent). Finally, average experience in wage employment of former business owners is higher than for individuals who were never business owners, but former business owners are, on average, older than wage employees. The majority of former business owners find employment in smaller firms when compared with wage employees.

EVIDENCE ON JOB ASSIGNMENTS

The distribution of hierarchical levels is different for former business owners than wage employees (descriptive tables are available upon request). A striking feature of the data is that the allocation of ex-business owners to top hierarchical levels is exceptionally high when compared with that of individuals who were always wage employees, especially ex-business owners are particularly concentrated in the top three hierarchical levels. These may be considered the 'managerial' levels, i.e. the ones where organizing, supervisory and coordinating tasks are likely to represent the majority of requirements. The same pattern of job assignment is present across firm size; however, the differences in the top levels between former business owners and wage employees are more obvious in micro and small firms.

It is important to check whether a relationship between the hierarchical level and worker tenure within the firm is identifiable. Results (not reported here but available from the author upon request) show that for the higher hierarchical levels – from highly-skilled professionals to top managers – the proportions at time of entry of former business owners are higher than those of individuals who were always wage employees. As years of tenure increase, we observe the expected movement up the hierarchy for both types of workers, but former business owners are promoted more frequently than the workers who were never business owners.

Entry

We begin by analyzing the job assignment at entry through the estimation of a (pooled) probit in order to determine if the differences observed between the two types of workers – with and without business ownership experience – are reflected in the estimates on past experience, controlling for the remaining individual attributes and the characteristics of the firm.

Table 2 presents the estimation results for job assignment at entry. The linear effect of business ownership experience on the probability of assignment to the top three hierarchical levels (13.2 percent) is considerably higher than the corresponding effect of wage employee experience (1.5 percent). The partial effect is more pronounced for medium firms. For larger firms, the magnitude of the coefficients of business ownership experience and wage employee experience is almost the same. The quadratic term does not change this relative magnitude. These results strongly suggest that business ownership experience is more valued at the moment of hiring than prior work experience, regardless of the hiring firm's size.

Promotions

In the previous section it became clear that former business owners are more likely to be assigned to higher levels in the firms' hierarchies at the time of hiring than wage employees of comparable characteristics. In this context, one plausible question arises: once entering a firm, do former business owners progress faster up the hierarchy? Results (not reported here but available upon request) show that former business owners spend less time at each hierarchical level than individuals who were always wage employees, except for micro and small firms, for the intermediary manager level. It can also be said that, for former business owners, the larger the firm, the shorter the time spent in the same hierarchical level. While for small- and micro-firms the differences are insignificant, in large firms, former business owners take less time to move from intermediary to top manager. These pattern fits into the concept of promotion 'fast tracks' in larger firms: those individuals who are promoted sooner are more likely to be promoted sooner again (Baker et al., 1994a; Ariga et al., 1999; and Seltzer and Merrett, 2000).

It is important to check whether the pattern of promotions identified above is particularly significant for the top three hierarchical levels (where supervisory/coordination abilities are likely to be of greater importance). **Table 3** presents probit estimates for the probability of being promoted to the top-three hierarchical levels (supervisors, intermediate and top managers) from non-managerial levels. The estimations provide evidence of the differences observed between the partial effect of past experience as former business owner and as wage employee. The dependent binary variable is equal to one if the worker is promoted from non-managerial/supervisory hierarchical levels to the top three levels, and zero otherwise. The estimation results show that one year of past business ownership experience holds a higher effect on the probability of being promoted to the top levels of the hierarchy than one year of past experience as wage employee. As firm size increases, the probability of a former business owner being promoted to a managerial position decreases, but is always superior to the probability of a wage employee being promoted to a managerial position.

EVIDENCE ON EARNINGS

Individual earnings are compared using hourly wages (while in wage employment) over the period 1995-2003 as the variable of interest. We investigate whether experience as a business owner (including the necessary skills to start a business and the skills acquired during business ownership) has a significant impact on the individuals' labor market earnings while wage employees. Years of experience as a business owner and as a wage employee are included as explanatory variables. The coefficients of experience are used to determine the value of the two types of human capital. Other explanatory variables include individual characteristics (education and tenure); hiring firm characteristics (size, industry, and region); and also the hierarchical levels.

