Journal of Macroeconomics 31 (2009) 376–393

Contents lists available at ScienceDirect

Journal of Macroeconomics

journal homepage: www.elsevier.com/locate/jmacro

Aggregate returns to social capital: Estimates based on the augmented augmented-Solow model

Hirokazu Ishise [a], Yasuyuki Sawada [b,*]

[a] Department of Economics, Boston University, 270 Bay State Road, Boston, MA 02215, USA
[b] Faculty of Economics, University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-0033, Japan

ARTICLE INFO

Article history:
Received 2 February 2007
Accepted 18 August 2008
Available online 16 September 2008

JEL classification:
E26
O10
O40

Keywords:
Social capital
Economic growth
The augmented-Solow model

ABSTRACT

We extend the augmented-Solow model to estimate the aggregate output elasticity and depreciation rate of social capital that characterize aggregate returns. The estimated output elasticity is approximately 0.1. While social capital positively affects economic growth, the magnitude is much smaller than that of other production inputs. The estimated depreciation rate is at least 10% per annum, which is higher than that of physical capital. The median value of the implied aggregate return of social capital is approximately 19.11% at the global level. In OECD countries, it is likely to be considerably smaller than the individual returns, suggesting the fallacy of composition. While there is no systematic relationship between GDP per capita and returns to physical or human capital, the aggregate returns to social capital seem to be negatively related to the level of development.

1. Introduction

Social capital has been used as a key concept to explain the unobserved heterogeneity in the economic performance of people, communities, and countries (Dasgupta and Serageldin, 2000). In general, social capital is recognized as the informal forms of institutions and organizations that are based on the social relationships, networks, and associations that create shared knowledge, mutual trust, social norms, and unwritten rules (Durlauf and Fafchamps, 2005). The concept of social capital is a combination of these intangible objects; therefore, it has remained elusive by nature since Loury (1977) introduced it into modern social science research and Coleman (1988) popularized it in sociology. What, then, are the aggregate returns to social capital? Is it even possible to quantify these seemingly intangible returns? We aim to answer these questions.

Many reduced-form micro studies have found positive returns to social capital (Durlauf and Fafchamps, 2005; Fafchamps and Minten, 2002). However, as Durlauf and Fafchamps (2005) and Fafchamps (2006) argue, individual returns are often poor predictors of aggregate returns. If social capital enables certain individuals or groups to capture rents at the expense of others, social capital becomes individually remunerative yet socially unproductive.[1] Olson (1982) specified that such examples include the formation of trade unions, political parties, and lobbyist groups. Fafchamps (2006) referred to this situation as the "fallacy of composition". In contrast, social capital can generate positive externalities that are not entirely appropriated by the owners of social capital, because informal institutions, which are subsets of social capital, can supplement underdeveloped market mechanism (Aoki and Hayami, 2001). In this case, individual returns to social capital will underestimate social returns.

* Corresponding author. Tel.: +81 3 5841 5572; fax: +81 3 5841 5521.
E-mail addresses: ishise@bu.edu (H. Ishise), sawada@e.u-tokyo.ac.jp (Y. Sawada).

[1] Social capital may facilitate collusion among group members, which is not socially productive (Fafchamps and Minten, 2002).

0164-0704/$ - see front matter
doi:10.1016/j.jmacro.2008.08.002

Accordingly, private returns to social capital from microlevel social capital studies should not be considered as evidence that social capital is also socially beneficial. An important empirical question pertains to determining whether it is fallacy of composition problems or positive externalities that exist. In order to estimate the aggregate returns to social capital, an independent empirical framework should be designed and carefully implemented.

While the existing macrolevel literature led by Knack and Keefer (1997) and Temple and Johnson (1998) found a positive correlation between social capital and economic growth, there has been no comprehensive study of the macroeconomic effects of social capital – the aggregate returns to social capital or the degree of social capital's contribution to economic growth – within the Solow framework that considers all the econometric issues. We aim to bridge this gap in the existing literature by closely following the empirical strategy of Mankiw et al. (1992) and Nonneman and Vanhoudt (1996). Mankiw et al. (1992) (hereafter, MRW) extended the canonical Solow model by incorporating human capital and estimating the degree of the contributions of both physical and human capital to economic growth. Nonneman and Vanhoudt (1996) augmented the augmented-Solow model of MRW by adding R&D investment so as to quantify the social rate of return for technological knowledge. Our basic strategy is to augment the MRW model by including social capital as an additional production input in order to estimate the output elasticity of social capital. This allows us to quantify the aggregate returns to social capital as compared with other types of capital.[2]

