Human capital revisited: The role of experience and education when controlling for performance and cognitive skills[☆]

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Abstract

Human capital theory predicts that differences in wages arise because of differences in human capital. The latter can be accumulated in two ways: through experience and education. Using matched firm–worker data for the Ghanaian Manufacturing sector we first test whether changes in wages over the life cycle reflect changes in performance, following the methodology of Medoff and Abraham [Medoff, J.L., & Abraham, K.G. (1980). Experience, Performance, and Earnings. Quarterly Journal of Economics, 95(4), 703-736; Medoff, J.L., & Abraham, K.G. (1981). Are Those Paid More Really More Productive? The Case of Experience. Journal of Human Resources, 16(2), 186–216]. We find that wage–seniority profiles are independent of performance – a result that holds when controlling for firm fixed effects. Extending the analysis, we include a control for on-the-job-training and find that it does not attenuate the seniority profile, which is also at odds with human capital theory. We do find however that firm characteristics play an important role. Wage–seniority profiles are steeper in large firms, but performance profiles are not, suggesting that the results from Medoff and Abraham are specific to large firms. We then assess the role of education. Our results confirm that education is important for the allocation to job levels. Using data on cognitive ability, we also find that the effect of education on wages is at least partially because it signals cognitive ability. We also find evidence that the returns to education are not related to performance, while the returns to cognitive ability are.
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1. Introduction

Human capital theory argues that changes in wages arise because of differences in human capital. Assuming that changes in wages reflect changes in productivity, it claims that accumulation of human capital increases productivity, and thus wages. Human capital is accumulated in two ways: through experience and education. More experienced and more educated workers are therefore expected to earn more (see for example Becker, 1964; Mincer, 1974).

Empirical evidence confirms that there is a positive relationship between wages and experience, and between wages and education[1], but, as is well known, these may by explained by alternative theories.[2] Regarding the positive relationship between wages and experience, an alternative view is that changes in earnings are unrelated to changes in productivity, but arise from institutional factors, like explicit or implicit contracts (see for example Lazear, 1979; Doeringer and Piore, 1971; Azariadis, 1979). In the case of education, an alternative view is that schooling does not necessarily increase human capital but that it works as a signalling device, implying that students with higher cognitive ability reach higher levels of education (Spence, 1973).

How to test between human capital theory and these alternative views? Regarding the effect of experience, to test accurately whether changes in wages reflect changes in productivity over the life cycle, one needs data on earnings and performance at the individual level. Data on individual productivity is, however, still uncommon, as a measure of individual output is costly to collect and also difficult to apply to most production processes.[3] However, an alternative approach, often used in personnel psychology, is to measure individual performance through the assessment of the worker's supervisor (see Sacket et al., 1988). This is the approach followed by Medoff and

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[1] Some authors doubt that the positive relationship between wages and experience has been shown beyond reasonable doubt (see for instance Felli and Harris, 1996), while others argue that the relationship is spurious (see for example Abraham and Farber, 1987 and Altonji and Shakoto, 1987). However, as underlined by Flabbi and Ichino (2001), even in the most conservative case, the 'true' effect of experience on wages is estimated to be 11% per year. In this paper we therefore accept that the positive relationship holds, as this is also the case for our data. Similarly, we accept that there are positive returns to education, as this is well illustrated to hold in many settings (see Psacharopoulos and Patrinos, 2004), including in most African countries (see for instance Appleton et al., 1999), and it is also confirmed for our data.

[2] For clarity of exposure, we present polarized views, considering only the two 'extremes'.

[3] Although there is some innovative work trying to measure output at the individual level-see for instance Bandiera et al., 2006, who analyse the effect of incentives schemes on individual output for fruit pickers-most studies analyse productivity profiles on a more aggregate level, namely for groups of workers or indeed for the firm's entire workforce. A common approach is to predict productivity for each worker using a firm level production function [see for example Hellerstein and Neumark (1993), Hellerstein and Neumark (1993), Bigsten et al. (2000), Jones (2001)], but the obtained variable is the average for a group of workers. Because one can only enter a limited number of categories in the production function it becomes also complicated to simultaneously analyse the effect for different-overlapping-characteristics. While taking the average may reduce the measurement error, it also suppresses heterogeneity, reducing variation across firms and potentially leading to results that are wrongly significant in a second stage regression of productivity on individual characteristics. A second method often used in the absence of a direct measure of individual productivity is to include the average of individual workers' characteristics in a log linear firm level production function [see Hall and Jones (1999), Bils and Klenow (2000), Bigsten et al. (2000), Soderbom et al. (2003), for example for years of schooling.] However, the obtained results reflect the effect of the mean years of schooling on firm level productivity, and to compare this with the effect of schooling on wages is ambiguous. The first reflects the average effect of a characteristic of the entire labour force, while the second reflects the average effect of an individual characteristic. The two are not necessarily the same as the first can be generated from different distributions and depends heavily on the composition of the labour force and on whether a characteristic has external effects beyond the individual. (Certain jobs do not require literacy, but only access to literate people. In this case it is the presence of an educated worker that has an effect on firm productivity; and the effect of his education goes beyond the effect on his own productivity. Basu and Foster, 1998 and Valenti, 2001 show that such externalities exist in a household setting.)