Empirical Specification

We specify a panel data model of wage determination as

$$\log(w_{ijt}) = x_{ijt}\beta + z_{ijt}\delta + v_{ijt} \quad (1)$$

where i indexes individual, j indexes firm, and t indexes time period; w_{ijt} is the hourly wage received by individual i in period t when employed in firm j ; x_{ij} is a vector of individual characteristics including education (three dummy variables), tenure (and its squared term), years of accumulated experience as a business owner (and its squared term), and years of accumulated experience as a wage-worker (and its squared term); z_{ij} is a vector of characteristics of the firm employing individual i , including size, industry, administrative region, and also hierarchical levels; and v_{ijt} is the error term.

Equation (1) can be estimated by a fixed effects model as

$$\log(w_{ijt}) = x_{ijt}\beta + z_{ijt}\delta + \alpha_i + \gamma_j + u_{ijt} \quad (2)$$

Earnings at Entry

This section introduces wage equations at the moment of entry. Only workers with one year of tenure are included in the regressions. The advantage of estimating wages at entry is that the results are not affected by tenure, but only by the worker-firm match at the moment of hiring.

Table 4 displays the results for the estimation of wage equations at the hiring year. The statistically significant variables associated with the accumulation of human capital have a positive effect on entry wages. Moreover, experience as business owner and experience as employee show decreasing returns, as the coefficients on the quadratic terms are generally negative. Considering both individual and firm characteristics at the moment of entry, employers seem to value business ownership less than wage employment experience, thus penalizing entrepreneurial experience with a lower wage premium. Ex-entrepreneurs see their wage increased by about 2.3 percent for every additional year of entrepreneurial experience, while every additional year of previous experience as an employee increases wages by 4.7 percent, though the negative quadratic term is higher.

When information about hierarchical levels is added, the linear coefficient of experience as an entrepreneur becomes negative, but not significant. However, we know that ex-entrepreneurs have a higher probability of being assigned to higher hierarchical levels at entry. The evidence seems to show that individuals with entrepreneurial experience capture higher earnings at entry not by a direct reward to that same experience, but rather by being hired to higher places in the hierarchy.

Rewards to Business Ownership Experience

In order to understand the effect of business ownership experience on wages, this section presents wage equations for the period 1995-2003 for all individuals (without any restriction on tenure). **Table 5** presents wage regressions comparing the explanatory power of human capital variables and level dummy variables. With this specification we capture the average effects of the regressors. Column 1 presents a pooled OLS estimation and as with a typical wage regression, the variables associated with the accumulation of human capital have a positive, statistically significant effect on wages. Moreover, tenure, experience as business owner, and experience as employee show decreasing returns, as the coefficients of the quadratic terms are negative.

The regression in column 2 includes also information about employees' hierarchical levels. In this regression, wages decrease by 2.3 percent for every additional year of previous experience as business owner. There is an increase of about 1.6 percent for every additional year of previous experience as an employee. These results show that the increase in wage associated with one more year of experience as a business owner is less than would be achieved if that additional year was spent in wage employment. Therefore, at first glance, evidence seems to confirm the idea that past experience as a business owner may be associated with a penalty, or a stigma of failure. This would, however, be at odds with the results concerning entry levels and promotions.

Rewards Accounting for Worker-firm Fixed Effects

The focus of this section is on fixed effects estimation, given the panel of individuals and firms, which allows us to account for individual and firm unobserved heterogeneity, as presented in equation (2). **Table 6** shows results for the estimation of wage equations with the worker-firm fixed effects specification. In this regression, the identification of the coefficients is only possible by the variation of the individual characteristics under consideration within a spell in a specific firm. Focusing on the results of column 2, employers seem to value entrepreneurial experience higher than wage employment experience, thus rewarding ex-entrepreneurs with a wage premium. This is an important result, since previous studies of this topic in the literature (who have found generally opposite effects) have taken into account variables concerning tenure and human capital indicators, but left out firm-level variables and, therefore, the specific worker-firm match.

