



The value of experience in research



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ABSTRACT

This article examines how different factors influence the number of times articles in the five most recognized transportation journals are cited. The effects of most of the explanatory variables indicating the characteristics of articles, authors and journals correspond with earlier studies of citation counts. Special focus in this study is placed on estimating the relationship between researchers' human capital or skills and their experience. For the purpose of this study, human capital is defined as a scientist's ability to conduct research at the frontier of his or her discipline and is measured by how frequently his or her research is cited. Experience is measured by counting the number of their previous scientific articles. Using negative binomial regression, we find that experience offers a statistically significant positive effect on the human capital of scientists. However, this effect diminishes rapidly with the level of experience. This suggests that young researchers relatively quickly learn the skills and gain the knowledge necessary to produce high-quality research.

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1. Introduction

Human capital is the accumulated skill and knowledge of human beings (Bade & Parkin, 2011) and an important factor in individual, firm and national economic growth (Blundell, Dearden, Meghir, & Sianesi, 1999). This is because individuals with more or higher quality human capital achieve higher performance (Dimov & Shepherd, 2005) and produce higher quality goods (Stokey, 1991). In Norway, for example, estimates from National Statistics and The Ministry of Finance suggest that the present value of human capital amounts to between 71% and 81% of national wealth (Flåten, 2013).

Human capital is similar to physical means of production (Becker, 1964); as in the case of investments in physical means, human capital investments can improve output. The most important investments to be made in human capital are education and on-the-job training (Becker, 1964). The majority of students experience negative net earnings while in school. This can be considered the cost of investing in human capital through schooling, and the monetary returns on such investments have been found to be significant at each stage of the educational process (Blundell, Dearden, & Sianesi, 2005). Training also has an important effect on the relationship between earnings and age, and because the income of trained individuals tends to lie below marginal productivity during training and becomes equal afterwards, these individuals' income increases sharply at the end of their training period before levelling off (Becker, 1964).

As far as researchers are concerned, the total number of times their papers have been cited is a good proxy for their human capital; i.e., their ability to do quality research at the frontiers of their discipline (Diamond, 1986). Such an operational measure of a scientist's skills or human capital has gradually become more important because the number of citations is now frequently examined when decisions are made with regard to funding, promotion, and career advancement in academia

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(Dries, Pepermans, & Carlier, 2008). Moreover, the number of citations is commonly used when evaluating journals, departments and research institutions (see Bornmann & Daniel, 2008). Thus, the widespread use of citation counts at all levels in academia indicates that scientists and decision-makers perceive that those institutions in which scientists in total have many citations are also institutions with plenty of human capital.

This article aims to analyze how different factors influence the number of times an article is being cited using data from the five most recognized transportation journals. We look at the articles published in these journals between 2000 and 2005 and count how many citations each of them received in late 2012. This paper extends the work done by Hanssen and Jørgensen (2014) in two key ways. First, it takes into account the authors' total experience, or on-the-job-training, before they wrote the article in question, operationalized by way of the total number of articles they have published previously in peer reviewed scientific journals. Second, the total number of times their previous works has been cited is introduced as an explanatory variable indicating the authors' skills or total human capital at the time they published the article in question. As mentioned previously, the number of times an author is cited signifies his or her ability to conduct quality research at the frontiers of his or her discipline. Summing up, compared with Hanssen and Jørgensen (2014) special focus is placed here on analysing how authors' experience and skills both influence the number of citations their articles will achieve.

The remainder of this article is organized as follows. Section 2 presents literature on human capital and the authors' hypotheses on the influence of authors' experience and skills on citation counts. In Section 3, a review of the literature on factors influencing citation counts is presented along with our hypotheses related to the influence of selected author, article and journal characteristics on citation counts. The methodology applied is presented in Section 4, followed by the estimation results in Section 5. Finally, in Section 6, the findings are discussed and summarized.

2. The influence of author experience and author skills on citation count

The relationship between productivity and experience has been investigated in sectors as diverse as baseball (Krohn, 1983) and venture capital firms (Dimov & Shepherd, 2005). In science the relationship has been addressed using age as a proxy for experience (Bonaccorsi & Daraio, 2003). However, past performance is a much better predictor of scientific productivity than age (Stroebe, 2010). Thus, researchers who are productive at a young age tend to be more productive when they are older, as opposed to researchers who are less productive at a young age. For this reason, instead of age, this article uses the number of previous publications to provide a measure of experience. Based on the above, experience can be considered an investment in human capital as such, offering increased productivity through higher citation rates. However, there are diminishing returns to experience (Berman, Down, & Hill, 2002; Loughran, Nguyen, Piquero, & Fagan, 2013), meaning that an additional unit of experience yields less and less additional human capital.

Whilst the number of previous publications by authors is an indicator of the authors' experience, their total number of previous citations describes their skills to a larger extent. The argument for including the number of previous citations as an explanatory variable is twofold. First, better known scientists tend to receive more credit than less well-known scientists, even if their work is similar (Merton, 1968). Frequently cited researchers generally have higher status than researchers who are cited less frequently. Because status influences perceptions of quality, those with high status often receive favourable assessments (Azoulay, Stuart, & Wang, 2014), which in turn can increase their odds of being cited. Higher status does not only influence perceptions of quality. Scientists with high status are also more likely to attract tangible resources, such as research funding and outstanding graduate students, which can result in research of higher quality (Merton, 1968). Second, many citations indicate that previous articles written by the author(s) have been at the frontier of research, i.e., of high quality. However, empirical studies cast doubts on previous number of citations as measure of authors' skills because an article citation record also seems to be affected by factors that are not directly linked to the scientific quality of it, for example its number of words in the title, place in the alphabet of the first author etc. (Hanssen & Jørgensen, 2014). Despite the last caveats, we expect to find a positive association between citation count and the number of previous citations (Stroebe, 2010). Based on the above discussion, we derive the following two hypotheses:

H1. Author experience affects the number of times the article is cited, in that the relationship between the numbers of times an article is cited and the author's total number of previous publications increases concavely.

H2. Author skills affect the number of times the article is cited, in that articles written by authors who have been cited many times previously are more frequently cited.

3. Other factors associated with citation counts

The main objective of this study is to investigate the influence of authors' experience on citation counts. This is done by testing H1 and H2. To isolate the effect of the number of previous publications and citations on citation counts, we control for a set of variables identified in previous research to correlate with citation counts. Broadly speaking, these factors can be related to author characteristics, article characteristics or journal characteristics.

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