With regard to the selection of appropriate data for social capital, we confine our consideration of social capital to a source of economic development that improves social connectivity through information sharing and mutual communication. In particular, we follow Ostrom (2000), which emphasizes the importance of shared knowledge when defining the concept of social capital. In addition, through a comprehensive survey on social capital, covering both micro-and macro literature, Durlauf and Fafchamps (2005) concluded that mutual communication is one of the most important common components of its different definitions. While it is not straightforward to quantify the total stock of social capital that is defined in this manner, flow investments in social capital should be observed by newspaper readership, phone call frequency, letter and electronic mail exchanges, the number of radio listeners and televiewers, and so on. We adopt a portion of such flow data and apply it to extend and estimate the augmented-Solow model of MRW by including social capital as an additional production input. Contrary to the standard reduced-form growth regression approach to the role of social capital in economic growth,[3] our strategy enables us to estimate the structural parameters associated with aggregate returns to social capital.

To preview our results, three important findings emerge from our empirical analysis. First, the upper bound of the output elasticity of social capital is estimated to be approximately 0.10. While social capital positively affects economic growth, the magnitude of the effect is smaller than that of physical and human capital and labor inputs. Second, the aggregate returns to social capital appear to be almost negligible for OECD countries. Yet, the returns are much higher for developing countries, which suggests that the aggregate effect of social capital is systematically related to the level of development. Third, the depreciation rate of social capital is estimated to be approximately 10% per annum and is considerably higher than that of physical capital. This may result from the fact that social capital is intangible and is, thus, easily eroded by nature unless continuous investment efforts are made.

The remainder of this paper is organized as follows. In the next section, we briefly describe the procedure to augment the augmented-Solow model of MRW. Section 3 explains the data and our choice of variables in order to quantify the concept of social capital. In Section 4, we present the main empirical results of the augmented augmented-Solow model with the new social capital variables. We then consider the relationship between our estimates and those of the existing studies on the role of social capital in economic growth and calculate the aggregate return to social capital. Section 5 proffers a set of robustness tests of our empirical results. In the final section, we discuss the direction of future research.

2. The augmented augmented-Solow model

We extend the MRW model by considering three types of capital input, i.e., physical capital, human capital, and social capital, which are denoted by $K_i(t), i = k, h, s$, respectively, in addition to labor input, $L(t)$ and labor-augmenting technology level, $A(t)$.[4] While we examine more flexible CES production functions and test the constant-returns-to-scale assumption in Section 5, the baseline specification is assumed to have the following constant-returns-to-scale Cobb–Douglas production function with share parameters for physical, human, and social capital, represented by α, β, and γ, respectively:

$$Y(t) = K_k(t)^\alpha K_h(t)^\beta K_s(t)^\gamma (A(t)L(t))^{1-\alpha-\beta-\gamma}, \tag{1}$$

[2] Despite its simplicity, this structural approach is subject to the common problem of the Barro (1991) type regression, which has been criticized, for example, by Quah (1993, 1996), Brock and Durlauf (2001), and Durlauf et al. (2005). It is known that the convergence equation suffers from the problem of the mean reversion, i.e., Galton's fallacy (Quah, 1993). Another problem is that the cross-country analysis contains a maximum of a couple of hundred observations, and all of the countries are inherently heterogenous. Later, we will explore several possible solutions to the heterogeneity problem, including the panel technique of Islam (1995), the sample splitting approach proposed by Hansen (2000), and the use of a more flexible function form, i.e., the constant elasticity of substitution (hereafter, CES) production function (Masanjala and Papageorgiou, 2004). Yet, as pointed out by Durlauf et al. (2005), these solutions require some assumptions on the data generating process. This issue is not specific to growth literature, but general to any type of structural estimations. In other words, we take all the required assumptions as granted in order to estimate the structural parameters.

[3] For example, Knack and Keefer (1997), Temple and Johnson (1998), Helliwell and Putnam (1995), Zak and Knack (2001), Beugelsdijk et al. (2004).

[4] Nonneman and Vanhoudt (1996) develop an augmented version of the augmented-Solow model that incorporates R&D investment. Our model replaces the R&D in their model with social capital. The model can also be regarded as a special case of Bajo-Rubio (2000).