CONCLUDING REMARKS

This study examines the effect of business ownership experience on careers and earnings in firms, compared with wage employment experience. We look at the moment of entry and at career and wage progression within firms for individuals who were business owners for at least one year and for individuals who are never business owners. The results suggest that there are significant differences in career mobility between former business owners and individuals who were always wage employees. Former business owners have a greater probability of entering a firm at a high job level than other individuals and progress faster up the job ladder. Moreover, while the direct effect of business ownership experience on wages does not seem to be higher than the effect of wage employment experience, former business owners capture a wage premium through better career prospects, as they are more concentrated at the top of the hierarchy and hold lower tenure in between promotions. This suggests that even if former business owners may receive lower wages than individuals occupying the same hierarchical position who have no entrepreneurial experience, the labor market rewards former business owners with higher hierarchical positions, leading to an overall earnings premium.

One explanation for these results is that ex-business owners may possess a kind of task-specific human capital (Gibbons and Waldman, 2004; 2006). In particular, entrepreneurial experience may allow individuals to accumulate greater experience in organizing, supervising, coordinating and planning activities. Firms may use entrepreneurial experience as an outside signal about the workers' ability (Waldman, 1984; Bernhardt, 1995) to perform in higher hierarchical levels, and thus hire former business owners to higher level jobs. The higher the job level a worker is assigned to, the more likely he is to acquire more supervisory/coordination ability. If this ability is an important requirement for career progress, then ex-business owners, being more likely to have initially been assigned to a higher job level, should also progress faster up the job ladder. This effect is akin to the cohort effect highlighted by Gibbons and Waldman (2006).

Results also suggest that human capital and imperfect information play the main role in generating a labor market premium for entrepreneurial experience. The fact that former business owners possess an observable characteristic that leads them to be hired to higher job levels (regardless of firm size, although the effect is stronger in small firms) provides them with an important advantage which is amplified by the fact that such assignment increases the amount of task-specific human capital required to progress up the job ladder. Even though wages increase with firm size (a common result in the literature), most former business owners are hired by micro and small firms, suggesting that scale of operations is not a central determinant of the labor market premium awarded to former business owners.

Further work is necessary to address some unanswered questions. One issue regards success in entrepreneurship. This research does not distinguish between ex-entrepreneurs who closed their business due to lack of financial viability, and those who sold or closed successful businesses. Results suggest that the acquisition of the kind of task-specific human capital (or other observable characteristic) required by firms does not seem to depend on entrepreneurial success. However, performance in wage employment may differ between successful and unsuccessful ex-entrepreneurs. Also, we have seen that micro and small firms hire the majority of ex-entrepreneurs. This suggests that large and medium firms may value entrepreneurial experience less when compared with, for instance, general human capital acquired in formal education. An obvious development would be to examine which manufacturing and service sectors hire the majority of ex-entrepreneurs, and whether ex-entrepreneurs are hired by firms in the same sectors where they developed their entrepreneurial activity. Such work would shed light on the interaction between entrepreneurial experience and industry-specific experience as sources of human capital.

CONTACT: Miguel T. Preto; miguel.preto@dem.ist.utl.pt; (T): +351-218-417-787; (F): +351-218-496-156; IN+, Instituto Superior Técnico, Av. Rovisco Pais, 1049-001 Lisbon – Portugal.

REFERENCES

- Ariga, K., Ohkusa, Y. & Brunello, G. (1999). Fast track: is it in the genes? The promotion policy of a large Japanese firm. *Journal of Economic Behavior & Organization* 38, no. 4: 385–402.
- Baker, G., Gibbs, M. & Holmstrom, B. (1994a). The internal economics of the firm: evidence from personnel data. *Quarterly Journal of Economics* 109, no. 4: 881–919.
- Baker, G., Gibbs, M. & Holmstrom, B. (1994b). The wage policy of a firm. *Quarterly Journal of Economics* 109, no. 4: 921–55.
- Becker, G. S. (1975). *Human capital*. 2nd edition. New York: National Bureau of Economic Research (first edition 1964).
- Becker, G. S. (1962). Investment in human capital: A theoretical analysis. *Journal of Political Economy* 70, no. 5: 9–49.
- Becker, G. S., & Murphy, K. M. (1992). The division of labor, coordination costs, and knowledge. *Quarterly Journal of Economics* 57, no. 4: 1137–60.
- Bernhardt, D. (1995). Strategic promotion and compensation. *Review of Economic Studies* 62, no. 2: 315–39.
- Bruce, D., & Schuetze, H J. (2004). The labor market consequences of experience in self-employment. *Labour Economics* 11, no. 5: 575–98.
- Evans, D. S., & Leighton, L. S. (1989). Some empirical aspects of entrepreneurship. *American Economic Review* 79, no. 3: 519–35.
- Gibbons, R., & Waldman, M. (2006). Enriching a theory of wage and promotion dynamics inside firms. *Journal of Labor Economics* 24, no. 1: 59–107.

- Gibbons, R., & Waldman, M. (2004). Task-specific human capital. *American Economic Review* 94, no. 2: 203–07.
- Gibbons, R., & Waldman, M. (1999). A theory of wage and promotion dynamics inside firms. *Quarterly Journal of Economics* 114, no. 4: 1321–58.
- Hamilton, B. H. (2000). Does entrepreneurship pay? An empirical analysis of the returns to self-employment. *Journal of Political Economy* 108, no. 3: 604–31.
- Hyytinen, A., & Rouvinen, P. (2008). The labour market consequences of self-employment spells: European evidence. *Labour Economics* 15, no. 2: 246–71.
- Jovanovic, B. (1984). Matching, turnover, and unemployment. *Journal of Political Economy* 92, no. 1: 108–22.
- Jovanovic, B. (1982). Selection and the evolution of industry. *Econometrica* 50, no. 3: 649–70.
- Jovanovic, B. (1979). Job matching and the theory of turnover. *Journal of Political Economy* 87, no. 5: 972–90.
- Kaldor, N. (1934). The equilibrium of the firm. *Economic Journal*, 44, no. 173: 60–76.
- Lucas, R. E. (1978). On the size distribution of business firms. *Bell Journal of Economics* 9, no. 2: 508–23.
- Marshall, A. (1930). *Principles of Economics*. London: Macmillan and Co. (first edition 1890).
- Mayer, T. (1960). The distribution of ability and earnings. *Review of Economics and Statistics* 2, no. 2: 189–95.
- Mincer, J. (1974). *Schooling, experience, and earnings*. New York: Columbia University Press.
- Rees, H., & Shah, A. (1986). An empirical analysis of self-employment in the U.K. *Journal of Applied Econometrics* 1, no. 1: 101–08.
- Rosen, S. (1981). The economics of superstars. *American Economic Review* 71, no. 5: 845–58.
- Roy, A. D. (1951). Some thoughts on the distribution of earnings. *Oxford Economic Papers* 3, no. 2: 235–46.
- Sattinger, M. (1993). Assignment models of the distribution of earnings. *Journal of Economic Literature* 31, no. 2: 831–80.
- Say, J.-B. (1971). *A treatise on political economy or the production, distribution and consumption of wealth*. New York: A.M. Kelley Publishers, (first edition 1803).
- Seltzer, A., & Merrett, D. (2000). Personnel policies at the Union Bank of Australia: Evidence from the 1888-1900 entry cohorts. *Journal of Labor Economics* 18, no. 4: 573–613.
- Spence, A. M. (1975). The economics of internal organization: An introduction. *Bell Journal of Economics* 6, no. 1: 163–72.
- Spence, A. M. (1973). Job market signaling. *Quarterly Journal of Economics* 87, no. 3: 355–74.
- Spurr, S. J. (1987). How the market solves an assignment problem: The matching of lawyers with legal claims. *Journal of Labor Economics* 5, no. 4: 502–32.
- Stiglitz, J. (1975). The theory of screening education and the distribution of income. *American Economic Review* 65, no. 3: 283–300.
- Taylor, M. P. (1996). Earnings, independence or unemployment: Why become self-employed? *Oxford Bulletin of Economics and Statistics* 58, no. 2: 253–66.
- Tinbergen, J. (1951). Some remarks on the distribution of labour incomes. *International Economic Papers* 1: 195–207.
- Topel, R. H. (1991). Specific capital, mobility, and wages: Wages rise with job seniority. *Journal of Political Economy* 99, no. 1: 145–76.
- Waldman, M. (1984). Job assignments, signaling, and efficiency. *Rand Journal of Economics* 15, no. 2: 255–67.
- Williams, D. R. (2000). Consequences of self-employment for women and men in the United States. *Labour Economics* 7, no. 5: 665–87.
- Williamson, O. E. (1967). Hierarchical control and optimum firm size. *The Journal of Political Economy* 75, no. 2: 123–38.

Table 1: Descriptive statistics, 1995-2003

Variables	All workers	Former business owners	Wage employees
Wage per hour (logarithm)	1.389 [0.546]	1.439 [0.606]	1.388 [0.545]
Age	30.176 [5.336]	33.073 [4.459]	30.138 [5.336]
Tenure	7.021 [5.108]	5.913 [5.750]	7.035 [5.111]
9-years education	0.166 [0.372]	0.187 [0.390]	0.166 [0.372]
Secondary education	0.167 [0.373]	0.191 [0.393]	0.166 [0.372]
College education	0.032 [0.177]	0.064 [0.244]	0.032 [0.176]
Experience as business owner	1.032 [0.380]	3.495 [2.269]	-- --
Experience as employee	12.134 [6.318]	13.074 [6.488]	12.122 [6.315]
Firm size (logarithm)	4.205 [2.226]	3.164 [1.871]	4.218 [2.227]
N	2,414,623	30,904	2,383,719

Notes: Standard deviation between brackets underneath the mean. Hourly wage is calculated by dividing the sum of base wage with regular payments by the number of monthly paid hours, deflated using the *Consumer Price Index*. Tenure, experience as business owner, and potential experience as employee are measured in years. 9-years of education, secondary education, and college education are defined as dummy variables.

Table 2: Probit for job assignment at entry (marginal effects)

Variables	All firms	Micro and small firms	Medium firms	Large firms
	(1)	(2)	(3)	(4)
9-years education	0.0643*** [0.0022]	0.0701*** [0.0029]	0.0639*** [0.0042]	0.0278*** [0.0053]
Secondary education	0.1963*** [0.0033]	0.1968*** [0.0044]	0.2151*** [0.0063]	0.1383*** [0.0073]
College education	0.7956*** [0.0038]	0.7707*** [0.0061]	0.8311*** [0.0055]	0.7724*** [0.0114]
Experience as business owner	0.1315*** [0.0031]	0.1497*** [0.0037]	0.0285*** [0.0043]	0.0146** [0.0065]
Experience as business owner ² x 10 ⁻²	-0.7982*** [0.0416]	-0.9139*** [0.0486]	-0.1057** [0.0516]	-0.0379 [0.0678]
Experience as employee	0.0148*** [0.0004]	0.0138*** [0.0005]	0.0150*** [0.0007]	0.0146*** [0.0010]
Experience as employee ² x 10 ⁻²	-0.0184*** [0.0011]	-0.0193*** [0.0015]	-0.0132*** [0.0020]	-0.0128*** [0.0028]
Firm size (log)	-0.0077*** [0.0003]	-0.0206*** [0.0008]	0.0026* [0.0016]	-0.0143*** [0.0020]
Year dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Region dummies	Yes	Yes	Yes	Yes
Observations	322,132	198,585	86,128	37,416
Wald χ -squared	31408.50	18851.10	10457.21	4629.46
Pseudo R-squared	0.244	0.282	0.231	0.213

Notes: Dependent binary variable equals one if the worker is assigned to one of the top three hierarchical levels, and zero otherwise, at the moment of hiring. Experience as business owner, and experience as employee are measured in years. 9-years of education, secondary education, and college education are defined as dummy variables. Industry dummies are defined for in two-letter ISIC classification. Firm size is divided into three classes: micro and small firms (less than 50 employees); medium firms (between 50 and 499 employees); large firms (more than or equal to 500 employees). Standard errors are in brackets. * Significant at 10%; ** significant at 5%; *** significant at 1%.

Table 3: Probit for promotion (marginal effects)

Variables	All firms	Micro and small firms	Medium firms	Large firms
	(1)	(2)	(3)	(4)
Tenure	0.0012*** [0.0001]	0.0007*** [0.0001]	0.0013*** [0.0001]	0.0024*** [0.0002]
Tenure ² x 10 ⁻²	-0.0017*** [0.0004]	-0.0003 [0.0004]	-0.0020*** [0.0007]	-0.0064*** [0.0010]
9-years education	0.0168*** [0.0005]	0.0152*** [0.0007]	0.0177*** [0.0010]	0.0165*** [0.0011]
Secondary education	0.0428*** [0.0008]	0.0365*** [0.0011]	0.0459*** [0.0015]	0.0417*** [0.0017]
College education	0.2352*** [0.0055]	0.2449*** [0.0101]	0.2956*** [0.0103]	0.1798*** [0.0093]
Experience as business owner	0.0185*** [0.0006]	0.0179*** [0.0006]	0.0056*** [0.0016]	0.0070** [0.0028]
Experience as business owner ² x 10 ⁻²	-0.1070*** [0.0082]	-0.1063*** [0.0082]	-0.0461* [0.0250]	-0.0674 [0.0471]
Experience as employee	0.0009*** [0.0001]	0.0009*** [0.0001]	0.0008*** [0.0001]	0.0003* [0.0002]
Experience as employee ² x 10 ⁻²	0.0000 [0.0002]	-0.0011*** [0.0003]	0.0009* [0.0005]	0.0048*** [0.0007]
Firm size (log)	0.0001 [0.0001]	0.0018*** [0.0002]	-0.0012*** [0.0003]	-0.0017*** [0.0003]
Year dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Region dummies	Yes	Yes	Yes	Yes
Observations	1,418,933	729,745	426,565	262,549
Wald χ^2 -squared	22819.08	12885.67	7877.73	4167.22
Pseudo R-squared	0.085	0.113	0.084	0.068

Notes: Dependent binary variable is equal to one if the worker is promoted from non-supervision hierarchical level to supervision hierarchical level, and zero otherwise. Tenure, experience as business owner, and experience as employee are measured in years. 9-years of education, secondary education, and college education are defined as dummy variables. Industry dummies are defined for in two-letter ISIC classification. Firm size is divided into three classes: micro and small firms (less than 50 employees); medium firms (between 50 and 499 employees); large firms (more than or equal to 500 employees). Standard errors are in brackets. * Significant at 10%; ** significant at 5%; *** significant at 1%.

Table 4: Wage equations at entry – pooled OLS

Variables	(1)	(2)
9-years education	0.1286*** [0.0022]	0.0752*** [0.0020]
Secondary education	0.3565*** [0.0031]	0.1948*** [0.0028]
College education	1.1500*** [0.0071]	0.5197*** [0.0076]
Experience as business owner	0.0225*** [0.0040]	-0.0042 [0.0034]
Experience as business owner ² x 10 ⁻²	-0.0587 [0.0486]	0.0091 [0.0393]
Experience as employee	0.0467*** [0.0006]	0.0269*** [0.0005]
Experience as employee ² x 10 ⁻²	-0.0872*** [0.0017]	-0.0531*** [0.0015]
Firm size (log)	0.0436*** [0.0005]	0.0497*** [0.0004]
Hierarchical level		
2: non-skilled professionals		0.0134*** [0.0025]
3: semi-skilled professionals		0.1042*** [0.0026]
4: skilled professionals		0.2215*** [0.0022]
5: higher-skilled professionals		0.5016*** [0.0049]
6: supervisors and team leaders		0.5101*** [0.0060]
7: intermediary managers		0.7548*** [0.0073]
8: top managers		0.9877*** [0.0084]
Intercept	0.2295*** [0.0077]	0.3495*** [0.0071]
Year dummies	Yes	Yes
Industry dummies	Yes	Yes
Region dummies	Yes	Yes
Observations	295,408	287,772
F test	2404.73	3418.18
R-squared	0.375	0.490

Notes: Dependent variable is the logarithm of hourly wage in the year of hiring. Experience as business owner, and experience as employee are measured in years. 9-years of education, secondary education, and college education are defined as dummy variables. Industry dummies are defined for in two-letter ISIC classification. Apprentices (level 1) are the comparison group in the hierarchical level dummies. Robust standard errors are in brackets. Significant at 10%; ** significant at 5%; *** significant at 1%.

Table 5: Wage equations – pooled OLS, 1995-2003

Variables	(1)	(2)
Tenure	0.0319*** [0.0002]	0.0186*** [0.0002]
Tenure ² x 10 ⁻²	-0.0475*** [0.0012]	-0.0274*** [0.0011]
9-years education	0.1754*** [0.0014]	0.1137*** [0.0012]
Secondary education	0.4059*** [0.0019]	0.2435*** [0.0016]
College education	1.1403*** [0.0037]	0.5421*** [0.0035]
Experience as business owner	0.0311*** [0.0029]	-0.0226*** [0.0026]
Experience as business owner ² x 10 ⁻²	-0.0888** [0.0367]	0.1925*** [0.0315]
Experience as employee	0.0254*** [0.0003]	0.0162*** [0.0002]
Experience as employee ² x 10 ⁻²	-0.0205*** [0.0010]	-0.0194*** [0.0008]
Firm size (log)	0.0589*** [0.0003]	0.0572*** [0.0002]
Hierarchical level		
2: non-skilled professionals		0.0028* [0.0015]
3: semi-skilled professionals		0.1055*** [0.0014]
4: skilled professionals		0.2088*** [0.0013]
5: higher-skilled professionals		0.4643*** [0.0023]
6: supervisors and team leaders		0.4733*** [0.0025]
7: intermediary managers		0.7282*** [0.0033]
8: top managers		0.9741*** [0.0038]
Intercept	0.2933*** [0.0045]	0.3739*** [0.0039]
Year dummies	Yes	Yes
Industry dummies	Yes	Yes
Region dummies	Yes	Yes
Observations	2,414,602	2,366,191
F test	14158.56	19659.73
R-squared	0.514	0.613

Notes: Dependent variable is the logarithm of hourly wage. Experience as business owner, and experience as employee are measured in years. 9-years of education, secondary education, and college education are defined as dummy variables. Industry dummies are defined for in two-letter ISIC classification. Apprentices (level 1) are the comparison group in the hierarchical level dummies. Robust standard errors are in brackets. Significant at 10%; ** significant at 5%; *** significant at 1%.

Table 6: Wage equations – worker-firm fixed effects, 1995-2003

Variables	(1)	(2)
Tenure	0.0155*** [0.0028]	0.0117*** [0.0027]
Tenure ² x 10 ⁻²	-0.0473*** [0.0010]	-0.0409*** [0.0010]
9-years education	-0.0011 [0.0019]	-0.0016 [0.0019]
Secondary education	0.0017 [0.0029]	0.0017 [0.0029]
College education	0.0394*** [0.0049]	0.0350*** [0.0049]
Experience as business owner	0.0405*** [0.0116]	0.0325*** [0.0123]
Experience as business owner ² x 10 ⁻²	-0.0648 [0.2608]	0.0986 [0.3044]
Experience as employee	-0.0046*** [0.0005]	-0.0043*** [0.0005]
Experience as employee ² x 10 ⁻²	0.0164*** [0.0013]	0.0145*** [0.0014]
Firm size (log)	0.0359*** [0.0009]	0.0336*** [0.0009]
Hierarchical level		
2: non-skilled professionals		0.0432*** [0.0018]
3: semi-skilled professionals		0.0696*** [0.0015]
4: skilled professionals		0.0957*** [0.0014]
5: higher-skilled professionals		0.1336*** [0.0019]
6: supervisors and team leaders		0.1718*** [0.0022]
7: intermediary managers		0.1756*** [0.0024]
8: top managers		0.2198*** [0.0030]
Intercept	1.0824*** [0.0129]	1.0173*** [0.0122]
Year dummies	Yes	Yes
Industry dummies	Yes	Yes
Region dummies	Yes	Yes
Observations (number of worker-firm)	2,414,602 (757,081)	2,366,191 (748,257)
F test	4141.88	3790.7
R-squared	0.210	0.219

Notes: Dependent variable is the logarithm of hourly wage. Experience as business owner, and experience as employee are measured in years. 9-years of education, secondary education, and college education are defined as dummy variables. Industry dummies are defined for in two-letter ISIC classification. Apprentices (level 1) are the comparison group in the hierarchical level dummies. Robust standard errors are in brackets. Significant at 10%; ** significant at 5%; *** significant at 1%.